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Analysis of interaction and strategies in Kanji learning using computer assisted language learning (CALL)

Satoko Itoh Van Aacken

University of Wollongong

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ANALYSIS OF INTERACTION AND STRATEGIES IN KANJI LEARNING USING COMPUTER ASSISTED LANGUAGE LEARNING (CALL)

A thesis submitted in fulfilment of the requirements for the award of the degree

DOCTOR OF PHILOSOPHY

from

UNIVERSITY OF WOLLONGONG

by

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School of Modern Languages
2003
I, Satoko Itoh Van Aacken, declare that this thesis, submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the School of Modern Languages, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for qualifications at any other academic institution.

Satoko Itoh Van Aacken

3 November 2003
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ABSTRACT

Kanji learning is demanding, complicated and time-consuming, but it is fundamental for adult learners of Japanese as a foreign language (JFL) acquiring written communication skills in Japanese. This study examines how learners proceduralise kanji knowledge (graphemic, semantic and phonemic representations) with reference to a skill learning model. It also explores the type of kanji learning strategies drawn on by learners, and how these strategies are used. These learning processes are then examined in relation to participants’ performance outcomes.

Following a naturalistic inquiry for the qualitative analysis, empirical data from multiple sources were obtained over two semesters of tertiary level JFL study during which learners interacted with the multimedia CALL program, KanjiSensee (KS), developed for this study. The 17 participants, falling into three groups, represent a typical distribution for JFL beginner classes in Australia: students without any previous learning experience of Japanese (the “no-J” group), students with some learning experience of Japanese as an L2 (target language) (the “yes-J” group), and students having a kanji background in their L1s (first language) (the “yes-K” group). Due to the small number of participants, one should be cautious in generalising from the results. Apparently however, while frequent interaction with KS may activate accurate production supported by self-testing and thorough practice of kanji, it may not always be associated with high performance. Learners’ negative attitudes toward CALL methods may be associated with low outcomes from the viewpoint of strategy use.

The main outcomes of this research suggest that the salient impact of KS is its capacity to promote input enhancement, while text modification on the screen is invaluable for the various needs of individual learners in processing and retaining kanji information. Above all, the study showed that CALL methods and the transferability of strategy and kanji knowledge from L1s affect the choice of strategy use. Irrespective of the learners’ backgrounds and CALL methods, however, the “Planning your learning” strategy is essential for managing the whole kanji learning process while the “Frequency” strategy
(repetitive writing practice) is indispensable for automatisation, cognitively and strategically.

It was further found that contextual learning could promote the expansion of kanji vocabulary and text processing skills. Further study is recommended to examine contextual learning dealing with the introduction of phonetic radicals from the beginning level by designing a special "help" function in CALL programs to sensitise learners to the phonological properties of kanji at lexical and sub-lexical levels.
GLOSSARY

ACT*  Adaptive Control of Thought (to be read as “ACT star”, Anderson 1983)
Automatisation  Ability to act unconsciously in the skill learning model
CALL  Computer Assisted Language Learning
DEC  Declarative knowledge (knowledge of factual information)
DECPRO  Declarative/Procedural
Furigana  Small hiragana or katakana written beside or above to indicate pronunciation
Hiragana  One of the phonetic syllabaries; used for traditional words in Japan
IA  Intraword Awareness refers to the learner’s understanding of a word’s internal structure and the ability to utilise this structural knowledge in extracting lexical and sub-lexical information (Koda 2002).
IL  InterLanguage refers to the systematic knowledge of an L2 which is independent of a learner’s L1 and L2 (Selinker 1972).
JFL  Japanese as a foreign language
JIS kanji  The Japanese Industrial Standard kanji contains 2,965 kanji including 1,945 Jōyō Kanji
Jōyō Kanji  The 1,945 kanji for general use
Jukugo  Compound, multiple kanji words
JWP  Japanese Word Processor
Kanji  Chinese characters used in Japan
Kango  Sino-Japanese words
Katakana  One of the phonetic syllabaries; used for loan words and onomatopoeia.
KI  Kanji Introduction component in KS consisting of KI and Variety (VA)
KS  CALL KanjiSensee program
Kun-yomi  Japanese pronunciation of kanji
Kūsho  Learning strategy to write kanji in the air with the fingers
Kyōiku Kanji  The 1,006 kanji for education in primary school
L1  First or native language
L2  Second or foreign language
Long-term memory  Memory system that retains for a long time
NLLIA  The National Languages and Literacy Institute of Australia
NLRI  The National Language Research Institute (in Japan)
On-yomi  Sino-Japanese pronunciation of kanji
PPP  Johnson’s skill model, representing Presentation, Practice and Production
PRO  Procedural knowledge (knowledge of how to perform various tasks)
PRODEC  Procedural/Declarative
QZ  Quiz component in KS consisting of Kanji Reading Quiz (KRQ) and Kanji Writing Quiz (KWQ)
Radicals  Graphic kanji constituents denoting semantic and/or phonetic roles
Rōma-ji  Roman letters
Short-term memory  Memory system that retains a small amount of information for a short time
SILL  Strategy Inventory for Learning Language (Oxford 1990)
SLIK  Strategy Inventory for Learning Kanji (Bourke 1997)
SLA  Second Language Acquisition
ST  Story component in KS consisting of Story (ST) and Story Quiz (SQ)
Stroke order  Writing order of kanji characters
Tōyō Kanji  The 1,850 kanji for interim use
Wago  Traditional Japanese words
Working memory  The information that is currently available in memory for working on a problem (Anderson 1995)
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CHAPTER ONE:
INTRODUCTION

1.1 Introduction

In Australia, there are more than 100 languages of immigrant origin, as well as English and indigenous Australian languages\(^1\) (Kipp, Clyne & Pauwels 1995). In this multilingual society climate in Australia, the teaching of Japanese as a foreign language (JFL) started in the mid-1960s\(^2\), and the number of learners increased at secondary and tertiary levels from the mid 1970s. This increase can be attributed in part to economic relationships between Australia and Japan, as well as to the flourishing Japanese tourist trade in Australia. In 1987, the Australian government endorsed the National Policy on Languages Other Than English (LOTE), and the Ingleson Report on Asian Languages in Higher Education was released the following year. As a result, there was a dramatic increase in enrolments, called a *tsunami* (tidal wave). The boom continued on to produce a 143 per cent growth of enrolments in Japanese programmes until the mid-1990s (Lo Bianco 2000), in spite of the economic collapse in Japan, which occurred around 1991. This can possibly be explained by a partial recovery in the economic situation over the next several years. Coincidently, multimedia technology was introduced into Japanese language pedagogy to partially fill the gap created by high student-staff ratios through individualised Computer Assisted Language Learning (CALL) methods (Stockwin 1997). Further, in 1996, National Asian Languages and

---

1 There are approximately 150 indigenous Australian languages.
2 Strictly speaking, the University of Sydney introduced a Japanese program in 1917; however, Japanese language studies were rare until the 1970s (Lo Bianco 2000).
Studies in Australian Schools (NALSAS) started a ten-year project to ensure that four identified Asian languages, including Japanese, would be part of formal language study at primary and secondary levels in Australia. In 1998, a DEETYA\(^3\) review of the NALSAS targets of a 15 per cent increase in Year 12 students by 2006 was determined to be “unrealistic” (DEETYA 1998:4)\(^4\).

According to a survey by the Japan Foundation in 1998, the total number of JFL learners from primary to tertiary levels in Australia was 307,760, second only in number to top-ranked Korea (with 946,857). Compared to the same survey in 1993, the figures show a 71.7 per cent increase from 179,241 (Japan Foundation’s Kyōiku Tsushin 2000:3-5; Kakazu 2001:83). Despite the rising number of learners, the attrition rate among JFL students was high in the 1990s. The report for the secondary level shows that 60.4 per cent of the students who studied Japanese in Year 10 discontinued in Year 11 in 1992 (Marriott, Neustupny & Spence-Brown 1994). Due to a lack of motivation, a similar tendency appeared in the US, too, with as many as 80 per cent of students abandoning their study of Japanese at university level (Mills, Richard & Sherwood 1987:19; Saito & Samimy 1996; Watt 1997). Other reasons for the attrition rates in beginner-level Japanese courses in Australian universities are that: students from non-Arts faculties with a very limited number of electives allowed in their degree take one semester of Japanese and then can do no more\(^5\), and that the credit points of Japanese are less valued in other faculties.

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\(^3\) Department of Employment, Education, Training and Youth Affairs

\(^4\) In May 2002, the Department of Education, Science and Training (DEST) announced a funding cut for the NALSAS project from the end of 2002.

\(^5\) As Gottlieb commented, this is true at the researcher’s university, too. Further, Japanese language carried eight credit points in the Arts Faculty, but only six credit points in the Economics, Business and Law Faculty.
Japanese is considered to be one of the most difficult languages for reaching a native-like level of competence for learners whose first language (L1) is English, because Japanese is a non-cognate or “truly foreign language” for them (Jorden & Lambert 1991:1). In fact, Japanese is classified as Category 4, the most difficult for native English learners. To achieve useful basic proficiency in character-based languages, an average of 2,600 contact hours is required (Ingleson 1989), or 1,320 hours of intensive instruction (Jorden et al. 1991) compared with an estimated 960-hour requirement to achieve basic proficiency in the major western languages. In general, Australian universities provide approximately 480 hours over three years and 650 hours over four years (Marriott et al. 1994). One of the hurdles for JFL learners occurs in the complicated orthographic structures in Japanese. Besides the number of kanji characters to be mastered, a large amount of homophony and multi-readings of kanji (ideographic) characters increase the difficulty of differentiating the appropriate readings from among the orthographic representations (Rogers 1995:31-43).

The Japanese writing system is claimed to be “the most intricate and complicated writing system ever used by a sizable population” (Coulmas 1989:122). It has three components: hiragana, katakana and kanji. Hiragana and katakana are phonetic syllabaries, each of which has 71 symbols. Both hiragana and katakana characters represent the same sounds but they perform separate functions. Hiragana are used for

---

6 The Foreign Service Institute (FSI) of the Department of State in the US assigns Arabic, Chinese, Japanese and Korean to Category 4. (Jorden et al. 1991:3).
7 Classes in Japanese language are offered three to seven hours per week, and 26 to 28 weeks per year (Marriott et al. 1994:31-32). The researcher’s university offers four hours per week, and weekly one hour conversation and CALL sessions each under the supervision of a Teaching Assistant.
8 A writing system is defined as “a set of signs used to represent units of language with the purpose of recording messages,” while an orthography is “consisting of the normative spelling conventions of a language, including letter sequencing, ...spacing and punctuation” (Coulmas 1999:137)
the inflectional parts of verbs and adjectives and other grammatical functions as well as for some nouns of Japanese origin. Katakana are reserved for nouns of foreign origin, onomatopoeia, telex communications and some other specialised functions. Kanji are ideographic or logographic symbols initiated in China and imported to Japan along with Buddhist sutras in the sixth century (Shibatani 1990). According to Dai Kanwa Jiten 大漢和辞典 (the Big Kanji Dictionary, by Morohashi 1976), there are 50,478 kanji. However, only 1,945 Jōyō Kanji9 常用漢字 (kanji for general use) are deemed to be required for literacy10 in addition to hiragana and katakana for L1 learners.

The National Language Research Institute (NLRI) reports each script type used in newspapers from 1976 and 1998, as shown in Table 1. The proportion of kanji making up the total increased by about 7 per cent during this period while that of hiragana has progressively decreased by about 13 per cent over the past 20 years. The proportion of katakana, however, increased slightly from 1976 to 1998.

Table 1.1. Frequency Lists of Scripts in Newspapers

<table>
<thead>
<tr>
<th></th>
<th>1976</th>
<th>199811</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kanji</td>
<td>36.0%</td>
<td>42.86%</td>
</tr>
<tr>
<td>Hiragana</td>
<td>51.0%</td>
<td>37.92%</td>
</tr>
<tr>
<td>Katakana</td>
<td>5.5%</td>
<td>6.60%</td>
</tr>
<tr>
<td>Numerals</td>
<td>7.3%</td>
<td>2.14%</td>
</tr>
<tr>
<td>Alphabet</td>
<td>0.2%</td>
<td>0.48%</td>
</tr>
</tbody>
</table>

(Chikamatsu 1999)

---

9 The present Jōyō Kanji list was announced by Cabinet in 1981 as a result of a rationalisation of the number of kanji and a standardisation of orthography (Gottlieb 1995:194-195).
10 "Literacy is the ability to read and write...Literacy differs in...logographic [systems] (like Chinese) where it is a matter of learning a large number of individual word signs (logograms) ... (Goody 1999:29).
One reason for the increasing use of kanji in newspapers may be that people are becoming more familiar with them because of the rapid spread of word-processors and computers in homes, schools and work places in Japan\(^{12}\). Another reason is simply that kanji take much less space. For example, the word for newspaper, \(しんぶん\), takes four spaces in hiragana but only two spaces in kanji, i.e., 新聞.

Apart from the increasing tendency to use kanji in L1, Japanese as a foreign and/or second language (L2) learners, majoring in Japanese at the tertiary level in Australia, are expected to learn a majority of the 1,945 Jōyō Kanji in a three or four year program, although the requirement varies depending on the institution\(^{13}\). In China, 3,755 kanji are in common use. Compared to western languages, there are obviously far more characters. The number of kanji for common use in Japan is approximately half that of China. The difficulty with Japanese, however, is that 66 per cent of the 1,945 Jōyō Kanji have multiple readings depending on the context (Miyajima, Nomura, Egawa, Nakano, Sanada & Satake 1982:251), while only 9 per cent of China’s 3,755 characters have more than one reading (Shanghai Shihan Daxue Jiao Wu Che 1986, cited in Okita 1996).

The other issue is how to deal with two types of words used in Japanese, \(wago\) (traditional Japanese words) and \(kango\) (Sino-Japanese words) in relation to the abundance of homophones in Japanese. In general, \(wago\) are used in spoken Japanese

\(^{12}\) According to the Yomiuri Newspaper’s public opinion survey (January 2002) about the influence of computers, 18.2 % of frequent users of computers and word processors answered that they had increased their use of difficult and unfamiliar kanji.

\(^{13}\) The Bachelor of Language degree at the researcher’s university, for example, requires four years of study, including one year of overseas language study. Students in this degree who start from the 2\(^{nd}\) or 3\(^{rd}\) year Japanese due to their previous learning experiences of Japanese, are expected to achieve the goal.
while *kango* are used in written Japanese, but both are used as a mixture every day, depending on the aims and situations. Interestingly, 36 per cent of 58,431 words used in Japanese for daily life are homophones, due to the limited number of phonemes and syllables in Japanese (Miyajima et al. 1982). In comparison, in Chinese only 11.6 per cent\(^\text{14}\) of 45,300 words are homophones because of tonal differences (Miyajima et al. 1982). The more homophones in a language, the smaller the number of characters a language needs. Conversely, this means that “... homographs are easier to write, but harder to read by requiring the reader to figure out which one is intended” (Rogers 1995:39). In natural settings however, any communications always occur in context, and the problems of the homophones should be resolved in the context. These issues provide some indications as to when and how we should deal with the kanji orthography in relation to an effective, systematic learning of kanji characters in the limited time available for learning JFL.

1.2 Statement of the problem

In formal classroom instruction, the first year of beginning JFL is a melting pot of learners with widely differing levels of cognate and non-cognate language backgrounds and writing systems. Some are so-called good language learners, but some are poor learners with regard to foreign/second language acquisition (SLA), in terms of the appropriate use of language learning strategies (Rubin 1987; Oxford 1990; O’Malley & Chamot 1990). Although placement tests are usually held to decide suitable proficiency levels for students to begin their study of Japanese, in reality, due to limitations

\[\text{\textsuperscript{14} The homophones in Chinese become 35\% without tonal differences. (Okita 1996:16)}\]
pedagogically and financially, learners from various learning backgrounds are not necessarily placed exactly in the appropriate level despite the differences in their kanji knowledge and processing skills.

Research on kanji characters indicates that the types of kanji and the complexity of kanji’s representations are the cause of many of the difficulties in learning JFL in the beginning stage (Yamashita & Maru 2000; Toyoda 1998). In particular, as previously mentioned, learners have problems dealing with the phonological representation of the two readings for the two types of words in Japanese. The distinction between these words is not clear, especially to beginning JFL learners. In fact, a context is necessary because there is no phonological relationship between the two readings, as Japanese and Chinese are typologically not related at all (Tanaka et al. 1982). The problem lies in deciding whether or not contextual learning can be effective from the beginner level.

As one of the solutions to facilitate individual learning, multimedia technology has been increasingly utilised in Australia since the early 1990s, especially at the tertiary level (Stockwin 1997). McBride (1990) suggests that CALL programs should play an important role in achieving Australia’s language policy goals to improve Japanese language learning. McCarthy describes CALL as, “...a very powerful one [tool] with the capacity to revolutionise foreign language learning” (McCarthy 1992:9). As development continues, various Computer Assisted Language Learning (CALL) kanji programs have been developed commercially and/or privately, and diversified studies have reported the efficacy of CALL kanji programs (Makita & Mori 1995; Van Aacken 1996; Inoue 1998).
However, to this researcher's knowledge, there have been few studies done to examine kanji learning strategies in relation to interaction with CALL kanji programs by learners with different learning backgrounds. The focus of this exploratory study therefore is: 1) to investigate how adult beginners interact with a CALL program utilising various modifications in the program for their learning, and at the same time, 2) to determine what strategies they use to learn kanji characters using CALL in a JFL environment, and 3) to determine from the outcomes, based on the influence of the adoption of CALL methods, whether contextual learning is suitable from the beginner JFL level.

1.3 Purpose of the study

The purpose of the study is to investigate the influence and potentiality of the adoption of computer technology for learning kanji characters. The study focuses on examining patterns of interaction with a CALL kanji program and kanji learning strategies by the participants using a CALL program for two semesters: a preparation period in the first, and the second for the study period in the CALL laboratory at a university. Based on theories in cognitive psychology and SLA, interactions with a CALL program are investigated to determine how learners interact with tasks by noticing the gaps between what they know and do not know during input/output processing. The study also endeavors to determine whether there are any developmental changes in their interactions with different activities, in particular, kanji presented in context and kanji in isolation. Then, the use of strategies is compared with Bourke's study (1997) of kanji learning strategies to identify the similarities and differences between CALL methods and the conventional approach. Further, the learning outcomes are analysed in relation to the interactions and strategy use to find the effects of using a CALL kanji program at
the beginning JFL level, especially for learners with little or no background in Japanese, as well as for those with previous Japanese learning experience, and with kanji background in their L1s.

The following three questions are addressed in this study:

1. To what extent do JFL learners use the KS program in learning kanji in terms of skill learning development?

2. What kinds of kanji learning strategies do JFL learners employ and how do they utilise them while using the KS program?

3. What are the effects of using the KS program on outcomes in promoting kanji learning?

1.4 Overview of the contents

This introduction began by addressing the history of JFL in the multicultural society of Australia, focusing on the problems and the need for research. Various CALL materials developed to ease the difficulties of learning kanji characters in JFL need specific study in the area of interaction with a CALL program and learning strategies in relation to the learning outcomes. Chapter Two presents further background information about kanji characters to provide understanding in the area of language-specific features, although all written languages have, in common, graphemic, semantic and phonemic representations. Chapter Three presents the theoretical review of literature in the following areas:

1) L2 acquisition and interlanguage systems in the framework of SLA (R. Ellis 1994) in relation to the mechanism of memory (Atkinson & Shiffrin 1968; Gathercole & Baddeley 1993) and information processing between input and

2) the dichotomy of implicit/explicit learning (N. Ellis 1994, 1995; Krashen 1981, 1985; R. Ellis 1994), words in context or without context in relation to vocabulary learning (Zimmerman 1997; Coady & Huckin 1997; Nation 1990; Koda 1997, 1999), and further studies of the kanji processing mechanism at lexical/sub-lexical levels and contextual levels (Katz & Frost 1992; Kaiho & Nomura 1983; Flores d’Arcais, Saito & Kawakami 1995; Kess & Miyamoto 1999);

3) language learning strategies (O’Malley & Chamot 1990; Wenden 1991; Rubin 1987), focused on Oxford’s (1990) model, are reviewed to determine the necessity of behavioral and mental instruction for effective learning. Then, the review is extended to investigate diversified kanji learning strategies for JFL learners (de Courcy & Birch 1993; Okita 1995, 1996; Bourke 1997; Kato 2000), and;

4) CALL methods (Levy 1997; Pennington 1996) for language learning, and a review of existing CALL kanji programs (Ashworth & Stelovsky 1989; Benedek & Majima 1989; Macquarie University Japanese studies 1995) to determine their usability for the present study.

Chapter Four describes the learning environment for this study and gives a clear picture of the participants, the CALL kanji program, KanjiSensee (KS) developed for this study as an instructional tool, and the learning context. The research method (Lincoln & Guba 1985; Nunan 1992) and design are presented in Chapter Five. Then, the following three chapters deal with the analysis and findings: Chapter Six for student interaction with the KS program; Chapter Seven for the use of kanji learning strategies using KS, in
comparison with Bourke's study (1997) using a conventional approach\( ^{15} \); and Chapter Eight for learning outcomes in relation to the interactions with KS and the kanji learning strategies dealt with in Chapters Six and Seven. Finally in the last chapter, the study will present findings and implications, and propose recommendations for future study to enhance effective learning of kanji in the JFL environment.

\( ^{15} \) As her SILK form includes the use of CALL, Bourke (1997) also used CALL programs, but did not use them as a major intervention method as in this study.
CHAPTER TWO
CHARACTERISTICS OF KANJI CHARACTERS

It is generally agreed that, for L2 learners\(^\text{16}\), learning kanji is an extremely time-consuming process. So, this chapter examines the difficulty of kanji learning such as the number of kanji characters to be learned by L1 and L2 learners, and explores the complexity of kanji characters: multiple types of words, multiple readings, multiple radicals, homophones and word structures, in relation to learning JFL.

2.1 Number of kanji to be learned for L1 and L2

To be considered literate in Japan, it is essential for L1 learners to study the 1,945 Jōyō Kanji (kanji for general use) during the nine years of compulsory education from primary through junior high school. Soon after mastering hiragana and katakana, children in primary school must learn the 1,006 Kyōiku Kanji (kanji for education in primary school) as laid down in the “List of Characters Classified by School Grade” (学年別漢字配当表 Gakumen-betsu Kanji Haitō-hyō). During junior high school, the goals are to achieve reading comprehension of all Jōyō Kanji and to be able to produce 50 per cent of them by hand (Suda 1988; Kobayashi 1998). By the end of high school, both reading and writing of all 1,945 Jōyō Kanji are expected to be mastered along with comprehension of special words which are frequently used in kanji,

\(^{16}\) L2 learners whose L1 backgrounds are non-cognate to Japanese, e.g., English speakers.
but not included in the Jōyō Kanji; for example, 挨拶 /aisatsu/ “greetings”, 蟻 /ari/ “ants” and 鳩 /hato/ “pigeon” (S. Shimizu 1998).

Meanwhile, the rapid spread of computers and word processors has encouraged the recognition of up to 2,965 kanji in the first level of the Japanese Industrial Standard (JIS\textsuperscript{17}) kanji for the exchange of information, because users are required only to recognise and choose the appropriate kanji from a list of homophone kanji on the computer screen. For instance, if a user types /ai/ of /aisatsu/ in hiragana or Roman letters, Roma-ji, and hits the spacebar, the computer displays all the kanji pronounced /ai/. So, a user is able to recognise the correct kanji rather easily even if he/she has only a vague image of it in mind.

Obviously, those kanji above the Jōyō Kanji are beyond the scope of the current study of kanji for L2 learners. In fact, even in Japan there are two opposing views (Gottlieb 1995); to reduce the required number of kanji (H. Kato 1998,1999) and to increase the number of required kanji to 2,700 or 2,800 kanji for expressing ideas in the computer era (Kindaichi 1988).

According to a survey by the National Language Research Institute (NLRI), the 1,006 Kyōiku Kanji allow the reading of up to 93.9 per cent of daily newspapers and 90.0 per cent of magazines as Table 2.1 indicates. The 1,945 Jōyō Kanji, a further thousand kanji

\textsuperscript{17} The Ministry of International Trade and Industry established “JIS Kanji” in order to communicate smoothly using computers in 1978. Since then, JIS has undergone three revisions, in 1983, 1990 and in 1997. The latest JIS Kanji contain 2,965 kanji including the Jōyō Kanji as “level one” and 3,390 kanji as “level two”, so that rare personal names and place names are able to be appropriately expressed.
learnt during and after high school, are necessary to comprehend 99.9 per cent of newspapers and magazines, depending upon each individual's areas of specialisation.

Table 2.1: Comparison of Kanji Distribution in Newspapers and Magazines

<table>
<thead>
<tr>
<th>Frequently used kanji</th>
<th>Newspapers in 1966 (total 3213 out of 991,375 kanji)</th>
<th>Magazines in 1963&lt;sup&gt;18&lt;/sup&gt; (total 3328 out of 280,000 kanji)</th>
</tr>
</thead>
<tbody>
<tr>
<td>most frequent 100 characters</td>
<td>40.2 %</td>
<td>37.1 %</td>
</tr>
<tr>
<td>200</td>
<td>56.1</td>
<td>52.0</td>
</tr>
<tr>
<td>500</td>
<td>79.4</td>
<td>74.5</td>
</tr>
<tr>
<td>1000</td>
<td>93.9</td>
<td>90.0</td>
</tr>
<tr>
<td>2000</td>
<td>99.6</td>
<td>98.6</td>
</tr>
<tr>
<td>3000</td>
<td>99.9</td>
<td>99.9</td>
</tr>
</tbody>
</table>

The National Language Research Institute (1976:28)

As these surveys were conducted 30 years ago, the NLRI team (Yokoyama, Sasahara, Nozaki & Long 1998) collected 4,476 out of approximately 54,620,000 kanji used in the Asahi Newspaper (CD-ROM) in 1993 and analysed the usage rates and orders among the 3,213 kanji in 1966 and the 4,476 in 1993. The analysis showed no major change among the top 1,000 most frequently used kanji, but a big change among the kanji used less frequently such as personal names, place names, and station names, among others. Also, the top 500 most frequently used kanji both in 1966 and 1993 provide up to 80 per cent of kanji used in current newspapers. These results indicate that there has been no dramatic change among the frequently used kanji during the past 30 years.

Adult L2 learners of the Japanese language at university level in foreign environments are different from children learning Japanese as their L1 who know vocabulary from the spoken language (Hatasa 1989; Flaherty 1991; Okita 1996). Each institution has

different goals for the number of kanji required due to different curricula in undergraduate studies. For example, for the three to four years of undergraduate degrees in Australia, the requirement ranges from all or some of the 1,006 Kyōiku Kanji to the 1,945 Jōyō Kanji, which is highly challenging, especially for non-kanji background learners. However, Marriott et al. (1994) expressed an opposing view to that of Jorden et al. (1991:3) who held that Japanese was a “difficult” language. They commented that a student learning Japanese for six years at secondary level has approximately 645 hours of exposure to Japanese, and is able to attain a “high level of competence” (1994:20) at the end of a three-year, or preferably four-year, tertiary course depending on the student’s degree structure. These contact hours are, of course, used for all four skill activities, not just for kanji learning. In fact, because of the widespread use of the communicative approach, a majority of class hours tend to be used for speaking and listening activities while kanji instruction is limited to an initial introduction at most, and left to the learner’s self-initiated, individual study at the majority of institutions. After reviewing the current situation of Japanese programmes in Australia, Bourke pointed out that:

A minimum requirement for students who hope to use their Japanese skills in employment should be the 1,945 general purpose kanji, but in order to access relevant information in newspaper and magazines, they would need to be able to read around 3,000. (Bourke 1997:33).

Even for learners who started studying Japanese in secondary school (which means, in the case of New South Wales for example, students learn approximately 200 kanji before commencing university studies) mastering the Jōyō Kanji by tertiary graduation is a significant task, and requires “dedication and perseverance” (Nara 2003:165). So, in the next section, the complexity of kanji is explored.
2.2. Complexity of kanji

Most writing systems in the world are generally categorised into three types: logographic, syllabic and alphabetic. For example, kanji characters are logographic (consisting of morphemes), hiragana and katakana are syllabic (consisting of syllables), and Roman letters are alphabetic (consisting of phonemes). Both syllabic and alphabetic are sound-based (Taylor & Olson 1995:2), while logographic is mainly meaning-based like 人 /jin//hito/ “people”, 休 /kyû//yasu-mu/ “rest”, etc. The scripts, using different writing systems, have various degrees of correspondence between visual-orthographic and phonological representations (Katz & Frost 1992). To learn the written language in L2, it is essential for L2 learners to be able to decode the text described in the L2 writing system. As the different writing systems require different L2 orthographic processing procedures (Henderson 1982), this section will review the complexity of kanji in terms of multiple readings, multiple word types, radicals and numerous homophones.

2.2.1. Multiple readings of kanji

Most kanji characters can be read in at least two different ways; the On-yomi 音読み (Chinese pronunciation) and the Kun-yomi 訓読 (Japanese pronunciation). Some kanji have up to 12 different readings - two on-readings and 10 kun-readings - however, the majority of kanji have one or two on-readings and from zero to two kun-readings.

---

19 DeFrancis (1989) calls modern Mandarin logographic-phonetic, as Chinese characters represent grapheme-phonetics. Out of 4300 characters for literacy, there are 895 phonetic components while only 214 are semantic or graphic components which represent meanings.
Multiple *on*-readings came about because of the different regional pronunciations used in China as well as the era in which the kanji was imported into Japan. For example, 京 is pronounced /kyō/ in *go* pronunciation, /kei/ in *kan* pronunciation, and /kin/ in *Tang-Song* dynasties pronunciation. *Go* pronunciation refers to a southern Chinese pronunciation of the sixth century, *Kan* pronunciation from central China and the capital of the Tang dynasty (618-907AD) and *Tang-Song* dynasties pronunciation from the Hangzhou area during the 14th century (Shibatani 1990). Coulmas explains multiple *on*-readings of kanji as follows:

> When *kan on* first came to use, there was an effort to make it the official pronunciation of kanji, but *go on* readings were never abolished, chiefly because they were firmly associated with Buddhist usage. Thus rather than replacing earlier pronunciations, the latter ones were added, yielding multiple syllabic values for many characters. (Coulmas 1989:125).

On the other hand, *kun*-readings were applied to kanji characters and words in Chinese which are the same or close to Japanese meanings (Henderson 1982); for example, /miyako/, meaning “capital” in Japanese, was applied to 京 /kyō/, /kei/ and /kin/ in *on-*

<table>
<thead>
<tr>
<th>Kun \ On</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-</td>
<td>664</td>
<td>70</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>736</td>
</tr>
<tr>
<td>1</td>
<td>32</td>
<td>634</td>
<td>91</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>764</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>228</td>
<td>53</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td>294</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>76</td>
<td>15</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>94</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>31</td>
<td>10</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>42</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>total</td>
<td>40</td>
<td>1644</td>
<td>243</td>
<td>17</td>
<td>0</td>
<td>1</td>
<td>1945</td>
</tr>
</tbody>
</table>

(Hasegawa 1987:150)
readings. Some kanji have up to ten different kun-readings because of their different Japanese meanings and usages.

The 1,945 Jōyō Kanji include 2,187 on-readings and 1,900 kun-readings, a total of 4,087 readings (Taylor & Taylor 1995:303) with different combinations of kanji and kana. In the present study, however, students are expected to learn 174 kanji during their first year at university. 91.9 per cent of them have multiple readings, 7.5 per cent have a single on-reading and 0.6 per cent have a single kun-reading. The majority of these kanji, 72.9 per cent or 127 kanji have one or two on-readings and kun-readings. So, learning these 174 kanji is equivalent to learning over 300 readings.

Further, the appropriate selection of either an on-reading or a kun-reading for each kanji is a most difficult area for L2 learners due to the lack of precise rules\(^{20}\) other than relying on the context in which a kanji occurs (Henderson 1982:19; Scovel 1999), that is, the selection occurs only at a lexical level, not at a sub-lexical level. So, the next section examines in greater detail how these two readings are distinguished at a lexical level.

2.2.2 Multiple types of words: Wago versus Kango

Two types of words in modern Japanese\(^{21}\) use kanji characters, wago (native Japanese

\(^{20}\) The general rules for usage of on- and kun-readings of kanji are: 1. On-reading is applied to multiple kanji compound words. 2. Kun-reading is applied to single kanji words or single kanji followed by kana. 3. For multiple kanji compounds, if the first one uses the on-reading, the following one also uses the on-reading. There are some exceptions. 4. In general, kun-reading is used for peoples’ names.

\(^{21}\) Besides wago and kango, there are loan words and onomatopoeia which are generally written in Katakana. For example, “television” /teレビ/ テレビ as a loan word, and “the sound of knocking on a door” /トントン/ トントン.
words, for example, /i-ku/ 行く meaning “to go”), and kango (Sino-Japanese words, for example, /ginkō/ 銀行 meaning “bank”). Shibatani (1990) reported on the words in magazines (NLRI 1964) and in newspapers (NLRI 1976) as shown below in Table 2.3.

Table 2.3. NLRI Report on the Words in Magazines and Newspapers

<table>
<thead>
<tr>
<th>Types of words</th>
<th>total word counts including repetition</th>
<th>total word counts excluding repetition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>magazines</td>
<td>newspapers</td>
</tr>
<tr>
<td>Native (wago)</td>
<td>53.9%</td>
<td>26.6-43.9%</td>
</tr>
<tr>
<td>Sino-Japanese (kango)</td>
<td>41.3</td>
<td>50.7-65.3%</td>
</tr>
</tbody>
</table>

(Shibatani 1990:142-3)

Focusing on wago and kango, kango are used more in both magazines and newspapers than wago if repetitions are not counted, but wago are used more in magazines if repetitions are counted, because expressions and topics in magazines are more speech-oriented than newspapers. Thus, kango are more used in written documents such as magazines and newspapers because “[kango] vocabulary is prominent in fields that involve abstract concepts” (Shibatani 1990:143). This is one of the special features of both spoken and written Japanese.

Kango are usually written in kanji except in the case of extremely complicated and less frequently used kanji, while wago often consist of kanji and hiragana. As a consequence, the total proportion of kanji words would be higher than 65.3 per cent (Mori & Nagy 1999). In handwriting, however, when L1 adults forget or are uncertain

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22 According to Dwyer’s (1998:32) examination of the Kadokawa Small Dictionary, Kango are used 52.9% of the time.

23 Gottlieb (2003) comments that Latin and Greek-derived words fill the same function in English as kango in Japanese.
of a kanji, they use hiragana as an alternative, like children who do not know many kanji, or add *furigana*, small hiragana above or beside kanji depending on whether the writing is horizontal or vertical, to give the pronunciation. On the other hand, as noted, it is assumed that kanji words are being used more readily because of computer use. As there are some perplexities among *kango*, *wago* and kanji words in general, kanji structure and word formation are further examined from lexical to sub-lexical (or morpheme/syllable) levels in the next section.

2.2.3 Word structure: syllable, morpheme, and word

In Chinese, one kanji matches one morpheme, but kanji and syllables form “a set of many-to-one relations” (Coulmas 1989:107). In fact, it is 100 per cent syllable but 89 per cent morpheme (DeFrancis 1984; Matsunaga 1994:35). However, one single kanji in Japanese consists of either one or multiple syllables/morphemes, or one word or part of a word. The Longman Dictionary of Applied Linguistics defines a syllable as a unit in speech which is often longer than one sound and smaller than a whole word, and a morpheme as the smallest meaningful unit in a language. The following classification may help during the processing of word recognition at a lexical level.

a). One word consists of one kanji: (more *wago* than *kango*)

Words in this group are made of one kanji and form one independent word; they are read in *kun-reading*. Many wago in *kun-reading* are nouns, for example, 山 /yama/, “mountain” and 車 /kuruma/, “car”. A handful of kango also consist of one kanji, for example, 衣 /fuku/, “clothes” and 点 /ten/, “point”. The number of kango in this group is limited. Most words are one or two syllables, but some are three to four syllables.

---

24 In the 1940s, Yamamoto Yûzô, a novelist, insisted on not using furigana which look like “mosquito larva”, even if the number of kanji used decreased (cited in Kobayashi 1998:29).
b). One word consists of one kanji followed by hiragana: (more wago than kango)

Verbs and adjectives in the Japanese language have inflections which are written in hiragana, for example, 行く /i-ku/, “to go”, 大きい /ō-ki/i/, “big” and 静かな /shizu-kan/a, “quiet”. Most of this group are wago, however, some were originally kango, like 信じる /shin-jiru/, “to trust”. Other words such as adverbs are also written in kanji and hiragana, for example, 特に /toku-ni/, “especially”.

c). One word consists of multiple kanji: (more kango than wago)

A multiple-kanji sequence or jukugo, normally two kanji or three to four kanji in the case of multiple compound words, making one independent word. These words are mainly kango and read in on-readings, for example, 旅行 /ryokû/, “trip” and 図書館 /toshokan/, “library”. There are not many, but some are compound wago read in kun-readings, e.g., 父親 /chichioya/ “father”, 相手 /aite/, “partner”.

There is no clear-cut classification between wago and kango, however, the last two groups, words consisting of single or multiple kanji, may assist L2 learners to distinguish types of words and the choice of on- or kun-readings as first-hand information.

Further, type c), multiple kanji words (jukugo), constitute more than 50 per cent of words in dictionaries (Kess & Miyamoto 1999). These compound words are processed syntactically and semantically during the recognition processing. Word formations of two kanji jukugo are categorised into the four groups as shown below:

1) Combination of the same, semantically similar or opposite kanji:
   e.g., same kanji - 年々/nen-nen/ “year after year”
   e.g., semantically similar - 増加 /zōka/ (“increase” & “add” = “increase”)
   e.g., semantically opposite - 大小 /daishô/ (“big” & “small” = “size”)

2) Combination of modifier and nouns:
   e.g., 日記 /nikki/ “daily record or diary”
3) Combination of verbs and adjectives:
   e.g., verbs - 読書/dokusho/ “reading books”
   e.g., adjectives - 冷夏/reika/ “cold summer”

4) Combination with kanji expressing negation:
   e.g., 不正/fusei/ “incorrect”

(Japanese Language Dictionary for Primary School 1975)

In addition, when the meaning of a single kanji in a compound word is not transparent, the degree of difficulty increases even for L1 native speakers (Hirose 1992). For example, 運/un/, “to carry” in combination with 命/mei/, “life” becomes 運命/unmei/, “destiny” and the sense of the individual kanji becomes difficult to gauge. However, the more closely related the meaning of each kanji is to the word meaning, the easier it is to link the meanings to a compound word. For example, the 運/un/, “to carry” is closely related to 動/dō/, “to move” in 運動/undō/, “exercise”. Further, if an understanding of the cultural background of a kanji word is required, it becomes more difficult even for cognate language learners. For example, the 青/ao/ in 青年/seinen/,”young man”, literally means “blue” but also has the meaning of “young” in Japanese culture (Mori et al. 1999).

Thus, these word formations are helpful for both L1 and L2 learners. However, the timing and methods of introduction should be well considered (Kano 1995). Otherwise, learners will suffer intellectual indigestion due to the flood of information, and they may simply avoid using kanji.
2.2.4 Radicals (kanji constituents)

Kanji characters are composed of various types of radicals or basic units of character formation. Although some kanji characters are formed by single radicals, the majority are complex, vertically or horizontally, or both. Radicals are defined as “frequently recurring graphic components used for classifying characters into groups sharing a common element” (Halpern 1990:1769). There are phonetic and semantic radicals.

The former contain information for the phonological structure of the kanji to be read, and the latter offer at least some basis for the meaning of the kanji (Flores d’Arcais 1992:57). For example, the phonetic radical “貳” occurs in the kanji 仏, 師, 檀 or 倭 which are all pronounced “ken”, while the semantic radical “艶” means “roof”. So, while 字, 家, 安 and 室 relate semantically, they are read differently. Based on the locations of the radicals, kanji characters are categorised visually into seven types (Henshall 1988) as follows:

- Left
  - e.g. 海
- Right
  - e.g. 騭
- Top
  - e.g. 空
- Bottom
  - e.g. 思
- Top-left or north-west
  - e.g. 病
- Bottom-left or south-west
  - e.g. 近
- Closure
  - e.g. 国

Further, these structural locations also indicate the role; for example, phonetic radicals are on the “right” in the second category while semantic radicals are on the “left” in the first, fifth and sixth. As is often cited, “the left radical is a likely cue for meaning and the right radical is a likely cue for pronunciation” (Flores d’Arcais 1992:57). Other

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25 In psychology and psycholinguistics, only semantic radicals are called “radical” while phonetic radicals are called “stem” (Flores d’Arcais 1992:57).
studies report the consistency of phonetic information between the radical and character among native L1 Japanese (Saito, Masuda & Kawakami 1998) and native L1 Chinese (Cheng 1992). Similarly, semantic radicals are also useful as they tend to “indicate meaning and often the meaning of the radical can be linked to the meaning of the kanji as a whole” (Bourke 1997:78), as a study with L2 Chinese adults (Taft & Chung 1999) and another with L1 Chinese school children (Shu & Anderson 1997) also report. However, the semantic radicals appear in the top, bottom and enclosure categories, basically everywhere, even in the right position in some cases. For example, the radical 工 appears in 功、江、貢、左 and 空. They present only partial information about a character’s meaning. As a consequence, contrary to the general comments about logographs in which graphemes express the meanings easily, Koda argues that it is “highly unlikely that the meaning of an unknown character can be obtained solely on the basis of semantic radical information” (Koda 2002:236).

In regard to the traditional categorisation of kanji in China, six categories of kanji were established 2000 years ago based on their formation or use. These are called 六書 rikusho in Japanese, and they are listed below:

1. The pictograph (essentially a picture of a physical object).
2. The sign or symbol (essentially a symbol expressing an abstract concept).
3. The ideograph (essentially a meaningful combination of two or more pictographs or symbols).
4. The semantic-phonetic compounds (essentially a combination of a semantic element with a phonetic element).
5. The phonetic loan (essentially characters borrowed phonetically in what is in effect a kanji alphabet).

As Coulmas (1989:98-99) pointed out, it is confusing that some classifications relate to
character composition while others relate to character usage. Henshall also had strong reservations about these traditional classifications, saying "rikusho do shed considerable light on the nature of kanji, but at the same time the reader should treat the categories per se as no more than a rough guide" (Henshall 1988: xvi).

Concentrating on the character structures from types 1 to 4 in Rikusho in her pioneering study, Ito (1979) classified 1,933 kanji into four categories to find how many phonetic and semantic radicals were included. The 1,933 kanji include the 1,850 Tôyô Kanji26 (Kanji for Interim use) plus 83 additional kanji submitted to the Japanese Government in 1977. Approximately 34 per cent of kanji are formed by the semantic radicals while 66 per cent are semantic-phonetic radicals, as shown below.

Table 2.4. Analysis of the 1933 Kanji

<table>
<thead>
<tr>
<th>Pictograph</th>
<th>Simple ideographic</th>
<th>Compound ideograph</th>
<th>Semantic-phonetic 27</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.6%</td>
<td>0.5%</td>
<td>21.8%</td>
<td>66.1%</td>
</tr>
</tbody>
</table>

(Ito 1979:70)

More interestingly, she found 61.6 per cent of the semantic-phonetic kanji have grapheme-phoneme correspondence while 38.4 per cent do not. This means that about 1,200 kanji are semantic-phonetic compounds and about 740 kanji match their phonetic radicals with the whole kanji readings. For example, the phonetic radical 工 /kô/ matches the kanji readings of 江, 巛, 火 and 虹 as /kô/. Further study (Saito, Kawakami & Masuda 1995) of the 2,965 Japan Industrial Standard (JIS) kanji revealed

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26 The Japanese Government issued the Tôyô Kanji in 1946.
27 About 80 per cent of modern Chinese characters are estimated as phonetic-semantic compounds. (Li 1977 cited in Cheng 1992:72).
that only about 550 (33 per cent) have the same pronunciation with their phonetic radicals in the 1668 (56.3 per cent) of the semantic-phonetic kanji. However, some studies (Dwyer 1997; Komori & Zimmerman 2001) suggest greater consideration of the phonetic implications of kanji instruction.

According to the research in Chinese\(^\text{28}\), over 80 per cent of the Chinese characters are phonograms (Hue 1992) and less than 18 per cent are semantic characters which are categorised in either pictographic or ideographic characters (Zhou 1978, cited in Liu 1995)\(^\text{29}\). In spite of the high rate of phonograms, there are problems identifying the appropriate readings of the characters due to transparent and opaque pronunciations\(^\text{30}\). Along the same line, DeFrancis (1984) examined 500 kanji out of Chen’s list of 4,719 different Chinese characters and found that 394 (79 per cent) were phonetic compounds. As a result, Matsunaga (1994) stated that kanji should be treated as phonetic characters rather than semantic characters, traditionally called ideographs, however, as semantic elements are also included in kanji, as opposed to the purely phonetic character of letters, the term “morphophon” or “morphonic” was recommended. The current study employs the term morphography for kanji graphemic representations as opposed to phonography for alphabetic graphemes.

2.2.5 Numbers of strokes and stroke orders

The many strokes of kanji characters increase the complexity. In an alphabetical

\(^\text{28}\) It is based on the *Shuowen Jiezi* (121 A.D.), the oldest character dictionary.

\(^\text{29}\) Zhou (1978) estimated that “there are 81% of Chinese characters formed by compounding sound-cuing phonetics and meaning-conveying radicals...the relationship between phonetics and sounds in actual characters are very low (30%)” (cited in Liu 1995:155).

\(^\text{30}\) Pronunciations can be correctly guessed by the phonetic radicals in transparent characters, but not in opaque characters.
orthography, only 26 letters in English for example, letters are combined horizontally
with simple lines and curves, in different orders, while the 214 radicals in kanji\textsuperscript{31}, with
more complicated lines and curves, create many different combinations horizontally and
vertically (Watanabe 1977). Thus, more complex visual processing is required for kanji
graphics than for the letters of an alphabet (Tollini 1992). In fact, as Table 2.5 indicates,
the average stroke count of kana and alphabetical characters is from two to 2.3, while
kanji is more complicated by a factor of approximately five.

Table 2.5. Average Stroke Counts and Standard Deviations

<table>
<thead>
<tr>
<th></th>
<th>Katakana 46 characters</th>
<th>Hiragana 46 characters</th>
<th>Kyōiku Kanji</th>
<th>Tōyō Kanji</th>
<th>Alphabet capitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>2.3</td>
<td>2.3</td>
<td>9.4</td>
<td>10.3</td>
<td>2.0</td>
</tr>
<tr>
<td>SD</td>
<td>0.7</td>
<td>0.9</td>
<td>3.6</td>
<td>3.8</td>
<td>0.9</td>
</tr>
</tbody>
</table>

(Kaiho & Nomura 1983:28)

Each kanji should be practised in the right order for a neat shape without distortion for
automatic formation in handwriting. The following are the basic rules of stroke order:

1. Write from top to bottom. e.g., 三、今
2. Write from left to right. e.g., 川、林
3. When a vertical and a horizontal line cross, the vertical line is written before
the horizontal line. e.g., 十、田
4. When a kanji consists of a left, a middle, and a right part and the left and
right parts consist of one or two strokes each, the middle part is written first.
e.g., 小
5. When a kanji has an enclosure, it is written first. e.g., 日、国
6. When two diagonal lines cross, the line from upper right to lower left is
written first. e.g., 文、人
7. Lines that cross an entire kanji or part of it from top to bottom are written last. e.g., 中、書
8. Lines that cross an entire kanji from left to right are written last. e.g., 子、女

\textsuperscript{31} Nelson (1962) categorised a total of 5,446 kanji into the “214 historical radicals” based on the 12 steps
in which Henshall’s categories plus five additional categories are included. Later Haig’s (1997) revised
version contains three more elements, for a total of 217, in order to generate JIS levels 1 and 2.
9. In kanji including the radical shinnyuu, that radical is written last. e.g., 道
10. In kanji including the radical tare, that radical is written first. e.g., 店、庭
(Fuji, Ito, Kataoka, Shiotani & Tohsaku 1994:116-117)

Kanji dictionaries and kanji workbooks like the above usually illustrate the directions for writing orders for each kanji so that learners can follow them to form good habits. Calligraphy, in particular, requires repetitive writing for both mental and physical training as well as for an appreciation of beauty in Japan.

2.2.6 Homophones

Another difficult area in learning kanji is the frequently occurring homophone as cited by Katz and Frost (1992:68-69) “Indo-European languages have less homophony and more polysyllabic morphemes than Chinese and Japanese”. When kanji were imported from China into Japan, there was no way to resist the occurrence of homophones as there are only 20 phonemes and 112 syllables in Japanese, one of the smallest numbers of phonemes and syllables in the world’s languages32 (Suzuki 1986).

Nakano (1989) analysed the homophones in the textbooks used at high schools on two levels, one at word level and the other at morpheme level as in Table 2.6.

Table 2.6. Homophones in Textbooks Used at High Schools

<table>
<thead>
<tr>
<th></th>
<th>Total words by NLRI survey 1984</th>
<th>Homophone</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morpheme level</td>
<td>15519</td>
<td>5446</td>
<td>35.1%</td>
</tr>
<tr>
<td>Word level</td>
<td>40504</td>
<td>3011</td>
<td>7.4%</td>
</tr>
</tbody>
</table>


---

32 English has at least 8000 syllables while Chinese has about 400 syllables or 1300 tone syllables. In Chinese, however, morphemes are monosyllabic, and full of homophones (Taylor & Olson 1995:3).
Despite the large number of total word homophones, there are more homophones at the morpheme level than at the word level. Homophones at the morpheme level are of two types. The first is where the homophone occurs in the inflectional form although not in the basic form: for example, 編む /a-mu/, "to knit", but changes to 編め /a-me/, in the command form and so becomes a homophone for 雨 /ame/, "rain". The other type of homophone, at the morpheme level, is where homophones occur in the basic form although not in the inflected form; for example, 寝る /ne-ru/, "to sleep" inflects to 寝ない /ne-nai/, "do not sleep", but 練る /ne-ru/33, "to knead" inflects to 練らない /ne-ranai/, "do not knead".

However, as homophones are usually considered to be the basic form of conjugate words, Ishii (1991) checked homophones further in the word lists of textbooks and found that homophones occur more in kango than in wago, more than twice as often in fact, as shown in Table 2.7.

<table>
<thead>
<tr>
<th>Types of words</th>
<th>Total words</th>
<th>Homophone</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wago</td>
<td>108</td>
<td>25</td>
<td>23.1</td>
</tr>
<tr>
<td>Kango</td>
<td>258</td>
<td>129</td>
<td>50.1</td>
</tr>
</tbody>
</table>

(Ishii 1991: 15)

He explained that these contradictory results occurred because inflection occurs mainly at the morphological level in wago which is rare in kango.

33 寝る and 練る have the same sound /ne-ru/, but their accents are different.
The important issue here for JFL learners is that the numerous homophones increase the difficulty of phonological processing to connect the target kanji's semantic representation during recognition of kanji, especially as learners have extremely limited kanji knowledge and processing skills during the beginning stage. In fact, the results of an experiment of handwriting the compound kanji word show that adult L1 readers made more phonological errors than semantic and graphemic errors (Hatta, Kawakami & Tamaoka 1998).

2.3 Summary

Kanji is considered to be one of the difficulties in learning JFL. Although historically there are various voices pro and con increasing the number, the mastery of the 1,945 Jōyō kanji is required for one to be considered literate in Japanese. In fact, requirements for three to four years of undergraduate degree in Australia range from 1,006 Kyōiku Kanji to 1,945 Jōyō Kanji. Due to the multiple readings of kanji in Japanese, 1,945 kanji means over 4,000 readings. Moreover, the locations of phonetic and semantic radicals in kanji allowing discrimination of one from another are not fixed, although there are some basic rules. This phonological problem is extended further to compound kanji words (jukugo), phonologically and semantically. As a consequence, the most difficult area in learning kanji is reading. As a matter of fact, learners with a cognate writing system like Chinese and Koreans can transfer the kanji knowledge and processing skills from their L1, but they often find reading kanji difficult. Another problem is the complication of kanji graphics. The maximum number of strokes for a kanji is 30, but the average is about ten strokes, which is approximately five times that of alphabetical letters.
These issues of kanji characters will be reviewed in the literature of information processing in the next chapter.
CHAPTER THREE:
REVIEW OF LITERATURE

This chapter will review the three main theoretical and pedagogical areas in second language acquisition (SLA): 1) the first is information processing linking memory and retention, studied originally in cognitive psychology (Atkinson & Shiffrin 1968; Anderson 1980, 1983; Gathercole & Baddley 1993; Johnson 1996). 2) The next section focuses on vocabulary learning in relation to implicit/explicit learning, words in context or without context (Coady & Huckin 1997; Nation 1990). The review is further extended to kanji vocabulary learning at lexical and sub-lexical levels due to the nature of kanji function and formation (Kess et al. 1999; Koda 1997, 2002). 3) The third section deals with language learning strategies (Oxford 1990; O’Malley & Chamot 1990; Rubin 1987; Wenden 1991) used by learners to improve their performance from general to language-specific areas. After reviewing kanji learning strategies (Birch et al. 1993, 1995; Okita 1995, 1996; Bourke 1997; Kato 2000), the Strategy Inventory for Learning Kanji (SILK) developed by Bourke (1997) was employed for the examination of kanji learning for this study. 4) Finally, the review extends to the pedagogical application of kanji learning using CALL methods, supporting the skill learning model. In fact, the theoretical basis of CALL methodology is not new, though the basic concept still remains a learner-centred, individualised approach. So, the review will focus on how CALL methods suit L2 beginners dealing with orthographical constraints such as kanji characters in JFL.
3.1 Information processing

The theory of input and output in SLA is illustrated below (R. Ellis 1994a), consisting of three influential components on input: social factors and settings; other knowledge; and, individual learner factors.

L2 learners expose themselves to various elements of L2 information in a setting such as an extremely isolated FL classroom using a CALL program in a laboratory, as in this study. This process may influence learners externally as input takes a potentially important role to let L2 learners notice a salience (Pica 1994; Skehan 1998; Chapelle 1998; Schmidt 1994). Then, input information is processed in combination with the learner's L1 knowledge linguistically and other individual factors strategically for learning the L2. Further interaction assists processing in an InterLanguage system (IL,
Selinker 1972) by intake\(^{34}\) and generates outputs, some of which cause responses which circulate back to influence new inputs.

Two important issues are involved in this framework. One is input enhancement. The studies (Sharwood-Smith 1993; Schmidt 1990) revealed that input enhancement is triggered by manipulation of settings externally to involve learners in noticing better retention internally. Noticing will be discussed further in conjunction with memory in the following sections. The other issue is the interaction for information processing in the dot-lined box in Figure 3.1. Under InterLanguage theory\(^{35}\) (Selinker 1972), Selinker identifies several issues in cognitive processes for L2 acquisition such as language transfer, learning strategies and overgeneralisation. Odlin (1989) explains positive transfers as follows:

The effects of positive transfer are only determinable through comparisons of the success of groups with different native languages. Such comparisons often show that cross-linguistic similarities can produce positive transfer in several ways. Similarities between native language and target language vocabulary can reduce the time needed to develop good reading comprehension. (Odlin 1989: 36).

Odlin further reflects on pedagogical issues related to writing systems such as kanji in Japanese and Chinese saying that, “the more similar the writing systems of two languages are, the less time learners will need to develop basic encoding and decoding skills” (Odlin 1989:125). However, the negative transfer is “often relatively easy to identify” (Odlin 1989:36) such as the simplified kanji used by Mandarin Chinese speakers or the complicated traditional kanji by learners from Taiwan and Hong Kong.

\(^{34}\) "Intake is that portion of the input that learners notice and therefore take into temporary memory" (Ellis1994a:708).

\(^{35}\) IL refers to the interim grammar, neither L1 nor L2, that L2 learners develop to attain the target language.
On the other hand, language distance such as that between Japanese and English is obviously “most probably a major determinant of the amount of time students will need in order to become highly proficient in a language” (Odlin 1989:125). Once learners acquire the basic knowledge and processing skills, the speed increases even for distant language learners. In fact, due to language distance, little negative transfer from the L1 is found among distant L2 learners, compared to L2 learners from a cognate writing system.

Other features during the process of developing an IL are overgeneralisation, and simplification. This means that L2 learners apply L1 rules to the target language by either overgeneralising or simplifying the target items, although those rules do not exist in the L2. In fact, these are the kinds of learning strategies that L2 learners use to overcome difficulties during processing. However, when they are unable to fix problems, the problems may become fossilised as errors in the L2 learners’ systems. These developmental changes over time, during the use of the IL, are discussed in terms of different theories about how learners develop L2 knowledge in relation to implicit and explicit knowledge. However, the current focus is on the learners’ processing abilities, and implicit and explicit learning will be discussed later in relation to vocabulary learning in section 3.2.

The studies on the skill learning model in cognitive psychology deal with language as a skill for processing various tasks efficiently in the L2. Much the same as Figure 3.1 shows in SLA, input information received from the environment is developed during central processing (the dotted box in Figure 3.1) to produce better outcomes than the current state, using necessary action. As the current study is concerned with the
acquisition of kanji orthography in Japanese, the skill learning model will be reviewed along with the mechanism of human memory for learning kanji orthography.

3.1.1 Short-term and long-term memory

Information processing in cognitive psychology has been discussed in relation to human memory. Originally, Atkinson and Shiffrin (1968) proposed two memory systems: the short-term memory with a limited capacity and the long-term memory with a large capacity, as shown below:

![Diagram of short-term and long-term memory](image)

Figure 3.2. The Atkinson and Shiffrin's (1968) Theory (source: Anderson 1995:28)

According to this model, the short-term memory receives current and recently emerged information while some memories are destroyed or forgotten through competition and interference, and only the remaining information is kept in the long-term memory through processing by rehearsal. However, because only verbal rehearsals are required to keep information in the long-term memory, little relationship between the number of rehearsals and recall is found (Rundus 1971).
Further, Baddeley’s serial studies (Baddeley & Hitch 1974; Gathercole & Baddeley 1993) reveal that short-term memory functions in both processing and storing information even though it is of limited duration. As a consequence, they propose the concept of working memory, refining short-term memory, consisting of three components, as shown below: the main “central executive”, and two slave systems, the “phonological loop” and “visuo-spatial sketch pad”.

![Diagram of the Working Memory Model](image)

Figure 3.3. A Schematic Representation of the Working Memory Model. (A simplified representation of the Baddeley & Hitch (1974) working memory model, Gathercole & Baddeley 1993:4)

The functions of the central executive include “the regulation of information flow within working memory, the retrieval of information from other memory systems such as long-term memory, and the processing and storage of information” (Gathercole et al. 1993:4). It also assigns verbal inputs to the phonological loop and visual or spatial materials to the visuo-spatial sketch pad. This suggests that the visual image and phonological representation of kanji are activated separately in each component and forwarded to the main office. Importantly, the working memory\(^\text{36}\) can store information,

\(^{36}\) Working memory refers to all transient information to which we currently have access (Anderson 1995:182).
but only for a short time; the central executive suffers when the two subsystems are overloaded. Therefore, the tasks being performed suffer either in speed or accuracy although both the phonological and visual systems are capable of handling transient memories independently. Anderson’s model of the working memory will be further discussed in the next section.

Paivio (1971,1986) argues in the dual code theory that the verbal system operates sequentially in a linear code while visual information operates synchronously in picture-like records. It is assumed that the verbal system is suitable for serial/sequential learning while the visual system is good for random memorisation (Okita 1996:42). Another study, however, reports that visual elaboration, good for concrete words, and combined aural and visual elaboration, are more effective for recall than repetition and rehearsal (Atkinson & Raugh 1975), as in the studies of learning kanji characters. For vocabulary learning, the phonological memory skills contribute to establishing long-term phonological representations (Gathercole & Baddeley 1993). Ashcraft indicates that any dual tasks performed simultaneously may show “either complete independence, complete dependence or some intermediate level of dependency” (Ashcraft 1994:182) depending on the activities. Further, as regards the semantic quality of rehearsal during processing, Craik and Lockhart (1972) argued in their depth of processing theory that rehearsal only improves memory if the material is practised in a deep and meaningful way.

These studies suggest that multiple code processing applying semantic processing will assist better memory. Now the review will turn to the skill learning models to examine
the development of skills by means of rehearsal and also examine how attention is allocated for learning and memory.

3.1.2 Skill learning models

Three models are reviewed for this study, mainly because learning kanji characters entails cognitive skills in addition to linguistic knowledge. They are: 1) the information processing models (Schiffrin & Schneider 1977; Mclaughlin, Rossman & McLeod 1983); 2) the ACT* (Adaptive Control of Thought, to be read as “ACT star”) model\(^{37}\) (Anderson 1983,1993) and; 3) the skill development model (Johnson 1996), based on the ACT*.

3.1.2.1. Information processing models

Shiffrin and Schneider (1997) proposed two modes of information processing: automatic processing and controlled processing. The former involves “the activation of certain nodes in memory every time the appropriate inputs are present” (Shiffrin & Schneider 1977:134). The latter is “a temporary activation of nodes in a sequence [with limited capacity which] require more time for their activation” (Shiffrin & Schneider 1977:135). Learning starts from controlled processing which requires attention for activation for a longer time due to its limited capacity, and it reaches automatic

\(^{37}\) ACT* is revised from ACT developed by Anderson (1976). This study focuses mainly on ACT* as it covers a wide range of cognitive phenomena, while the further revised ACT-R is devoted to “the development of intelligent computer based tutors that teach mathematical and computer-programming skills” (Anderson 1993:vii).
processing through the repetition of practice. Controlled processing is considered as “the ‘stepping stones’ for automatic processing as the learner moves to more and more difficult levels” (McLaughlin, Rossman & McLeod 1983:140). Some researchers claimed a weak distinction between them. Lightbown (1985) argues that learners often forget items, even those they have practised thoroughly, especially when new forms are introduced. McLaughlin (1990) describes a U-shaped curve, with declining performance for a period of time due to restructuring the system with mixed old and new information. As practice improves sub-skills, learning may increase again as skill develops (McLaughlin & Heredia 1996). However, learning gets harder sometimes due to heavy demands on working memory currently available for problem-solving; that is, information does not proceed in controlled processing from short-term storage (STS) to long-term storage (LTS) because of poor processing ability. Furthermore, differences are found for lexical encoding in memory between L1 and L2 learners, and between advanced and beginning stages of L2 learning; less proficient learners use predominantly acoustic and orthographic encoding of vocabulary while more advanced learners and native speakers made more use of semantic processing (McLaughlin et al. 1983; McLaughlin 1990). This indicates that capacity limitations prevent further activation of higher level inference of meanings among unskilled learners.

3.1.2.2. ACT* model

Similar to the previous processing approach, but “more detailed and more powerful” (McLaughlin et al. 1996:218) are Anderson’s (1976,1983,1993,1995) ACT* models. Based on the original ACT theory (1976), ACT* (1983) was developed for the general theory of human cognition as illustrated below.
The ACT production system consists of three types of memories: declarative and procedural as long-term memory and working memory, replacing short-term memory used in classical models due to its interpretation of "just a passive storehouse for data" (Just 1987).

Working memory contains the information that the system can currently access, consisting of information retrieved from long-term declarative memory as well as temporary structures deposited by encoding processes and the action of productions. (Anderson 1983:19-20).

Anderson (1983) continues that declarative memory is created by the storage process and is retrieved to working memory, and that data in working memory are put into procedural memory through the match process and install matched production in working memory through the execution process. So, working memory is dynamic and

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38 Anderson (1995:174) criticised the term of short-term memory as “a once-popular view in cognitive psychology”.

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essential for production, and requires an immense activation. New information from working memory is applied to existing knowledge and cycled back into the production memory. During this process, a schema is required to infer information for larger units of meaning. The main concept is that "all knowledge initially comes in declarative form" (Anderson 1983:34) demanding full attention and awareness, and gradually turns into procedural knowledge with practice. At the procedural stage, generalisation, discrimination and strengthening processes operate. When learning new things, the mind moves from declarative to procedural knowledge in three stages: cognitive, associative and autonomous, in a complicated process explained below.

In [the cognitive] stage, the learner often works from instructions or an example of how the task is to be performed. Whether example or instruction, the information a person learns from initially is represented declaratively and must be interpreted in a way to yield appropriate behavior.

In [the associative] stage the skill makes a transition from a declarative representation to a procedural representation. It becomes a lot more fluid and error free. Verbalization of the skill drops out in this phase...

[In the autonomous stage], [t]he skill becomes continuously more automated and rapid, and cognitive involvement is gradually eliminated. Sometimes a person even loses the ability to verbally describe the skill. In such a case, the skill becomes totally a matter of implicit memory. (Anderson 1995:319).

Taking the example of a kanji word, 銀 (ginkô) and means bank.

Firstly, during the cognitive stage, learners are exposed to information about the first kanji 銀, /gin/ "silver". The information of this kanji is recognised probably with two

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39 "Generalisation" denotes production rules becoming broader in the range of applicability, "discrimination" where rules become narrower, and a "strengthening" where better rules are strengthened and poorer rules weakened. (Anderson 1983:241).

40 Declarative knowledge is "explicit knowledge that we can report and of which we are consciously aware" while procedural knowledge is "knowledge of how to do things, and it is often implicit " (Anderson 1995:308).
components, 金 “gold” and 良 “good”, or each of them is recognised in smaller pieces or chunks depending on the learners’ processing skills. JFL beginners have to pay full attention to the arrangement of the pieces vertically, horizontally and diagonally, but they may miss some information such as a small dot on the top of 良 “good”, but missing in the case of 銀 “silver”. In ACT, “activation converges on the trace from all presented components. If there is sufficient activation, the trace becomes available” (1983:189). After applying similar but more costly processing to the second character due to multiple meanings, a learner associates 銀, with 行 along with its reading and meaning. Constant practice of 銀行 will lead them to tune the internal representation of the skill. Then, the learners will reach the associative stage of processing this kanji vocabulary and be able to use it in written communication, just like signing one’s own name where the movement is executed with little or no cognitive control.

In general, even if knowledge is processed and stored firmly in memory, short term or long term, retention does not last forever (Lightbown 1985). In fact, the learning and forgetting functions exist due to the limitations of human memory capacity (Anderson 1995:234-239). Forgetting accelerates learning, and vice versa; the more one learns, the more one forgets. Anderson detected in one study that “increased practice resulted in increased retention, but performance fell off linearly in the log-log scale for all degrees of practice” (Anderson 1995:237). However, repeated rehearsals and reviews activate recency and spacing effects\(^\text{41}\) in the retention function (Anderson 1995:166-171).

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\(^\text{41}\) “Recency effect” refers to good memory for the latest few words because of rehearsing in short term memory (Anderson 1995:164). “Spacing effect” refers to spaced study intervals which are like the retention interval (Anderson 1995:244).
Importantly, periodic practice and review are obligatory for automatisation to attain the goals in effective learning, not the stimulus-response associations of Skinner’s behaviorism, but “environmental stimuli” (Johnson 1996:33) through interaction with the environment.

Thus, in order for knowledge to reach the autonomous stage, practice is necessary (Anderson 1983, 1995). McLaughlin (1990) also acknowledged that repetition of meaningful practice is important. In addition to practice, feedback encourages learning (Anderson 1993; McLaughlin et al. 1996) which is reflected more in Johnson’s skill development model in relation to errors and mistakes in processing dimensionally, as well as more than one path of processing of declarative and procedural knowledge.

3.1.2.3. Johnson’s “PPP” (Presentation, Practice, Production) sequential model

Johnson’s skill development model (1996:34-37, 38-44) is based on two views; one is that language learning is seen as skill learning, and the other is the concept of automatisation for information processing in association with Anderson’s model. First, he describes the six concepts for language learning, referring to non-linguistic skills based on the servo-mechanism:

1. Skills are hierarchically organised.
   This is true for both linguistic theories and non-linguistic skills.

2. Skills are goal-oriented behaviour.
   Linguistic analysis is goal-directed. Skilled performance and learning also aim for the “desired state” as its goal.

3. Skills involve evaluation of data.
   Evaluation is involved in both receptive and productive language in order to examine its effectiveness and appropriateness. So do non-linguistic skills to provide feedback.
4. Skills involve selection.
Language use involves "a simultaneous selection from among a large number of interrelated options" (Halliday 1970:142, cited in Johnson 1996:41). Non-linguistic skills also require an appropriate output from the wide ranges of options in "real time".

5. Skills involve "combination skill".
Language performance involves many skilled activities. Equally, the most suitable skill or combination of skills at the time of production must be chosen as an output in non-linguistic skill performance.

6. Skilled behaviour is non-stereotyped.
As Chomsky argued against Skinner's Stimulus-Response view, there is no stereotyping in the skilled performance. Skilled performances are "discoverable" constantly, because they are always unique on each occasion, and described "human skills are seldom performed in exactly the same way twice". (Summer 1989:58, cited in Johnson 1996).

In the end, Johnson compressed these characterisations of language behaviour derived from results of the non-language skills as follows:

Language is goal-directed, hierarchically organised, non-stereotyped behaviour. From the environment, the performer receives information along various parameters. The performer's response is selected from a large repertoire of possible responses. It must be appropriate along all the relevant parameters (hence exhibiting considerable "combinational skill"), and in many cases must be executed speedily. (Johnson 1996:44).

His view of language as skill persuades both language learning and language teaching in the sense that "interaction with the environment" requires practice for knowing how to manage environmental stimuli, not the Skinnerian stimulus-response model. Skill acquisition does not occur suddenly "from rule-guided "knowing that" to "experience-based know-how" (Dreyfus & Dreyfus 1986:19). They establish five stages of qualitatively different perceptions of tasks and/or modes of decision-making along with skill improvement, that is, the novice uses precise rules one by one, the advanced

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42 One study (Maingard 1999) notes that processing kanji characters by repetitive writing appears to be stereotyped. However, the repetition is not just copying the symbols hundreds of times. Instead, lack of flexibility can not attain the complexity of the representation of kanji characters in various contexts.
beginners begin to recognise the role of context, realising the modified rules; the
competent performers can coordinate rules and known facts, and the proficient
performers can utilise schema recollecting previous similar events. Finally, the experts
become smooth and fluid automatically, as they can see what to do intuitively (Dreyfus
& Dreyfus 1986:21-36). In fact, this expert-novice concept is applicable for assessing
the steps of kanji learning.

The other issue in Johnson’s sequential model is how learners are automatised in the
skill learning model. Automatisation43 is a central concept in cognitive skill learning, as
it takes the role of “a fundamental component of skill development” (Shiffrin & Dumais

First, Johnson applies the DECPRO concept to a “PPP” sequential model, presentation,
practice and production44. The presentation refers to the process of DECLAREtisation and
the other two are concerned with PROCeduralisation. Declarative knowledge has two
roles: one is to serve as the basis for proceduralisation in DECPRO, which “needs to be
simple, uncluttered, concrete, and easily convertible into a ‘plan for action’” (Johnson
1996:104). The other is to provide a data base for language use in PRODEC or
DECPRODEC (the second DEC), which “needs to be accurate…and as generalisable as
possible” (Johnson 1996:104). Here, Johnson criticises Anderson’s (1983) argument of
“a progression from declarative to procedural (DECPRO) for all learning (non-linguistic
skills, L1 and L2) and all learners.” (Johnson 1996:97) One learns declaratively first,
then automatises over time, but other people learn the direct importation of

43 Automatisation is called “automization” by Johnson (1996).
44 The 3P approach is “probably still the commonest teaching approach when judged on a world-wide
basis” (Skehan 1998:94).
proceduralised knowledge from the L1 (Raupach 1987; O’Malley et al. 1990), like Chinese and Koreans with kanji backgrounds in L1 taking JFL. Later, Anderson and Fincham acknowledged that “not all knowledge starts from declarative knowledge” (Anderson & Fincham 1994:1323).

In addition, the progression relates to types of practice; part or whole practice, that is, “the concepts of PRO and whole practice on the one hand, and DEC and part practice on the other are related” (Johnson 1996:155). Both types of practices are necessary for automatisation to convert declarative knowledge into procedural knowledge. Production is also essential for automatisation to avoid processing mistakes, and to increase accuracy and to urge fluency. Errors come from inappropriate declarative knowledge while mistakes are from lack of processing ability to perform competently (Corder 1981; Johnson 1996). In other words, these outputs suggest that any problems in the input during the presentation phase and in the central processing during the practice phase affect automatisation.

Further, automatisation as the main concept is not the same as in audiolingualism. The differences between them are that the idea of audiolingualism is based on habit formation by practice whereas the skill learning model requires meaningful practice for proceduralisation where the amount of attention decreases gradually. Attention facilitates automatisation from the formula “ra-1” (or “required attention minus one” means less attention is available) to “ra=0” indicating no attention is necessary to perform a task comfortably. As “ra” is essential to create declarative encodings for the input stage, it will be examined further in the next section in terms of noticing, awareness, and attention.
The review of the PPP sequential model revealed that this skill model is suitable to kanji learning using a CALL kanji program. In particular, it is applicable for JFL kanji learning with mixed background learners, and allows the flexibility of multiple paths depending on their L1, and even L2 background, and individuals’ linguistic and non-linguistic processing skills. In particular, the flexibility of the paths is extremely suitable for CALL methods which aim fundamentally to assist self-paced individual learners to become autonomous learners.

3.1.3. Noticing, awareness and attention

In relation to the psychological research on consciousness as one of the controversial issues (Krashen 1981, 1985; Gregg 1984), Schmidt (1990, 1994, 1995) proposes noticing hypotheses, claiming that “...noticing is the necessary and sufficient condition for converting input to intake” (1990:131). Also, noticing has been discussed as conscious awareness and attention in L2 language learning (James & Garrett 1991, VanPattern & Cardierno 1993). This means that learning does not happen without noticing, or awareness and even attention to memory (Robinson 1995). In fact, it is difficult to distinguish the differences among them as these are viewed often as synonymous, as “attention and awareness at the level of noticing are flip sides of the same coin” (Schmidt 1995:18). Pedagogically however, the main concern is with noticing for input enhancement (Sharwood Smith 1993; Pica 1994; Hegelheimer & Chapelle 2000) and how salient materials draw learners’ attention for input. For example, CALL methods utilise colour coding, bold fonts and animation among other methods, to manipulate the

45 The National Congress on Languages in Education (NCLE) working party defines Language Awareness (LA) as “a person’s sensitivity to and conscious perception of the nature of language and its role in human life” (p.108).
input information. As far as kanji learning is concerned, Schmidt (1995) claims that the phonological or orthographic form of a word is a matter of noticing\(^{46}\), while the meaning of a word is a matter of understanding. This implies information processing at dual levels to enhance better retention as discussed in the previous section. It is arguable theoretically, but the question remains regarding how to claim the interaction among the three representations of kanji characters, and also “exactly when and where noticing has occurred” (Hegelheimer et al. 2000).

Further, Skehan (1998) analyses the 3P approach, focusing on the importance of the concept of noticing, proposed by Schmidt (1990,1994) as shown below.

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\(^{46}\) Noticing refers to conscious registration of the occurrence of some event at the surface level, while understanding implies recognition of a general principle, rule or pattern at a deeper level. (Schmidt 1995:29).
Skehan draws a clear framework of noticing, emphasising “input processing and the interaction of input features, via noticing, with a current interlanguage system” (Skehan 1998:52). External factors such as frequent exposure to the perceptually salient resources, e.g., tasks in the computer program, play important roles for making input more attentional. Learners’ internal factors such as the current level of information processing, and use of appropriate learning strategies also affect noticing which may have an impact on further processing of information in working memory with a capacity limitation and long-term memory with a larger capacity. This memory mechanism is refined further by various types of practice in the IL system (see figure 3.1, R. Ellis 1994a). At the same time, the role of “required attention” (ra) (Johnson 1996:138-9) diminishes gradually as automatisation is attained. As memory capacity is limited, the choice of implicit or explicit learning, and the rule-based or exemplar memory system has become an important issue in maximising the effect of input/intake (see section 3.2.1).

Apart from input processing, Swain (1998) and Swain and Lapkin (1995) propose that output also promotes noticing when a learner notices a “hole” in his/her interlanguage. Using Dictogloss to encourage students to reflect on their own output, Swain found that students notice the difference between what they want to say and what they are able to say, and concluded that sometimes noticing the hole triggers a search for a solution (Swain 1988:79). A similar case often occurs during kanji production when students search their memories for a target kanji character among possible associated options.
This means that noticing at any stage from input through output plays a crucial role in information processing, however, "[p]ay attention to input...Nothing comes free" (Schmidt 1995:45).

3.1.4. Intraword Awareness (IA)

Further concentrating on L2 lexical processing, Koda proposes intraword awareness (IA) on typologically different, cross-linguistic analysis.

The IA refers to:

[t]he learner’s understanding of a word’s internal structure and the ability to utilise this structural knowledge in extracting lexical and sub-lexical information from the visual configurations. Phonological and morphological awareness, therefore, constitute distinct aspects of IA. Each aspect, moreover, contains several related, but distinguishable, competency components: e.g., (a) understanding that words can be segmented into smaller, functionally identifiable units; (b) mapping each functional unit onto graphic symbols; and (c) manipulating (e.g., isolating, blending, and combining) sub-lexical information. (Koda 2002:228).

The findings of Koda’s study among adult L2 readers of English with Chinese (see Chinese orthography in Chapter Two) and non-Chinese L1 backgrounds are that L2 processing competence is developed “primarily through repeated experience with the lexical peculiarities in the target language” (Koda 2002:239), and is not largely affected but is seemingly influenced by a consequence of their L1 processing experience up to a point. Other studies of character-learning in Chinese and Japanese report on the L2 IA. Beginning learners of Chinese as a foreign language (CFL) find “repeated practices and mnemonics devices more effective than using component radicals when learning new
characters” (McGinnis 1995, cited in Koda 2002:240). However, Dwyer (1997) in his experiment on the systematic presentation of phonetic radicals using HyperCard on computer with L2 beginners reports that phonetic radicals assist learning pronunciation and retrieval of characters. Mori (1998) reports the analysis of decomposition of words as well as inference through contextual learning among JFL learners in the upper level. Further, Koda’s studies (1998,1999) compare L2 lexical development among ESL readers with L1 backgrounds of Chinese as logographs and Korean (Hangul) as an alphabetic-syllabary. Statistically, no significant differences are found between the two groups in terms of intraword sensitivity and decoding, however, the results suggest different capabilities in L2 lexical processing. In the end, Koda summarises the development of L2 character processing competence as like native L1 children, “beginning with an unanalytical, holistic, processing mode and gradually advancing to more sophisticated, analytical, word-learning approaches” (Koda 2002:241). The question remains as to when and how the gradual development occurs.

Besides a developmental approach in strategic training at the lexical/sub-lexical level, awareness has been discussed also in “metalingual strategies” as one of the major aspects among the good language learning strategies (O’Malley et al. 1990; R. Ellis 1994a:546). This will be discussed later in the strategy (section 3.3).

3.1.5. Summary

Memory and skill learning models were reviewed as learning kanji orthography involves complicated memory mechanisms. First, information is processed in short-term memory, and some is kept in long-term memory through rehearsal (Atkinson et al. 52
1968; Baddeley et al. 1974; McLaughlin et al. 1983). Further, replacing short-term memory by working memory due to its passive function, Anderson (1983,1995) investigates working memory in the ACT* production system. The main issue is that declarative memory is developed gradually to procedural memory through three stages; cognitive, associative and autonomous, and that knowledge is also proceduralised by repeated rehearsals. Based on Anderson’s model, Johnson proposed the skill learning model, called 3P sequential learning in which there is more than one path for proceduralisation in L2 learning, that is, PRODEC progression besides DECPRO occurs when L1 knowledge is transferred to L2. This concept is applicable to kanji learning in JFL with a mixture of L1 backgrounds, as in the present study.

Then, the concepts of noticing, or awareness, and attention (Schmidt 1990,1994,1995; Skehan 1998; Johnson 1996) were discussed in the input/output framework of the 3P approach. Intraword Awareness was also scrutinised further at the lexical/sub-lexical level across languages for various orthographical barriers such as kanji characters (Koda 1998,1999, 2002; Mori 1998)

This theoretical review suggests that Figure 3.1, representing mainly the grammatical dimension but applicable to orthographical learning in SLA, and the model of Figure 3.5 for processing information and memory give an insight to learning kanji characters. In the next section, implicit/explicit learning for vocabulary learning, the presentation of the lexical items in context or without context, and the recognition process in kanji learning at lexical and sub-lexical levels are discussed in terms of memory and retention for practice and the ultimate goal of automatisation.
3.2 Vocabulary learning

It is widely agreed that children learn words naturally and automatically through meaningful communication while adult L2 learners need both implicit and explicit learning formally and/or informally. According to recent vocabulary research (Carter & McCarthy 1988; Coady & Huckin 1997; Nation 1990), vocabulary knowledge for L1 learners predominantly increases implicitly through extensive reading by guessing unknown words. What happens for L2 beginners with a significantly different L1 orthography from that of the L2, e.g., JFL learners with an English L1 background? As vocabulary contributes syntactic and lexical levels in relation to top-down and bottom-up processing, this discussion will cover word processing in context and/or without context. Then, the focus will turn to learning to recognise and produce kanji at the sub-lexical and lexical levels.

3.2.1 Implicit and explicit learning for vocabulary learning

L1 learning is more an implicit learning process (Durkin 1994), while it has not been totally agreed that L2 learning involves both implicit and explicit learning (Berry 1994; Chamot & O'Malley 1994; N. Ellis 1994; Schmidt 1990,1994). This is partially because the definitions of implicit and explicit learning are unclear, and the usage of implicit/explicit knowledge, memory and instruction is also perplexing.

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47 Knowledge attainment can thus take place implicitly (a nonconscious and automatic abstraction of the structural nature of the material arrived at from experience of instances), explicitly through selective learning (the learner searching for information and building then testing hypotheses). (N.Ellis 1994:1-2).
N. Ellis defines implicit and explicit learning as follows:

Implicit learning is acquisition of knowledge about the underlying structure of a complex stimulus environment by a process which takes place naturally, simply and without conscious operations. Explicit learning is a more conscious operation where the individual makes and tests hypotheses in a search for structure. (N. Ellis 1994:1).

As some of the controversies are on the consciousness (Krashen 1981,1985) and methodological issues of the experiments (Kirsner 1994), the definitions vary among researchers. In general, the implicit process ranges from natural, simple and “incidental, unattended, unconscious” (Schmidt 1995:172). On the other hand, explicit learning involves selective attention and conscious induction of abstract rules (Schmidt 1994,1995).

Different views about implicit and explicit learning arise concerning the role of formal instruction in the L2 and the development of implicit and explicit knowledge. Some focus on the learning process while others concentrate on the learning product in the IL system. Bialystok refers to analysis of knowledge as “the process by which mental representations of this knowledge are built up, structured, and made explicit for the learner” (Bialystok 1991:65). In her theory, implicit knowledge becomes explicit knowledge by formal practice along with inference using other knowledge through language exposure. That is to say, L2 learning starts with unanalysed implicit knowledge and becomes analysed explicit knowledge through instructional exposure. Krashen (1981, 1985) argues to the contrary that explicit and implicit knowledge do not interact at all (or non-interface position) even if learners practise repeatedly. With his acquisition-learning hypothesis to describe L2 acquisition by adults, Krashen believes that language “acquisition” happens only for L1, as explained below.
Acquisition is a “subconscious process identical in all important ways to the process children utilise in acquiring their first language” while learning is a “conscious process that results in ‘knowing about’ language” (Krashen 1985:1). His monitor model with rich exposure to the L2 environment, like immersion programmes, instead of the habitual repeated practice model of the behaviorists, appealed strongly for changes in classroom pedagogy. However, severe criticisms were raised about the definitions of ‘‘conscious and subconscious’’ (Gregg 1984; McLaughlin 1987) and his distinction between acquisition-learning processing modes (R. Ellis 1991; McLaughlin et al. 1983). In fact, this dichotomy contradicts the skill learning model (Anderson 1980,1983; Johnson 1996) in which conscious and repetitive practice promotes learning to reach unconscious automatisation. That is to say, explicit learning during the cognitive stage is gradually advanced to implicit learning during the autonomous stage (O’Malley, Chamot & Walker 1987).

Partially agreeing with Krashen’s non-interface hypothesis that L2 learning comes about through explicit learning, R. Ellis (1994b:106) proposes that explicit knowledge is available in controlled and automatic processing, and that a combination of explicit and implicit knowledge is also available in formal instruction. Starting with explicit
learning is particularly effective in dealing with complex materials (R. Ellis 1994b), while Matthews et al. (1989) argue that implicit first to explicit conversion later is better. However, Schmidt (1995) claims that learner awareness is the key issue to determine the effects of implicit and explicit learning: attention to input is necessary for explicit learning, but it is necessary and sufficient for implicit learning. Overall, the advantage of formal L2 instruction is on explicit learning, but “teaching packages should be based on a combination of implicit and explicit approaches” (Berry 1994:159).

Concerning vocabulary learning in particular, N. Ellis assures that “the recognition and production aspects of vocabulary learning rely on implicit learning, but meaning and mediational aspects of vocabulary heavily involve explicit, conscious learning processes” (N. Ellis 1994:212). Implicit learning mechanisms persuade practice, referring to the power law of learning, that is, practice with frequency, recency and regularity becomes tuned with automatisation (N. Ellis 1994; Kirsner 1994).

Automatisation is the ultimate goal, and it is attained through appropriate practice. Implicit knowledge needs practice that requires learners to make use of IL knowledge under “real operating conditions” (Johnson 1996:122), that is, real and natural communication. On the other hand, explicit knowledge will be automatised through actual performances of classroom activities. In the end, R. Ellis entices us to believe that practice is a “device that leads the learners from explicit to implicit knowledge” (R. Ellis 1994b:100) so that learners can attend to the new forms in controlled processing.
In addition to implicit/explicit learning, learners use two systems in IL development, rule-based and exemplar-based systems. "The rule-based system is generative and flexible, but rather demanding in processing terms, while the exemplar (memory) system may be more rigid in application, but functions much more quickly and effectively in ongoing communication" (Skehan 1998:62). This theory is mainly for syntactical processing, but it is applicable to kanji learning and involves both systems. For example, the rules to represent kanji structures and semantic and/or phonemic radicals (see Chapter Two) are applied with careful attention when learners encounter new kanji one after another. Often times, recognition may fail during processing due to complexity and unfamiliarity, especially for beginning JFL learners. So, many unskilled learners employ the exemplar based system. Single kanji to compound kanji are memorised as whole chunks. For example, 大学 /daigaku/ "university", always comes with this combination. As long as learners recognise it as a whole, it is immediately processed. In real communication, written or spoken, it is highly likely that the exemplar based system is chosen as time pressure to correspond is high (Skehan 1998). However, as the exemplar-based system requires huge memory storage, both systems are used together with contextual information.

In the next section, the review will focus more on vocabulary learning either with words in context or without context. In fact, contextualisation is a top-down approach, used more in implicit learning while decontextualisation is more analytical, used in explicit learning.

3.2.2 Contextualisation and decontextualisation
As Zimmerman claims, “[v]ocabulary is central to language learning and of critical importance to the typical language learner” (Zimmerman 1997:5), because vocabulary is central to language use. Coady recommends the necessity of both definitional and contextual information about words because “[i]n the case of L2 learners, this could be related to their often-felt need for dictionary access” (Coady 1997:287).

Vocabulary learning has been discussed often in contextualised and decontextualised approaches (Nation 1990; Coady 1993). Some studies of L1 vocabulary acquisition (Jenkins, Matlock, & Slocum 1989; McKeown 1985) suggest that children learn new words incidentally through reading. It is widely agreed that adult learners of L2 also acquire vocabulary incidentally while engaging in extensive reading (Huckin & Coady 1999; Paribakht & Wesche 1999; Wode 1999). However, it is still not clear how incidental learning of vocabulary assists acquisition of the form and meaning of vocabulary in relation to how it is retained. According to Nation (1983), during the initial stage, word lists accompanied by translations into the mother tongue are an effective way to learn many words, especially when used in conjunction with memory devices such as association and mnemonics (Atkinson & Raugh 1975). On the other hand, because of the limited information provided by word lists and dictionaries, learning word meanings from context is considered better because it promotes deep processing (Nagy, Anderson & Herman 1985). Hulstijn (1992) discusses inferred versus given meanings as learners remembering the meanings of unknown words inferred through incorrect understanding, but the results depend on learners’ focus, either on text comprehension or vocabulary learning.

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48 Learning words from word lists without context is considered to be shallow processing while learning words from context requires deep processing through inferring word and sentential meanings as well as syntactical knowledge.
The question of whether L2 vocabulary should be presented contextualised or decontextualised can be linked to the concept of receptive versus productive knowledge of vocabulary. According to the Longman Dictionary of Applied Linguistics, “[t]he ability of a person to actively produce their own speech and writing is called their active [productive] language knowledge. This is compared to their ability to understand the speech and writing of other people, their passive [receptive] language knowledge”. High frequency words tend to be contained in the productive vocabulary while low frequency words tend to be in the receptive vocabulary. The theory of learning words in context, proposed by Coady, Carrell and Nation (1985) indicates that “the less frequent words are to be learned through incidental contact in context via extensive reading, but only after a critical level of automaticity has been achieved with the high-frequency or core vocabulary” (cited in Coady 1993:16). This means that decontextualised vocabulary learning is more appropriate at elementary levels before reaching a critical level (Lewis 1993). However, Carter (1987) warns, “[t]oo great a focus on learning vocabulary as individual, decontextualized items” does not support effective vocabulary instruction.

Nation and Hwang (1995) claim that the 2,000 most frequently occurring word families of English are required for recognition, but they cover the use of only 84 per cent of the words in written texts. Further, Laufer (1997) contends that at least 95 per cent of the words, or the 3,000 most frequently occurring word families, are required to guess meaning from context in reading. Similar to word frequency in English, kanji characters are also categorised by frequency of use in popular newspapers and magazines in Japan (see section 2.1), although kanji frequency is not the same as word frequency because of the way kanji are used as vocabulary (see section 2.2.3). Interestingly, Mori and Nagy
found a supporting result in vocabulary processing in JFL in their 1999 study. They examined how English-speaking college students at a pre-advanced level utilised kanji, contextual and morphological clues in interpreting unknown kanji compound vocabulary in a short, written, sentential context. The findings were that students, in general, used multiple clues as an effective strategy to infer meaning, but that individuals had different abilities in their strategy use; not all successful learners used any types of contextual and decontextual clues, while unsuccessful learners tended to use kanji clues due to lack of a contextual strategy (see in section 3.3.2).

Using L2 to L1 translation at the sentence level on CALL's technological devices, Grace (1998) examined the retention of word meanings by elementary L2 French learners. The purpose of this task was not only to help learners learn to infer meaning but also to assist them in not retaining information through wrong inferences, which often happens at the elementary level. The results were that learners who practised sentence level translation showed significantly greater retention of correct word meanings than learners who did not.

In short, contextualisation is advantageous for skilled learners because it allows them to infer global meanings as in deep processing (Craik & Lockhart 1972). On the other hand, decontextualisation may be more helpful for unskilled L2 beginners, especially for kanji character processing which requires both lexical and sub-lexical levels of processing. These issues relate to attention and automatisation in the skill learning model in the sense that declarative knowledge needs required attention with repetitive
part practice\textsuperscript{49} in decontextualised presentations for explicit learning. However, procedural knowledge will be attained in the contextualised environment using whole practice as automatisation gradually diminishes the required attention (Johnson 1996). It is critical for an individual learner’s proceduralisation level to match contextualisation, and vice versa. In fact, word learning is a fundamental processing skill dealing cognitively with the environment (Richards & Rogers 1986; Stroller & Grabe 1993), utilising schema for networking with existing and new word knowledge (Coady 1993; Rumelhart 1980; Aitchison 1987). Considerable importance is placed on the progressive development of skills from one phase to another, as with Intraword Awareness (Koda 2002) as discussed in the previous section. Consequently, there must be various types of active interactions between contextualisation and decontextualisation, whole and part practice, holistic and analytic (or top-down and bottom-up) analysis, with implicit and explicit learning modes during the developmental processes for effective vocabulary learning.

3.2.3 Kanji processing

3.2.3.1. Single kanji processing

Any orthography represents graphemic, semantic and phonemic properties, but the degree of complexity varies depending on the language. Kanji’s graphemic symbols are usually more complicated than alphabetic symbols in horizontal, vertical and diagonal arrangements consisting of 214 radicals or composites (see 2.2.4, Nelson 1962;\textsuperscript{62})

\textsuperscript{49} Part practice includes deconstructing and analysing words at the local level while whole practice denotes inferring meaning from context, applying metalinguistic knowledge.
Watanabe 1977; Kaiho & Nomura 1983). This means that “kanji display a large array of graphic configurations (which) increase the number of potential contact points for activation to take place” (Kess & Miyamoto 1999:34). Therefore, kanji with more than 13 strokes are processed as a chunk, instead of each stroke (Kaiho 1979) so that the number of the recognition units is decreased.

In addition to the graphemic complexity, various studies have further examined kanji in terms of the degree of grapheme-phoneme and grapheme-semantic correspondence (Katz & Frost 1992; Seidenberg 1992). According to the orthographic depth hypothesis (ODH), a shallow (or phonologically transparent) orthography represents a consistent letter-sound relationship like kana in Japanese, while a deep (or phonologically opaque) orthography indicates a highly ambiguous relationship. So, response to word recognition written in an opaque orthography is delayed compared to those in a transparent orthography due to additional analysis being required from the mental lexicon (Hatta 1992; Katz & Frost 1992; Flores d’Arcais 1992).

As observed in Chapter Two, wago consists mostly of single kanji followed by kana. A brief review of kanji processing (Kaiho & Nomura 1983; Koda 1989,1990,1996; Coulmas 1989; Okita 1996) and kana processing (Nomura 1981; Chikamatsu 1996) indicates that kana carry no semantic component as isolated symbols, like letters of an alphabet, whereas kanji require more complicated processing. In kanji, there are two types of radicals, semantic and phonemic, and the locations of the radicals in a single
kanji discriminate one from the other up to a point\(^{50}\) (see section 2.2.4). As a consequence, kanji processing takes longer due to the necessity for both phonemic and semantic processing, but radicals help retention (Umemura 1981).

According to Kaiho (1979), native Japanese speakers perceive the graphemic component first, then they tie it in with its semantic and phonological components, as illustrated below.

The phonemic information of the on- and kun-readings of the kanji and semantic information of the meanings in the kun-reading are perceived in the brain. After a matching process using phonemic and semantic cues, three codes are produced separately, a phonemic code for reading, a semantic code for meaning and a graphemic code for the kanji graphic. It has been argued, however, that L1 readers either process semantic components first or phonemic components first depending upon the type of

\(^{50}\) In general, semantic radicals occur at the left side while phonetic radicals are at the right side of the kanji characters. For example, 結 and 終 are distinguished by the radicals, 木 “tree”, and 糸 “thread”, at the left side of the kanji which carry the semantic representations. However, the semantic radical 木 tree, can be seen in 柴 in which 木 takes the role of the phonetic radical “moku”, and does not convey any meaning related to “tree”.

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kanji (Kaiho & Nomura 1983, see also Table 2.4) or, graphemic and semantic information is processed almost automatically and unconsciously after processing the phonemic information, similar to kana processing (Mizuno 1997).

Further, Wydell, Patterson and Humphreys (1993) determined that kanji processing requires both phonemic and graphemic information first whereas Flores d'Arcais and Saito (1993) found a semantic interference effect in judging 始 “to begin” by the priming kanji 女 “female”, but complex kanji were decomposed prior to semantic and phonemic processing. Then, Flores d'Arcais, Saito and Kawakami (1995) reported that both phonemic and semantic information are used, although phonemic processing takes the greater role. Leong and Tamaoka (1995) tested the lexicality of single kanji with L1 speakers (4th, 5th and 6th graders), and agreed with the results of Flores d'Arcais et al. (1995) that only if the kanji is difficult, phonemic processing may take place while decoding. The reason that semantic processing is not used often is:

[t]he role of “semantic” radicals is not semantic in recognition of many complex characters, for the recognition units which contribute to access procedures are simply not isomorphic with the semantic radicals as traditionally conceived. (Kess et al. 1999:67).

Based on these results, Okita stated that kanji processing in Japanese involves “more visual and less phonological computation” (Okita 1996:13), and “...obscure character-sound relationships in kanji might contribute to more involvement of the direct (grapheme to semantics) route” (Okita 1996:16). Flaherty (1994) also indicates that, because of the multiple readings of Japanese kanji, L1 learners require more graphemic processing compared with Chinese kanji and English words.
From the L2 pedagogical perspective, Okita continues that native Chinese speakers might process Chinese kanji, “first visually, second phonologically, and third semantically” (1996:11), however, English speakers depend more upon phonetic processing to access meaning than native Japanese due to the phonetic nature of the alphabet (Koda 1994). In spite of that, L2 beginners who are native English speakers are not familiar with effective utilisation of phonetic radicals mainly because of the distance from the L1. It is also because JFL teachers place more emphasis on semantic radicals (Toyoda 2000) due to the types of kanji introduced during the beginning level (Yamashita et al. 2000).

3.2.3.2. Compound kanji word (jukugo) processing

As stated in 2.2.3, wago and kango are used together in written script, and more than 50 per cent of most dictionaries are multiple compound kanji in Japanese (Kess et al. 1999) while 81 per cent are compounds at the lexicon level in Chinese (Zhou 1978 cited in Taylor & Olson 1995:155). This compositional difference leads to different word processing. Wydell, Butterworth and Patterson (1995) found that compounds in Chinese are processed phonologically at the sub-lexical level as in English, while those in Japanese are processed at the lexical level as a whole (jukugo) due to on- and kun-readings. For example, 親 /oya/ “parents” is read /shin/ in 両親 /ryōshin/ “parents”, but /oya/ in 父親 /chichioya/ “father”, in spite of having the same meaning because the former is kango, pronounced in an on-reading, and the latter is wago which is pronounced in a kun-reading. Through serial experiments, they concluded that the recognition units are at the word level where the correct reading is determined by the
context. However, Tamaoka and Hatsuzuka (1998) examined whether L1 readers always rely on whole *jukugo* processing, using three types of compound words: semantically opposite words, e.g., 長短 /chôtan/ “long & short, or length”, semantically similar words, e.g., 柔軟 /jûnan/ “soft & flexible or pliable”, and closely bound but frequently appear together as words, e.g., 荒野 /kôya/ “wild & field or wilderness”. The findings were that there is strong interference in the first type, and weak interference in the second type. This means that L1 readers also use semantic processing at the sub-lexical level depending on the types of words. Other studies (Hirose 1992; Tamaoka & Takahashi 1999) report the role of retrieval of the first kanji in two kanji compounds, and that frequency of kanji is a crucial factor. Further studies (Tamaoka & Hatsuzuka cited in Kess et al. 1999:76) examined the role of word construction frequency and printed frequency, and found that kanji printed frequently had a stronger effect in naming. In fact, a similar case occurs among L2 beginners to begin activation for matching graphics with any available sound, especially when they are familiar with words in spoken activities. Accuracy in kanji reading depends on “knowledge about how often this configuration appears and whether a lexical address for this is commonly accessed” (Kess et al. 1999:78).

Further, the results of the comparison between orthographically related JFL learners (Chinese and Korean51) and unrelated learners (English) revealed that the related group performed better, and that the initial performance difference in processing skills for

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51 Hangul is the sole script in North Korea and the major script in South Korea, which still uses some Chinese characters for some content words (Tayler & Park 1995:4).
kanji characters continued (Koda 1998, 1999). However, acquiring the phonetic elements of kanji is still difficult (Y. Shimizu 1993) as shown in a survey of the error rates for kanji reading of 74.3 per cent for non-kanji backgrounders and 64.9 per cent for kanji backgrounders (Ishida 1989).

Likewise, the kanji production was analysed in terms of the frequency of exposure to L2 processing, L1 and L2 orthographic distance as well as L1 processing experiences (Koda 1996). The result shows that frequent exposure to kanji assists in re-inforcement of sensory information processing, but learners should have critical and self-aware attitudes, because production requires more decisive accuracy than recognition due to the need for full retrieval from memory. Incomplete production indicates the developmental stage of acquisition (Toyoda 1998), and it may be still processing in the IL.

Thus, the findings of the processing order of kanji representations are not conclusive. It is agreed, however, that any orthography requires phonological processing although the dependence on phonological code varies among languages (Seidenberg 1992). For the promotion of recognisability of the orthography, repeated exposure to L2 scripts is encouraged to assist the L2 processing experience (Segalowitz & Segalowitz 1993). The more exposure learners have, the better the performance in automatic processing which also develops L2 linguistic knowledge. At the same time, conscious awareness induces the quality of exposure.
3.2.4 Summary

Following the information processing models, this section examined how IL knowledge is developed during the processing between input and output in Figure 3.5.

First, the definition of implicit and explicit learning was reviewed with the main differences being conscious or unconscious in their approaches. L1 learning is more incidental and implicit in a rich environment. The findings in L2, however, are more complicated due to the different definition, the role of instruction and tasks as well as complexity of the L2 materials. Although the results vary, in general, a combination of implicit and explicit learning is considered appropriate for L2 vocabulary learning.

The review is extended to vocabulary learning in context or without context, and part or whole practice. Due to different knowledge and skill levels among learners, contextualisation is suitable for skilled learners mainly because of the promotion of deep processing and inferrability. However, decontextualisation in explicit learning may be more helpful for unskilled L2 beginners due to limited working memory capacity. Along with the development of processing skills, however, declarative knowledge is proceduralised and attention also will be diminished, gradually.

Finally, the review focused on processing of kanji learning, single kanji and compound kanji (jukugo). Although the recognition unit and process are not the same in other languages, it is agreed that all use phonological processing although the weighting on semantic and graphemic processing varies. L2 learners of JFL reveal different results depending on the language level. For example, native English speakers tend to use
phonological processing for L1 reading, but not much for processing kanji in JFL learning, mainly due to a lack of skills and knowledge of the phonetic radical during the beginning level. In fact, these processing skills are transferable from L1 if the linguistic distance between a learner’s L1 and L2 is not large, because “the use of L1 processing mechanisms that are typologically similar will result in better and more efficient performance” (Koda 1997:38). This difference is one of the most influential factors for learning kanji at the beginner level.

In addition, compound kanji processing requires contextual processing due to multiple readings in Japanese, on- and kun-readings. The problem is that the phonological processing of single kanji is not always applicable to compound kanji reading. However, word familiarity through exposure to spoken and written language in L2 will increase word recognition and inferability.
3.3 Language learning strategies

So far, the review has concentrated on internal processing. This section will move on to the learners' internal and external dimensions, or learning strategies. The aim of language learning strategies is to improve learner proficiency and confidence in language learning and so enable students to become autonomous learners. Various studies on language learning strategies have been conducted in the past quarter century, focusing on identifying effective language learners (Stern 1975; Rubin 1975; Naiman et al. 1975, reprinted 1996), classifying what language learning strategies they have used/are using, and developing strategies (Cohen 1998; O’Malley, Chamot & Walker 1987; O’Malley & Chamot 1990; Oxford 1989,1990; Rubin 1987; Wenden 1987,1991). Since then, strategy research has been more diversified in order to examine other variables, such as individual differences in strategy use, learning styles, learner motivation, anxiety, the influence of tasks and instructions in relation to outcomes, and so on (Reid 1987; Wenden & Rubin 1987; Horwitz & Young 1991; R. Ellis 1994a).

Strategy taxonomies vary among researchers who use either behavioural models (Wenden 1987; Oxford 1989) or behavioural and mental models (O’Malley et al. 1990). Wenden (1987:6) defines learner strategies as “...language learning behaviours learners actually engage in to learn and regulate the learning of a second language”. They are somewhat observable and potentially conscious actions. Even the cognitive approach of the skill learning model employs various types of metacognitive strategies (N. Ellis 1994,1995) along with cognitive strategies in achieving automatisation.
In accordance with the ACT* model (Anderson 1980, 1983), as well as Rubin’s model (1975, 1981) of language learning strategies, O’Malley and Chamot (1990) expanded learning strategies to include metacognitive, cognitive and social/affective strategies. The main focus is on cognitive strategies which are linked directly to learning tasks, such as repetition, resourcing, directed physical response, translation, grouping, note-taking, deduction, recombination, imagery, auditory representation, keyword, contextualisation, elaboration, transfer and inferencing. Some are externally observable, but others are more internal. Another focus is the metacognitive strategy for management of learning consisting of organising, self-monitoring and self-evaluation, among others. This classification is to clarify the correspondence between mental processes in the cognitive theory and strategic processes in language learning strategies (O’Malley et al. 1990:12). Based on Dansereau’s (1978) classifications of primary and support strategies, Oxford (1989) called them direct and indirect strategies.

After more elaboration, Oxford (1989, 1990) developed six learning strategies, “born of [her] own grappling with language instruction” (Oxford 1990:x), to make learning strategies understandable to teachers of second and foreign languages. As this study will use the Strategy Inventory for Learning Kanji (SILK) (see section 3.3.3 Bourke 1997), based on Oxford’s model using the Strategy Inventory for Language Learning (SILL), the review will concentrate on it as a background.

3.3.1 Oxford’s SILL model (1990)

Learning strategies are defined as “specific actions taken by the learner to make learning easier, more enjoyable, more self-directed, more transferable to new situation”
Oxford developed the Strategies Inventory for Language Learning (SILL) for "improving proficiency and greater self-confidence" (Oxford 1990:1) on language learners. The SILL is a self-report type questionnaire containing the six strategies which are then divided into a further 19 subcategories and those into 62 statements. Each statement is rated on a five point Likert scale of the frequency of use. The SILL is widely used in SLA because it has been translated into ten languages. Moreover, because of its high reliability (Ehrman & Oxford 1995), and its practicality, the SILL instrument has been used widely by teachers, learners and researchers.

Oxford classified language learning strategies into direct strategies, which O’Malley et al. (1990) classify as cognitive strategies, and indirect strategies which are equivalent to the metacognitive and social strategies of O’Malley et al. (1990). The former, including memory strategies, cognitive strategies and compensation strategies, are for dealing with the new language, while the latter, such as metacognitive strategies, affective strategies and social strategies are for the general management of learning. Although cognitive and metacognitive strategies are essential for language learning, the SILL includes a variety of affective and social strategies for easy access to the whole range of language learning strategies. Oxford describes these six, main types of language learning strategies thus:

Memory strategies for remembering and retrieving new information, cognitive strategies for understanding and producing the language, and compensation strategies for using the language despite knowledge gaps.


Each of these six language learning strategies is examined in relation to kanji learning strategies to see later how learners utilise them for effective learning. Firstly, memory
strategies are classified into four categories as follows:

A. Creating mental linkages
B. Applying images and sounds
C. Reviewing well
D. Employing action

These strategies are used very often to memorise vocabulary by arranging knowledge in order, making associations and reviewing so as not to forget. Mnemonics are popular memory devices, e.g., the peg method, the key word method, the loci method, and the like. These utilise some well-known principles: “a retrieval plan is developed during encoding, and mental imagery, both visual and verbal, is used” (Thompson 1987:43). However, a question remains as to how they enhance decoding for retrieval. In addition, visualisation and physical movements such as Total Physical Response (Asher 1965, 1972) and the Silent Way (Gattegno 1974), often used in class, are also helpful for memorisation. Efficiency varies depending on individual learning differences.

The second type of direct strategy, cognitive strategies, refer to practising repeatedly, analysing, translating and summarising new information. The types of cognitive strategies are listed below.

A. Practising
B. Receiving and sending messages
C. Analysing and reasoning
D. Creating structure for input and output

Practising is the most important and is essential to increasing proficiency. It occurs formally in class, and happens informally outside of class, too. Oxford suggests “practising naturalistically” (1990:76) by watching TV and films and reading target language newspapers and magazines. Applying this strategy to kanji learning, learners have to practise reading and writing new kanji repeatedly along with old kanji, using the schematic technique in memory strategies. L2 learners may transfer skills and
knowledge from their native language, and occasionally make an interlanguage by overgeneralising L1 rules.

The third and final group of Oxford’s direct language learning strategies is compensation strategies used for comprehension and production. These are used to fill in gaps between pieces of known information by inferencing either linguistically or non-linguistically. Learners also get help from friends or avoid communication to overcome or sidestep their limitations. Occasionally, learners switch to their L1 due to a limited L2 vocabulary. They may also adjust the message they wish to speak or write in the L2 into more familiar expressions, use synonyms or get help from others if it is available. A common example of a compensation strategy among JFL learners is simply avoiding the use of certain kanji and using hiragana instead, which provides a precise phonetic representation of the word52. In addition, dictionary use is another useful compensation strategy (Bourke 1997). O’Malley et al. (1990) classify those compensation strategies into the cognitive strategies.

Oxford’s other main group of strategies is the indirect strategies, metacognitive strategies, affective strategies and social strategies, which support learners’ efforts indirectly without involving the L2. Consequently, these strategies are applicable to many other areas of study, in a sense they describe generally how to behave and manage learning effectively. The metacognitive strategies are “actions which go beyond purely cognitive devices, and which provide a way for learners to coordinate their own learning process” (Oxford 1990:136).

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52 Problems may arise when words usually written in kanji are written in hiragana because of the high proportion of homonyms in Japanese (see section 2.2.5) and because the reader expects certain words to be written in kanji and so does not recognise them in hiragana.
Metacognitive strategies are used to oversee, organise, plan and evaluate learning and Oxford described three types.

A. Centering your learning
B. Arranging and planning your learning
C. Evaluating your learning

All of these sub-categorised metacognitive strategies are indispensable for effective learning (Chamot et al 1987), so are cognitive strategies (Chamot & Küpper 1989). The problem is that there is no clear-cut identification between them due to the different categorisation of the interview data collected in the context of the study (O’Malley et al. 1990). Oxford also comments that “[e]ven individual researchers often classify a particular strategy differently at different times, in light of new insights” (Oxford 1990:22).

The second type of indirect strategies, affective strategies, refer to, “emotion, attitudes, motivations, and values” that learners bring to their learning (Oxford 1990:140). Three subcategories are: lowering your anxiety, encouraging yourself, and taking your emotional temperature. It is important for learners to encourage themselves by calming down and controlling negative thoughts which may cause fear and anxiety. Good language learners often know the value of self-esteem. They can also cope with ambiguity in language learning. An example in kanji learning would be to find relaxation and enjoyment by watching TV, listening to music, taking a walk, writing kanji on the wall, etc. It does not matter whether the activities relate to kanji or not as long as they can maintain positive feelings. Perhaps they should not compete or compare themselves with someone who has a kanji background, especially at the initial stage of learning kanji.
The last type of indirect strategies, social strategies are used to assist communication at the social level where language is used as a tool of communication. Asking questions for clarification and cooperating with others are basic strategies between and among people. Cooperative learning increases confidence, rapid achievement and motivation. On the other hand, occasionally it may cause negative competition and debilitating anxiety, hostility and fear of failure. Again, there are overlapping areas between “cooperating with others” and “getting help from others” in compensation strategies. However, the former is for managing social communication and not directly involved in the language level, while the latter is for assistance in directly providing/obtaining missing words and phrases. As a matter of fact, all language learning strategies mutually support each other as illustrated below.

Figure 3.8. Interrelationships between Direct and Indirect Strategies and among the Six Strategies Groups (Oxford 1990:15)
The six strategies naturally overlap, as Oxford states:

The metacognitive category helps students to regulate their own cognition by assessing how they are learning and by planning for future language tasks, but metacognitive self-assessment and planning often require reasoning, which is itself a cognitive strategy. (Oxford 1990:16).

As learning problems are tangled like a puzzle, learning strategies for problem solving also become complicated and overlapping directly or indirectly.

3.3.1.1 Findings with or without the SILL

The SILL has been translated into ten languages including Japanese. In worldwide studies using the SILL to determine the language learning strategies in L2, its reliability using Cronbach’s alpha is in the range of the 0.90s indicating it to be “a valid, significant predictor or correlate of language proficiency and achievement” (Ehrman & Oxford 1995:73).

Using the SILL to determine language learning strategies, Oxford and Ehrman (1995) examined the relationship between strategy use and ESL learning success at the Foreign Service Institute in the US. The most frequently used strategies by successful learners were compensation strategies. Another study, looking for some pattern among groups of university students who either succeeded, failed or dropped out, was carried out using a CALL ESL course and variables such as use of language learning strategies, the student’s L1 and the student’s level of L2 proficiency (Jamieson & Chapelle 1993). The degree to which learners used cognitive strategies was a significant variable in their success or lack of success in language learning.
In relation to learning motivation, Okada, Oxford and Abo’s study (1996) about learning strategy use among JFL and Spanish learners at college level in the US reports that both groups showed a significant correlation between metacognitive strategy use and intrinsic motivation such as enjoying language learning. JFL learners had a stronger interest and motivation in learning because of its difficulty for English speakers, compared to Spanish, that is, it can be considered that JFL learners had a greater commitment when they chose Japanese. Also, Oxford and Nyikos (1989) found that there is a strong relationship between use of language learning strategies and motivation. Learners highly motivated for fulfilling course requirements or obtaining good grades used more strategies. In another study, however, a group of high school students learning Japanese in Japan (Murano 1996) used compensation strategies most often and their level of use was very high, probably due to the direct influence of the rich exposure to the L2 environment.

On the other hand, qualitative analysis was also carried out in different languages. Two studies were conducted with JFL beginners at tertiary level; one by Takahashi (1993), was a study of language learning strategies use by unsuccessful learners in the US, and another by Maingard (1999), using a multimedia CALL Japanese conversation program in Australia. The common findings were that unsuccessful learners used far fewer strategies than successful learners, and that the only strategies they used were memorisation strategies involving rote memorisation without proper comprehension of what they were memorising. Further, Maingard pointed out that, although metacognitive strategies such as planning, monitoring and evaluating one’s own learning are

53 The FSI assigns Spanish to Category 1, and Japanese to Category 4 or the most difficult for native English speakers (see Chapter Two).
indispensable for beginners due to the massive amounts of new information they have to
deal with and the new learning experiences they have, only successful learners used
them. Takahashi also added that, during conversation activities, unsuccessful learners
used few or no social strategies, but used memory strategies intensely with insufficient
practice to be effective. Furthermore, these students had even greater difficulty with
Japanese kana script lessons, due to the importance of effective memorisation backed up
with a large amount of practice. More precisely, in vocabulary learning, successful
learners use “sophisticated metacognitive knowledge to choose suitable cognitive
explicit learning strategies appropriate to the task” (N. Ellis 1994:51). Other study in
German and French compared less effective students to their counterparts; Graham
(1997:62) found that, regardless of the language, less effective students used 73 per cent
word level analysis for reading comprehension activities while effective students used
only 54 per cent, but more contextual analysis utilising inferencing techniques.

These findings show that both frequent use of strategies and the use of a variety of
strategies are common in successful learners who tend to develop a combination of
Effective language learners tend to use more strategies (Nyikos 1991). According to
Chamot and Kupper (1989), all learners attempt to use appropriate strategies with
flexibility, and “good” language learners tend to choose the right strategy for the right
occasion. However, many learners are not always aware of the existence of language
learning strategies and how to use them (Oxford et al. 1989).

Finally, the trainability or teachability of the use of language learning strategies has
been discussed in relation to materials, tasks and levels among learners (Chamot &
O’Malley 1996; Oxford & Leaver 1996). Initially, a good language learning model was proposed for the training of effective learners (Rubin 1975; Naiman et al. 1975, reprinted 1996). Also, there appear to be language-specific phenomena depending upon the learner’s level of proficiency. Chamot et al. (1996) investigated a Japanese program along with other languages at college and high school levels in the US.

Beginning level Japanese teachers found that memory strategies for developing their students’ knowledge of vocabulary were quite important to teach. The early introduction of writing in the high school Japanese classes also evoked an interest in teaching students strategies that would assist in recognizing and producing Japanese characters. Students found that imagery was the most helpful strategy for learning the Japanese characters. (Chamot et al. 1996:185).

In addition, they found that the strategies that teachers and students identified as most effective are not always the same, and the selection of appropriate strategies depended upon the language learning task. Oxford states that, “[the] goal of strategy instruction is to help students become more self-directed, autonomous, and effective learners through the improved use of language learning strategies (1996:227).” Also, as strategy use is individually different, learners’ individual differences (Skehan 1991; Lightbown & Spada 1993; R. Ellis 1994a; Spolsky 1989; Graham 1997) such as learning style, personality, motivation, attitude, aptitude, age and gender may affect the choice of strategies for language learning. While some of them are included up to a point, the present study focuses on strategy use for learning kanji characters using a CALL kanji program.
In the next sections, previous studies of kanji learning strategies from learning kanji graphics to reading comprehension will be reviewed to find an appropriate approach for the current research.

3.3.2 Techniques for learning kanji

This section reviews various techniques and devices used for recognition and production of kanji to assist memory with slightly different weightings at different developmental stages. However, as the strategies are reviewed in the next section, this section is limited only to the individual technical devices, instead of strategies as "production sets" (R. Ellis 1994a:533), although some inevitably overlap.

First of all, stroke order along with stroke counts is a traditionally used technique (see section 2.2.5). Writing kanji using the established stroke order is more economical, saving physical energy, and accurate so that the graphic outcome is well-balanced. In particular, during calligraphy classes instructors pay special attention to whether the tip of brush starts in the right position and moves in the right direction, and whether students finish writing each constituent correctly using either a stop (tomeru), fade (harau) or flick (haneru). As Bourke's video tape (1997) indicates, the majority of primary school teachers in Japan introduce kanji by explaining the stroke order on the blackboard in the classroom and practising each kanji following the correct stroke orders and counts. Generally speaking, form is considered to be an important factor in maintaining balance in the harmonious Japanese society, and concentrating on the aesthetic form of writing was also popular historically among military warriors, for
mental training. This probably led to the stroke order technique being well-received in the Japanese educational community.

Importantly, stroke counts are used to search for unknown kanji in dictionaries. The kanji dictionary, *Kanwa jiten* or *Kanji jiten* (see Bourke 1997:92-101; Noguchi 2001), presents thousands of kanji either by stroke counts in groups or by radicals, so that users can find a kanji and its readings, meanings, stroke counts and orders, and usage usually at the vocabulary level. Consequently, it is crucial for upper level L2 learners to be able to use kanji dictionaries effectively by themselves, as it is extremely time-consuming to master the Jōyō Kanji during the limited instruction time available in the foreign language learning environment. Needless to say, learners should know how to use a dictionary, and become used to it from the beginning level.

In relation to the stroke counts, a unique way to practise kanji used with Japanese children is “Kūsho” ("writing in the air" with fingers), (Sasaki 1984; Bourke 1997) which is believed to strengthen the memory, concurrently with or after recognition. Kūsho is often accompanied by the verbal sound of the stroke counts while drawing kanji in the air following the stroke order of each kanji. Although the origin of Kūsho is uncertain, it is assumed that mastering a large number of kanji and their complicated graphics matched well with a three dimensional learning method using visual, motional and verbal actions for children aged from nine through 12 among L1 learners (Sasaki 1984). The higher the grade, the more children used “Kūsho” action. In fact, many native adults use it in Japan. Further study with L2 learners revealed that some Chinese and Korean L2 learners use it while learning Japanese, whereas English
speakers do not (Sasaki & Watanabe 1983), perhaps because alphabet letters are so simple to draw, at most four strokes against the maximum number of 30 strokes for a kanji. Based on these studies, Kess et al. describe Kusho as a "culturally-based external tool in cueing the motoric and action-based aspects of mental representation" (Kess et al. 1999:80).

Mnemonics are often used in the form of story making with the association of sounds, meanings and graphics, and there are also visual and/or acoustic mnemonics and the key-word method (Atkinson et al. 1975; Hulstijn 1997) which associates meanings and sounds. Those are not for retrieval of the exact L2 word or characters, but for an approximation to trigger the L2 form (Pressley, Levin, Hall, Miller & Berry 1980). Kaiser (1997,1998,1999) classified kanji learning methods using graphemic, semantic and phonemic elements of kanji into several approaches54, and found the uniqueness of Japanese mnemonics is the use of the rhyme pattern of 5-7-5 syllabic sounds based on traditional Japanese sonnets or haiku. At the same time, he suggested that learners themselves, not teachers, should create mnemonics, so that kanji are memorised more easily as Atkinson recommended (1975: 824-825). However, Hulstijn (1997) argues that less imaginative students can retain words better even if they only imitate examples made by teachers. So, cautious assistance is necessary pedagogically to support student-oriented learning so that students become autonomous learners.

Another memory technique (Sakai 1994) is to present discriminative features

54 1. Memory using graphic elements (Foerster/Tamura), 2. Combination of graphics (Vaccari & Vaccari), 3. Story using graphic elements (Heisig), 4. Grouping in common phonetic elements (Habein & Mathias), 5. Story using graphic and phonetic elements (Hamanishi), 6. Combination of graphic and semantic elements in situations where kanji is used (Kanji Text Research Group) and 7. Combination of 1) through 6).
contrasting common errors in kanji graphics for kanji production. In fact, this approach is often used in grammatical instruction, but usually errors are pointed out afterwards, so as not to instil wrong information in the introduction because behaviourism penalises making errors. However, she argues that comparative presentations with samples of possible errors are helpful to attract special attention at the input stage. This seems effective because correction of the memory usually requires more effort than the effort for the initial input. However, further study is needed to substantiate whether such information would be better presented at the input or output stages in terms of noticing effects and the promotion of long term memory.

Due to the nature of kanji graphics, the techniques of visualisation are actively used. Watanabe and Toyoda (1994) tested how colour distinctions of kanji components affected memory and found no significant difference, but that the participants distinguished at least the coloured kanji components correctly. Another study of the kanji graphic pattern approach (Takagi 1995) indicates that graphic instruction activates enforcement of graphic pattern training. Further, Hatasa’s (1989) study investigated the effect on memorisation and cognitive processing of whether a kanji is pictographic or not by preparing three groups of kanji: pictographic kanji with correct meanings, pictographic kanji with incorrect meanings, and non-pictographic kanji with correct meanings. The results showed that for pictographic kanji it was easier for the learner to associate the kanji graphics with meaning than for non-pictographic kanji, so visual images appear to enhance learning. However, as this experiment used only eight kanji per group, further research is necessary to verify the results. In fact, the pictographic approach is employed in Kantarō, a CALL kanji program (see section 4.3).
Flashcards and/or kanji cards are often used as a popular method in and out of the classroom for memorisation of vocabulary and kanji as well (Birch et al 1995; Okita 1995; Kato 2000), since they are simple and handy to use anywhere. Kanji lists or kanji vocabulary lists, used among JFL learners, contain kanji graphics, meanings and pronunciations. One or two meanings are mostly written in English or the students’ native language. Both on- and kun-readings are written for the kanji pronunciations, occasionally hiragana and katakana are used to distinguish on- and kun-readings, but introductory JFL learners tend to use Roman letters until they are used to using kana. Also, they “help students make the transition from oral imitation to reading” (Harris 1977, cited in Dwyer 1997:355). The effect of flashcard practice on computer programs was found that it can be helpful to increase recognition as well as to assist students in developing good learning habits (Dwyer 1997, see section 3.3.3).

It is interesting that L2 learners with kanji backgrounds generally use rote-memorisation along with stroke counts/orders like L1 learners in Japan while learners with English backgrounds tend to use other learning techniques and aids such as mnemonics/stories and flashcards. It could be culture-related (Ballard 1987), or those with kanji backgrounds such as Chinese and Korean readily transfer their processing skills from their L1 (Koda 1998,1999). Takebe suggests that each kanji should be initially introduced as a logograph, not like English vocabulary, so that non-kanji background learners do not seek a reading but just recognise it as a sign. At the end, however, his “kanji diagram theory”, in which there are 24 rules for mastering kanji by breaking kanji into meaningful components, requires that “kanji signify meaning” (Takebe 1989:4). Using his approach of grapheme-semantic correspondence, the semantic
representation is tied to the symbol, e.g., prefs as a postal code in Japan.\textsuperscript{55}

3.3.3 Studies of kanji learning strategies

Learning kanji is one of the big obstacles in JFL due to the major differences between an L1 phonography such as an alphabet and a morphography like kanji in Chinese. Besides common strategies with other languages like ESL, learning requires kanji-specific strategies, especially for mastering the 1,945 Jōyō Kanji including about 4,000 multiple readings within a limited time (see section 2.2.1). Under the influence of studies in ESL, many researchers conducted research in kanji learning strategies in JFL/JSL, with emphasis on beginners (Hatasa 1989; Birch et al. 1995; Sakai 1994; Takagi 1995; Bourke 1997; Kato 2000; Yamashita et al. 2000) or, beginning to intermediate levels (Kano 1993, 1995; Douglas 1992; Okita 1995, 1996) or, more focused on the upper levels (Mori 1998, 1999; Komori et al. 2001) to observe developmental differences. Also, wide ranges of studies in kanji acquisition were conducted among L1 learners in Japan (Shimamura 1989; Suda 1988; Kobayashi 1998).

The most common strategy actively used by L1 and L2 learners is repetitive writing practice. It is a culture-independent strategy (Kess et al. 1999), as even the phonography-oriented learners in L1 such as in the US and Canada rely on the frequency strategy. Physical involvement encourages memorisation in encoding and decoding for accurate processing of complicated kanji images, as in Kūsho. So, the memory strategy was analysed further in relation to the pattern of kanji composites from the cognitive perspective and/or learning styles such as verbal and visual patterns from the

\textsuperscript{55} The katakana symbol \textit{/te/} comes from the initial sound of “Teishin-shō” (Ministry of Posts & Telecommunication) of the pre-war period.
the psycho-linguistic perspective. As this is an exploratory study on strategy use, four studies (Birch et al. 1993, 1995; Okita 1995, 1996; Bourke 1997; Kato 2000) were chosen for an elaborate review in this section, including categorically related studies.

3.3.3.1. Birch and colleagues’ studies (1993, 1995)

De Courcy and Birch’s (1993) and Birch, Norris and Negishi’s (1995) studies examined reading and writing strategies, particularly for learning kanji with a more top-down approach, in a partial immersion Japanese program at university level for one semester in 1993 and 1994 respectively in Australia. In 1993, the participants consisted of four subjects, English speakers from a non character-based background, but, with some amount of learning experience in Japanese before the course. In 1994, the same students participated at a more advanced level, and one more student was added. The written materials used were near authentic, focusing on contemporary Japanese society; there was one item without any furigana, and another with furigana above the difficult kanji. Students started to learn with the first one, but the second one was given before their tolerance levels were reached, due to the difficulty of the material. The main strategies for reading were use of key vocabulary and inferencing by using prior knowledge syntactically. In particular, first, they tended to be “locked in their phonetic script reading habits and treated an unfamiliar kanji like they would a new word in English” (de Courcy et al. 1993:28), however, in the end they tended to “tap directly into the meaning of the character” (de Courcy et al. 1993:29). For writing kanji, they used repetition for accurate production as the basic strategy. The findings were that, through teaching interventions, the students in 1994 utilised a broader range of strategies such as
using flash cards, repeated writing practice, recalling kanji as pictures, analysing kanji into semantic and phonetic radicals, and focusing on the stroke orders. Furthermore, they gained more confidence, and dealt with kanji as a manageable task. Another was access to the Japanese word processor called Jiejing which allows the user to process the strokes of each kanji character. Also, it was used to produce the written assignments. All showed more positive attitudes at the end. However, it is not clear whether there was a direct effect from use of Jiejing on kanji writing or even awareness raising. The more one can develop one’s processing skills, the more one learns the content area beyond orthographic processing. However, it takes time to gain confidence which varies individually. Similar cases occurred in the present study; some indicated a similar confidence about kanji learning while some made little progress.

3.3.3.2 Okita’s study (1995, 1996)

After modifying Oxford’s (1990) SILL survey, Okita (1995) prepared 30 kanji learning strategies and examined 84 university students at three different levels in Hawaii in the US. The learning place is much richer than other JFL environments. For example, 70 per cent of learners were Japanese descendants or related, Japanese TV programs are available in daily life, and there are many street signs in Japanese. The results showed significant differences among three levels\(^{56}\); the 1\(^{st}\) year students used flashcards, the 2\(^{nd}\) year students memorised the places where kanji is used, and the 3\(^{rd}\) year students utilised a dictionary and tried to comprehend the contents without translation. In

\(^{56}\)Douglas (1992) also found developmental differences in her study of JFL reading at university level.
addition, all were inclined to utilise the kanji graphemic rather than kanji phonemic representation for encoding, but still relied on phonemic importance for decoding. The same behaviours were seen in the results of the handwritten quizzes by the JFL learners with phonographic backgrounds in the present study, that is, the majority of alphabetic backgrounders in L1 had more difficulty with kanji reading or pronunciation than kanji graphemic distinction and kanji production. In fact, this is also true for beginners with kanji backgrounds, in their cases, however, because they already have kanji graphemic knowledge. Although kanji in Chinese are not completely the same as kanji in Japanese, kanji reading in Japanese is the more difficult due to the multiple readings and, the right selection mostly depends on the context (Scovel 1999; Kess et al. 1999).

Furthermore, applying factor analysis to the seven kanji learning strategies, Okita (1996) extracted three factors for kanji learning strategies: contextual learning, mnemonics learning and rote learning, and two verbal and visual learning style preferences. The findings were that contextual learning relates to a high verbal learning style preference (e.g., sounding out texts) by learners, mnemonic learning relates to a high visual learning style preference, and rote learning relates to only “verbal-high and visual-high” learning style preferences, suggesting that the reason for a “verbal learning style preference in rote learning is that learners subvocalized pronunciations while they were writing kanji” (Okita 1996:74). This behaviour of dual

57 Contextual learning consists of “reading paragraphs again and again”, “reading street signs”, and “watching Japanese TV programs”, mnemonic learning involves “making associations with pictures”, and “making associations with simple kanji or kana”, and rote learning consists of “writing kanji repeatedly”, and “paying attention to stroke order” (Okita 1996:56).

58 Verbal and visual learning style preferences are examined further by dichotomising them into high versus low, that is, verbal-high, verbal-low, visual-high and visual low patterns. (Okita 1996:58-61).
motions is seen often, disregarding the different backgrounds in the present study group. Some practise writing kanji while saying the numbers of the kanji strokes, and some simply mumble the phonemic representations of the kanji while writing them, as seen in Kūsho (see section 3.3.2). Interestingly, Shimizu and Green (2002) found these three kanji learning strategies as popular kanji teaching strategies from a survey of Japanese teachers in the US and Japan. Specifically, the rote-learning strategy is the most popular method.

Relating to Okita’s dichotomy of learners’ styles, Takagi (1995) examined the discriminability of kanji graphics by training JSL beginners at university level in visual and aural kanji patterns during one semester. For example, the former is to memorise kanji visually by analysing, synthesising and drawing kanji as pictures while the latter is to learn kanji aurally by converting radicals, stroke orders and kanji origins into stories and songs. She concluded that the ability to recognise visual and aural kanji graphic patterns is trainable, but this should be treated cautiously due to there being only five participants in the study. An interesting issue pedagogically is how the learners’ verbal/visual styles relate to aural/visual kanji patterns respectively as Okita commented that “it is necessary to examine how visual aspects of kanji, especially graphic complexity of kanji, interact with visual learning style preference and kanji learning success” (Okita 1996:79).

3.3.3.3 Kato’s study (2000)

Kato aims to examine learning kanji in beginning JFL in a wider framework of improving learners’ effective learning strategies, together with academic time
management skills, and providing an anxiety-free learning environment for positive motivation. Also, it compares the differences between learners with and without kanji backgrounds. In the area of learning strategies, in particular, she set two scaffolds: macro and micro levels. The former is based on Oxford’s SILL (1989) questionnaire to find learning strategies in written Japanese. After applying factor analysis for the 49 scale items from the SILL survey, she extracted three factors which are labelled as: 1) indirect strategies (social and metacognitive strategies) 2) direct strategies (memory and cognitive strategies), and 3) memory/compensation strategies. As the labels indicate, naming creates confusion since 3) overlaps with 2), probably due to the nature of learning Japanese scripts. However, the loss of affective strategies is questionable as the macro skill weighs affective domains like anxiety. The micro level focused specifically on learning kanji, and collected 34 items through an open-ended survey from 77 subjects (42 with kanji background and 35 without kanji background). Through a similar statistical application to the macro level, she categorised 32 items into three factors at the micro level; 1) writing methods, 2) using cards/books methods, and 3) using sentence methods. Using these assessment forms, data were collected at the micro and macro levels. The final outcomes in relation to the successful learners are identified below:

Micro skills:

- Write actively, practise regularly, review and preview;
- Write repeatedly;
- Apply kanji to sentences

59 “Writing methods” include “write them repeatedly until you memorise them”, “write each kanji 20 to 30 times”, “write down all kanji being studied once a day”, and so on. (Kato 2000).
60 “Using cards/books methods” include “make small cards and read them whenever possible”, “practise with Japanese books”, and so on. (Kato 2000).
61 “Using sentence methods” include “I applied kanji to sentences”, “I wrote sentences, checked unfamiliar kanji and then read the sentences”, and so on. (Kato 2000).
Macro skills:
• Maintain steady progress, learn consistently;
• Devote considerable time to study;
• Manage academic time well;
• Enjoy learning;
• Complete the computer exercises. (Kato 2000:182).

The results were that students with kanji backgrounds tended to use more of the strategies used often by upper level learners while students with no kanji background used strategies which are familiar among beginners. This means that both groups, with and without kanji backgrounds, received benefit through training in the learning strategies, but there was a greater benefit for the kanji backgrounders. However, some kanji backgrounders utilised fewer of the learning resources developed for the course because they had already established and/or were using kanji learning strategies (Chamot et al 1996). If the learners with kanji backgrounds praised certain features, as she hinted, the level of the program tended to be highly adjusted to their level. As a consequence, only the upper level learners with kanji backgrounds could follow the program, while the rest tended to struggle more and dropped out or failed as unsuccessful learners. So, the level of the program should be highly controlled and adjusted to encourage all groups with different backgrounds as the content of the program may affect learning outcomes.

Another issue is the use of sentence methods or contextual learning for beginning JFL learners in terms of the development of the most difficult area, the phonemic representation in kanji characters. As discussed previously (see section 2.2.4), the semantic-phonetic compound kanji make up over 60 per cent of the Jōyō Kanji.
Yamashita et al (2000) examined the four compositional kanji features with 51 beginners at university level using 108 kanji. As Hatasa’s study shows, they found that pictographs are easiest, but semantic-phonetic composites are not easy probably because of more *wago* (traditional Japanese words) during the beginners’ level, but they continued that “intermediate and advanced learners would find semantic-phonetics more conductive to learning” (Hatasa 1989:169). This is a problem if the educators leave this difficulty until learners reach the upper level. Can they start to practise, with adequate modifications, using contextual learning from the beginning level? Noticeably, a limited number of beginners utilised contextual learning in Okita’s study (1996), although it is not clear whether contextual learning from the beginning level relates to successful outcomes. Kato (2000) mentions the sentential application as one of the micro skills used by successful learners. This is no doubt why Komori et al (2001) propose the contextual learning of kanji vocabulary at the advanced level for the promotion of internet programs. Their approach is to group single kanji characters by phonetic radicals for better memorisation, based on Heisig’s (1986) and Pye’s (1971) studies. As mentioned previously, Dwyer (1997) tested the efficiency of the phonetic reading of single kanji. Findings were that phonetic radical patterns facilitated learning of kanji pronunciation when introducing new kanji characters systematically, and that JFL beginners rely on radicals when recalling kanji.

3.3.3.4 Bourke’s study (1997)

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62 They are pictographs, katakana composites, semantic composites and semantic-phonetic composites (see table 2.4 in Chapter 2). Katakana composites refer to kanji katakana characters, e.g., 加 (to add) is composed of two katakana, 力 and 口.
Drawing on the theory of information processing (Gathercole et al. 1993; Anderson 1981,1983), and schema theory for integrating old information into new information for better recall, Bourke developed the Strategy Inventory for Learning Kanji (SILK) test instruments for learners to assess themselves by comparing scores before and after instruction. As the name suggests, the SILK is based on the SILL by Oxford (1989,1990). There are 15 strategies with 12 direct strategies and three indirect strategies as follows:

<table>
<thead>
<tr>
<th>Group I: Direct strategies</th>
<th>Group II: Indirect strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Association strategy</td>
<td>M. Planning your learning strategy</td>
</tr>
<tr>
<td>B. Stories strategy</td>
<td>N. Evaluating your learning strategy</td>
</tr>
<tr>
<td>C. Radicals strategy</td>
<td>O. Co-operating with others</td>
</tr>
<tr>
<td>D. Frequency strategy</td>
<td></td>
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<tr>
<td>E. Experience strategy</td>
<td></td>
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<tr>
<td>F. Visualisation strategy</td>
<td></td>
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<tr>
<td>G. Self-monitoring strategy</td>
<td></td>
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<tr>
<td>H. Compensation strategy</td>
<td></td>
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<tr>
<td>I. Sequence strategy</td>
<td></td>
</tr>
<tr>
<td>J. Physical/emotional response strategy</td>
<td></td>
</tr>
<tr>
<td>K. Sound strategy</td>
<td></td>
</tr>
<tr>
<td>L. Stroke order strategy</td>
<td></td>
</tr>
</tbody>
</table>

Figure 3.9. Categorisation of 15 Kanji Learning Strategies in the SILK (Bourke 1997)

Further, there are 55 items altogether in subcategories with uneven numbers (see Appendix C); e.g., the planning your study strategy includes ten statements, association strategy nine, frequency and stroke order strategies only two, and so on. Following the SILL format, the SILK Test Instrument is also designed for learners to mark using five point Likert scales: 5 for “very often”, 4 for “quite often”, 3 for “sometimes”, 2 for “almost never” and 1 for “never”, so that learners can easily examine the different kanji learning styles for self improvement. At the same time, teachers can also improve themselves as one of the features of language learning strategies involves “expand(ing) the role of teachers” (Oxford 1990:9).
One of the special features of the SILK is in the memory and metacognitive strategies. First, the SILK is evidently more than an elaborate list of sub-categories of memory strategies due to the nature of learning kanji characters, as Chamot et al (1996) found the frequent use of the memory strategy among JFL learners. For example, nine out of the 12 direct strategies are strategies for memorisation of kanji characters, i.e., association, stories, radicals, experience, visualisation, sequence, physical/emotional response, sound and stroke order. Some relate directly to encoding and retention in the memory, and others link to retrieval from the memory, although they may be used interchangeably during activities. Moreover, the association strategy incorporates all aspects of the semantic, phonemic and graphemic representations of kanji characters, and it combines the features of kanji as a whole. The rest cater proportionally to the special features of kanji: stories, physical/emotional response and experience strategies deal primarily with the semantic features of kanji characters, while visualisation, stroke orders and some of the radicals strategies deal with graphic features. The sound strategy links with the phonological features of kanji, however it appears that the SILK limits the radical strategy only to semantic radicals, not to phonetic radicals. Second, the metacognitive strategies take a crucial role for JFL beginners, especially for L2 English learners due to the language distance between Japanese and English, as JFL is classified as Category 4 (most difficult language for English native learners) by the ACTFL\textsuperscript{63} (see Chapter One). Without question, the use of metacognitive strategies can provide one the tools to manage the entire process of kanji learning, by making one’s own kanji list, daily, weekly or monthly, and at the end assessing one’s learning progress. Also, using

\textsuperscript{63} Abbreviation of the American Council on the Teaching Foreign Languages
self-evaluation, learners make a plan to do more reviewing of learned kanji and/or continue the current study schedule.

Another feature of the SILK is the treatment of overlapping strategies as displayed in Oxford's Figure 3.10 (section 3.3.1). First, radicals and frequency strategies belong to cognitive strategies in Oxford's (1990) categorisation, although they can be treated as memory strategies. The distinction between them is that memory strategies are for "inputting information into memory", while cognitive strategies are for "organising and using this information (practice) at a later stage" (Oxford 1990, Bourke 1997:197). In other words, if these strategies are used for input, they are categorised as memory strategies, while if they are used for processing through practice, they are cognitive strategies. Second is the self-monitoring strategy which is included in direct strategies by Bourke only if it deals directly with the task, like regular self-testing to find mistakes or kanji components written in an unbalanced manner, and to confirm them before restoring them in memory. Third, there is the extended interpretation of the compensation strategy for "overcoming limitations" (Oxford 1990) by using dictionaries, or asking peers and teachers to fill in the unknown information. In fact, the use of a dictionary is not new, but it is dealt with in other studies (Douglas 1992; Okita 1996) conducted using Oxford's SILL form. The use of a dictionary appears often among learners at the upper level. Fourth, there is the merger of affective strategies into social strategies, concentrating on metacognitive and social strategies. Kato (2000) also excludes affective strategies, probably because of the close attention to learning the orthography of the written language, rather than the spoken language, which requires more affective factors for L2 learning (Horwitz et al. 1986,1991). In fact, O'Malley et al. (1990) deal with social and affective strategies as one combined strategy.
After the pilot study, the SILK form was developed for training with six JFL beginners at university level for six weeks. The main findings of the intervention using the SILK indicated that:

1. All students improved in the use of association, stories and radical strategies. Those strategies are used for developing a schema for deep processing.


In her summary, Bourke states that "memory representations must be actively constructed in the initial processing phase by the learner and the more different ways used to memorise material, the better the chance of recall" (1997:47). A powerful input using multiple strategies affects better output in terms of memorisation of kanji. In addition, she discovered that the teacher’s occasional questions and learning hints during the observation not only aided kanji learning but contributed to "raising awareness of strategy use and a more positive and confident attitude" (1997:152), especially during the initial learning period of kanji (1-250 kanji characters). Another study (Park 1994) also reports, methodologically, a similar effect of awareness raising during a self-explanation by students about learning using the "think-aloud" method.

3.3.3.5. Comparison of the four studies

Kanji learning strategies in different learning contexts are summarised to scrutinise strategy use in the four studies reviewed, as shown below.
<table>
<thead>
<tr>
<th>Birch et al ('93, '95)</th>
<th>Okita ('95, '96)</th>
<th>Bourke ('97)</th>
<th>Kato ('00)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- repetitive writing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- flashcards</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>- recall kanji as</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- pictures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- analysing kanji into</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- semantic and phonetic radicals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- stroke orders</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Strategies for reading</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- use of key vocabulary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- inferencing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- syntactically</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. **Mnemonic learning**
   - associate with kanji/kana
   - associate with picture

2. **Contextual learning**
   - reading again and again
   - reading street signs
   - watching Japanese TV

3. **Rote learning**
   - writing repeatedly
   - stroke order

1. **Memory strategies**
   - association
   - stories
   - radicals
   - visualisation
   - experience
   - physical/emotional response
   - sequence
   - sound

2. **Cognitive strategies**
   - frequency
   - stroke orders

3. **Compensation strategies**
   - compensation

4. **Others**
   - self-monitoring
   (direct strategies only)

1. **Writing methods**
   - write kanji repeatedly until memorising them
   - write each kanji 20-30 times
   - write kanji being studied everyday

2. **Cards/books methods**
   - make small cards
   - practise with Japanese books

3. **Sentence methods**
   - apply kanji to sentences
   - write sentences, check unfamiliar kanji and read the sentences
   (micro skills only)

---

Figure 3.10. List of Kanji Learning Strategies from the Four Studies

The learners' levels in these studies are not exactly the same. Their focuses also vary from reading comprehension to purely single kanji character learning. Materials used for the task are also different. For instance, the learning aids such as flashcards and small cards are used by all but, CALL/computer and/or TV programs are actively used in Birch’s et al, Okita’s and Kato’s studies. The use of these external aids is considered, pedagogically, as strategies to promote learning, at the same time, cognitive processing occurs while using these aids for language learning, e.g., repeating words on the cards, chunking, analysing, reasoning characters, words and phrases on TV and in books. In addition, the research instruments such as students’ verbal reports or questionnaires may

---

64 Bourke (1997) decided not to use Oxford’s SILL labels to avoid confusion with her SILK categorisation, but they are used here to categorise them for comparison.
create different results, as students are usually unfamiliar with how they perceive and report the strategies they use. Occasionally, even if they are engaging in certain strategies, they do not report them even if they notice them.

Further, the types of analysis, qualitative and/or quantitative, affect the results. Okita (1996) and Kato (2000) dealt with strategies more quantitatively, managing many students while the other two focused on only four to five learners qualitatively. For example, “repetitive writing” is scrutinised in Bourke whether it is used for the initial input or practicing for retention in storage as for the cognitive strategies. On the contrary, Okita classifies “writing repeatedly” into rote learning pedagogically, mainly because of the number of participants.

Furthermore, Birch’s et al studies on kanji learning are in the holistic approach using semi-authentic written materials. As they are JFL early intermediate level, comprehension is tried by inferring syntactically and interactively using a top-down and bottom-up approach in order to solve the problems. When they encounter unknown kanji words, association, stroke order, and analysis of the semantic and phonetic radicals are used. This is true for Kato’s case. As the materials used for the study ranged from cartoons to Japanese cultural articles on the homepage, wide ranges of the strategies among the micro skills were used together with the macro skills.

Similar findings are observed in Okita’s studies. Rote learning and contextual learning in Okita’s correspond to writing methods and sentence methods in Kato’s. “Books” in cards/books methods in Kato’s can be grouped into contextual learning as books are
used for reading. Mnemonics learning is not reported by Kato's students, but it does not mean they did not use mnemonics or stories for association.

Bourke's study, on the other hand, is more focused on the sub-lexical to lexical levels of kanji learning as shown in the comprehensive list of memory strategies. Also, the subcategories of Bourke's study (Appendix C) exhaustively cover from the cognitive processing of kanji information through fundamental management for effective kanji learning in metacognitive strategies for JFL beginners. On the contrary, the 30 items listed in Okita's (1995) questionnaire are for the examination of the three different learning levels of JFL learners in Hawaii. As Figure 3.11 illustrates, rote learning in Okita's study corresponds to frequency and stroke orders, and mnemonics learning corresponds to association. Interestingly, Bourke's study has a comprehensive list of memory strategies, but excludes contextual learning, while the other three studies include it. Instead, Bourke includes sequential strategies for learning compound kanji words although kanji learning emphasises processing single kanji in her study. The question remains whether kanji learning strategies for JFL beginners should stay at single kanji or compound kanji word level, or expand to the contextual level in terms of skill development.

Oxford includes "recombining known elements in new ways to produce a longer sequence" (Oxford 1990:45) in the cognitive strategies. Bourke mentions that, however, "[s]ince this test instrument was designed for students in the early stages of kanji learning, statements referring to skills beyond the capacity of beginning students were eliminated from the second version of the test" (Bourke 1997:201). The "early stages"
denote the “initial learning period (1 - 250 kanji)” (Bourke 1997:223). In addition, she emphasises that learning kanji does not refer to just the initial input of information. It is “a process over time…until the automatic stage has been reached” (1997:201). Other studies (Okita 1996; Kato 2000) during this learning stage found contextual learning to be one of the key strategies, even for beginners of JFL. Further, the review of compound kanji (*jukugo*) processing (3.2.2) endorses the contextual strategy. As a consequence, it would be reasonable to deal with the sequence strategy in relation to contextual learning for deep processing as skill development.

The current study aims to investigate kanji learning strategies and their developmental use. So, Bourke’s SILK survey form is used for comparison of two studies using different methods and examination of further differences among learners’ strategy use by different learners’ kanji backgrounds in L1 and L2.

3.3.4 Summary

This section reviewed first Oxford’s SILL model in the language learning strategies. Then, the review extended to kanji learning strategies by JFL learners focusing on the four studies (Birch et al 1993, 1994; Okita 1995,1996; Bourke 1997; Kato 2000).

The examination of the studies from sub-lexical/lexical level to contextual level, including other related strategy research (Yamashita et al. 2000; Komori et al. 2001; Takagi 1995) suggests some pedagogical implications for utilising CALL methods for learning kanji in order to investigate learning processes through the effects of CALL applications.
In the next section, CALL applications in SLA and some of the existent CALL kanji programs are reviewed in order to examine the special features of CALL methods, as the present research will use a CALL kanji program.
3.4 CALL methods

CALL is defined as "the search for and study of applications of the computer in language teaching and learning" (Levy 1997:1). There are several acronyms for CALL such as CAI (Computer-Assisted Instruction), ICALL (Intelligent Computer-Assisted Language Learning), and CELL (Computer-Enhanced Language Learning). Although all of these terms are used for computer use in language learning, each has a different focus. CAI represents "a largely North American view" while CALL represents "a more European view", as cited in Levy’s review (1997:80). However, CALL and CAI are used interchangeably in this study.

In this section, after an overview of CALL methods, studies of CALL applications and existing CALL kanji programs are reviewed.

3.4.1 Overview of CALL methods

In the 1980s, the arrival of the communicative approach to language teaching coincided with the availability of much simpler microcomputers, which encouraged language teachers to become involved in designing and using CALL programs. Many teachers, in fact, are still reluctant to devote the time and energy necessary to create CALL materials for their courses because of a perceived lack of commensurate reward for their efforts (Garrett 1991). Students, however, tend to demonstrate a more positive attitude towards CALL materials which have been developed by their own teachers and are well-integrated into their course curricula (Blomeyer 1985). Hussin suggests that, "language
teachers should not fear their lack of programming knowledge” (Hussin 1994:5), but encourages teachers to be more computer literate in order to be able to develop effective courseware based on pedagogical and linguistic theories. Fortunately, computer technology and authoring programs like HyperCard permit classroom teachers, who are generally not expert programmers, to create course materials of their own (Shugg 1992). Thus, CALL can be an innovative, beneficial approach for both teachers and students provided that it is used as an integral part of the curriculum (Kécskes 1988). However, the findings of the studies in the early days of this period are both positive and negative and sometimes inconclusive; they can be used to prove everything, or nothing. Fisher (1983) notes that CAI was almost always effective in the areas of science and foreign languages regardless of the learner’s age, the kind of computer or the type of tests used to measure achievement. However Roblyer, Castine and King (1988) suggested that computers can enhance learning at basic levels, but that the influence of computer assisted techniques diminishes as proficiency increases.

In the 1990s, a technological revolution made possible global communications via the internet, and physical environmental boundaries consequently diminished at great speed. As a result, the concept of CALL has changed remarkably and the clearance of language barriers has become much more important to mutual understanding globally. At the same time, the role of the computer has been discussed as, for example, the computer as tutor or the computer as tool (Lian 1991). Levy clarifies that the computer tutor “make[s] decisions by evaluating the data” (Levy 1997:180) while the computer tool “functions to enhance or improve the efficacy of the work of the teacher or student” (Levy 1997:184). This means that CALL as a tutor refers to learning the L2 using
various kinds of CALL software. However, it is important that the computer tutor does not take on the “totality of instruction” (Dunkel 1991:16). It is assumed that CALL is made available in a self-access mode outside the classroom or language laboratory and that human support is still required to fill in the gaps where a CALL tutor has limitations in evaluation or judgement. Individualised feedback, both linguistically and strategically, is not fully available from a CALL tutor with the current technology, although a human tutor can manage learners’ weaknesses and strengths up to a point through daily face-to-face contact.

CALL’s more focused and more individualised features as both tutor and tool display “effectiveness of instruction for some individuals or populations of learners” (Pennington 1996:1) such as exploring the World Wide Web (WWW), building Web sites, discussing via telecommunication and using email (Debski 1997). These social computing activities are suitable for advanced learners. In addition, the superiority of authentic materials has often been commended by theorists (Garrett 1995; Oxford 1995). The problem is that beginners can not explore effectively due to a lack of basic knowledge and experience (Oxford 1995; Maingard 1999). This is true, especially for character-based languages like Japanese which require both basic grammatical and orthographical knowledge besides a “deeper, more richly connected knowledge structure (schemata)” (Oxford 1995:365). Authentic materials have little value unless learners can understand the content. Even intermediate learners have indicated that orthographic comprehension used in email messages sent by native speakers was very difficult although the communication itself was enjoyable (Chikamatsu 1999).
Thus, the CALL environment has become and will continue to grow more complex with rapid technological development, as a tool on the one hand, and with an efficient facilitator as a tutor on the other hand, for global communication using diversified languages with their own language-specific features. It is necessary to review the CALL application to learn how advanced multimedia technology contributes to all learners from the L2 beginners level, as Hubbard comments, “Often missed is the fact that the field really involves the interplay of humans and technology and that the human is especially significant.” (Hubbard 1996:15).

3.4.2 CALL pedagogy

Since the 1980s, the pedagogical approaches to foreign language learning have been shifting from teacher-centred to learner-centred (Kenning & Kenning 1990). This is true in CALL pedagogy up to a point, although the review areas are limited in this section. One of the most attractive attributes of computers in language teaching is their ability to individualise instruction and make it interactive, giving immediate, consistent and non-judgemental feedback (Relan 1992:5).

The effectiveness of CALL feedback on learners' errors has been analysed by many researchers. Most drill-and-practice type software in grammar, vocabulary and pronunciation employ feedback comprising “right”, “wrong” or “try again”, but some give peripheral feedback for research purposes. The findings (Van der Linden 1993; DeKeyser 1995; Brandl 1995) indicate that optimal feedback is not necessarily supported by learners and that drill-like feedback is still effective, especially for beginners. This is a reflection of the evaluation that the importance of drill has been
reconsidered as a fundamental strategy (Decoo 1994), because repeated drill and practice are a “necessary evil” (Maingard 1999:162) in the L2 classroom even with the communicative approach.

Further, with 18 students for two weeks, Nagata (1995) examined the effectiveness of intelligent feedback in Japanese which explained the detailed grammatical and semantic roles of particles. The results show that the experimental group, which received the feedback, had significantly higher scores than the control group. Acknowledging the effect of the ICALL program however, Nagata mentioned that a more traditional CALL system without detailed feedback may be suitable for vocabulary learning in which only word-level analysis is required and simple “wrong-try-again” type feedback may suffice. The type of content or skills to be learned determine whether drill is appropriate or not and should be matched with suitable feedback.

As regards word retention, Chun and Plass (1996) investigated the effects of three types of annotations used in a CALL reading program; “pictures + text”, “video + text” and “text only”. They found a higher rate of incidental learning using pictures and text, and that pictures and text led to significantly higher scores for word retention than video and text or text only. On the contrary, Al-Seghayer (2001) found the reverse result, that is, video clips assist learners better to build a mental image, probably because of different L1 backgrounds of the participants. However, the common finding is that multiple cues are better than a single cue, especially because “retrieving [stored information from memory] is expected to be difficult [in vocabulary learning]” (Al-Seghayer 2001:18).
On the other hand, Brandl (1995) examined the strategies used by low achievers (LA) in German CALL grammar exercises, based on Garner’s study (1990) of strategies63 used by unsuccessful learners. She found their lack of achievement to be due to “poor cognitive monitoring” (Brandl 1995:206) because of a lack of knowledge of the correct morphographical forms or syntactic structures, and use of “primitive routines that get the job done” (Brandl 1995:207) like looking up the correct answer, random guessing and giving up perhaps because:

[either LA students believed that they could learn from seeing the correct answer in the same way as if they had generated it themselves, or they found themselves helpless when faced with difficulties in achievement-oriented situations. (Brandl 1995:207).

Concerned more with general management of a self-access CALL approach, McKay and Robinson (1997) found the positive attributes of CALL through their experience in CALL material development in Asian languages in an Australian University project. However, the dilemma they encountered was that only already motivated students become more motivated through self-access while unmotivated students simply did not access the material although they did not tend to suffer anxiety during study with computers since mistakes were not revealed to a classroom of peers.

Finally, using the drill type on-line program, “Java Kanji Flashcards 500” 64 (Ryner et al. 1998), Chikamatsu (1999) concurrently conducted an email exchange for students in the US with native Japanese students in Japan. The results of the writing tests to

63 Garner defines strategies that do not enhance learning as “primitive routines that get the job done” (Garner 1990:519).
64 The selection of 500 kanji was based on the latest survey of the 500 most frequently used kanji in Japanese newspapers (see section 2.1).
compare computer/word-processor written and hand-written kanji were that both correct kanji scores and correct kanji usage rates using a computer were significantly higher than those using hand-writing. In addition, kanji usage in essays written using a computer was significantly higher than those written by hand. Although it is not clear how the program affects kanji usage in essay writing, apparently computer use for genuine communication purposes encourages kanji learning and use at the recognition level. However, as some studies (Ishii 1991; Satake 1990) report, native speakers tend to misuse kanji homophones in their formal papers due to relying heavily on computers. This suggests that over reliance on the computer may decrease their ability to distinguish among homophones and, as a consequence, production by hand writing is necessary to maintain appropriate levels of recognition for JFL learners.

Thus, various types of CALL pedagogy indicate that CALL allows independence and choice in the learning process through different feedback methods, and promotes learner autonomy and self-awareness (Wenden 1991). In addition, a positive learning attitude promotes motivation and the skill of orthographic recognition (Murayama 1994), but appropriate feedback varies depending on the types of activities. Finally, CALL methods are not always helpful for the poor and unmotivated learner in terms of self-access learning. In this area one should consider how to justify the employment of CALL methods for classroom instruction.

3.4.3 Review of existing CALL programs for learning kanji

Since the late 1980s, many kanji programs have been developed commercially or privately for in-house use, for technological experiments or classroom use, but much of
the theoretical information and/or documentation about their effectiveness is unavailable. Consequently, while the programs described here are somewhat obsolete, they are limited to those with available review documents, with or without the relevant software program, due in part, to hardware incompatibility. The reason for measuring effectiveness for the review is to examine the most useful activities for kanji learning so that we could decide on an appropriate CALL program for the present research in order to investigate the relationships between learners’ strategy use and interaction with a CALL program.

The four programs for JFL beginners, listed below, were selected, although the categorisation of levels\textsuperscript{65} is not necessarily the same among the institutions.

1. Kanji Master
2. Kanji City
3. Interactive Japanese: Understanding Written Japanese
4. Kantarō, volume 1

There are two types of approach: 1) kanji with activities (testing, cultural memo, phrases, mnemonics, games, and stories), or 2) kanji in reading materials or kanji simulation. The target learners are English speakers who are unfamiliar with other than alphabetic orthographies, and who are taking beginning Japanese. With the first type, the basic kanji information is presented, and is followed by some kind of a “memory-testing approach” in or without a short context. The second type uses either inference for learning kanji through reading comprehension activities or real usage of kanji symbols through exposure to such things as train station names.

\textsuperscript{65} According to the Japan-Language Proficiency Test by the Japan Foundation, 4\textsuperscript{th} (100 kanji) & 3\textsuperscript{rd} (300 kanji) levels are called beginners, 2\textsuperscript{nd} (1000 kanji) level intermediate, and 1\textsuperscript{st} (2000 kanji) level advanced course.
3.4.3.1. **Kanji Master**

According to Majima's (1992) report on the use of the *Kanji Master* program (Benedek & Majima 1989), the program was developed for native English speakers at the University of Georgia in the US since 1989. From the Jōyō Kanji, 325 basic kanji are divided into six groups of approximately 50 kanji per group, and are presented in a pronunciation drill, an English meaning drill, a Japanese (kanji reading) drill, a stroke order drill, and a dictation drill, along with a basic browse mode as an introduction. The basic philosophy is to constrain the memory using stimulus-response practice based on behaviourism. The students’ feedback on using this program was quite positive, perhaps due to the novelty effect among the JFL beginners, as Majima indicated in her report. In fact, this new media impressed L2 learners with the strong impact of “technology” at university level where the researcher taught in 1992. However, since the selection was of only a little over 300 kanji from the 1,945 Jōyō Kanji, the choices should be reasonably justifiable; for example 猿 “saruy” (monkey), as well as others, could probably have been left out in favour of some more frequently used kanji. It is not clear how deeply learners process kanji through this drill style of exposure.

3.4.3.2. **Kanji City**

*Kanji City* is also a piece of multimedia Japanese kanji courseware, developed at the University of Hawaii, using HyperCard. The main aim of the developers was to explore the possibilities of the hypermedia concept, and *Kanji City* is one of the applications in a proposed “software warehouse” (Ashworth & Stelovsky 1989:36). This technology-led program, containing text with sound, interactive graphics and animation, supports
the contextualisation of language and language use to create virtual real life situations. The selection of kanji does not exactly follow specific books or policy, instead it is, “to teach recognition of kanji characters inductively through the simulation of a train ride around Tokyo...particularly suited to adaptation of the effectiveness of the inductive learning method” (Crosby, Stelovsky & Ashworth 1994:3). For example, /shibuya/, one of the stations in Tokyo, individual kanji information for /juu/ or /shibu/ or /koku/ or /ya/ are not presented. All kanji words are presented “in context”, but it is a limited contextualisation as no inference can be applied after understanding the meaning of either a kanji or a kanji word. In addition, the names of places are often read in kun-reading even the compound kanji words (jukugo), like /shibul/. From the kanji learning viewpoint, however, Kanji City may help kanji input in an inductive way by combining kanji graphics and one of the kanji readings, a special station name, as the authors note. Crosby et al. (1994) examined the relationship between CALL methods and the learners’ visual ability while learning kanji using the program. In fact, as they modified this program a little for research purposes, the results may have changed from those for the real program. Forty high school students, 20 for a CALL group and 20 for a traditional method group were invited to participate in this experiment. The CALL group remembered kanji significantly better than the traditional group, in particular, the high visual ability group received the most benefit. However, as the participants’ long term motivation for learning kanji is not clear, this type of game oriented program of a “train ride around Tokyo” may affect the results of a short term study. However, as the names of places often use secondary readings such as in /shibuya/, instead of /shibutani/, further study may be needed to confirm its efficacy.
A different type of CALL program, "Interactive Japanese: Understanding Written Japanese (UWJ)" (Nara 1990), is for improving reading skills in Japanese. UWJ follows a combined notional/functional, situational and grammatical syllabus. There are 30 lessons divided into three levels of ten each, beginning, intermediate and advanced. Each lesson is composed of a "reading comprehension module" and a "self-test module". In the former, there are skimming, scanning, summarising, complete comprehension and task activities, with a comprehension test included for improvement of reading strategies. The latter has vocabulary, phrases, grammar and discourse. Another feature is the text function through which learners can obtain word/phrase/clause/sentence meanings as well as syntax and segmentation to segment a sentence into words. For reading tools, it contains on-line kanji-English and Japanese-English dictionaries to encourage self-initiated learning. Nara (1992) suggested that learners could save 70 per cent to 80 per cent of the time normally used in the traditional method of searching for words in a dictionary. Also, immediate application of single kanji or kanji vocabulary to a fairly long story seems effective in terms of deep processing for long term memory. However, no information is available regarding the findings of the beginners’ use, in particular, as to how they cooperated with integrated kanji learning in the reading comprehension activities which require higher schematic skills for beginners. Unfortunately this program is no longer available due to technological developments.
After previewing Kantarô, volume 1, the researcher expected that it might be a candidate for this study (see section 4.2) in terms of learning level and content activities. So, a detailed inspection was conducted based on the CALICO\textsuperscript{66} CALL software review format below.

- **Product at a glance:**

<table>
<thead>
<tr>
<th>Product type:</th>
<th>Japanese tutorial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language:</td>
<td>JFL/JSJ</td>
</tr>
<tr>
<td>Level:</td>
<td>beginning</td>
</tr>
<tr>
<td>Product type:</td>
<td>language tutorials</td>
</tr>
<tr>
<td>Media format:</td>
<td>CD-ROM</td>
</tr>
<tr>
<td>Computer platform:</td>
<td>Windows 95, Windows 3.1x or later</td>
</tr>
<tr>
<td>Hardware requirement:</td>
<td>386 PC, 4MB RAM, 3MB of free disk space, CD-ROM drive, SVGA card and monitor</td>
</tr>
<tr>
<td>Price:</td>
<td>A$129 (as at 1999)</td>
</tr>
</tbody>
</table>

- **General description:**

  The kanji multimedia program, Kantarô, developed at Macquarie University is composed of three CD-ROM\textsuperscript{67} volumes. Volume One includes 200 beginning kanji, required for the Higher School Certificate (HSC) in New South Wales in Australia, presented with mnemonics, animated graphics and games. Kantarô consists of ten chapters, 20 kanji for each chapter, and each chapter containing theory and practice modules. The former module is called the discover module which has an “Explore mode” and a “Research mode”. The explorer mode presents the basic kanji information utilising various technological features. This is a special feature of Kantarô presented

\textsuperscript{66} CALICO is the abbreviation of Computer Assisted Language Instruction COnsortium.

\textsuperscript{67} Volumes Two and Three cover 200 and 300 kanji respectively for the next level.
with picture mnemonics, along with word mnemonics in the research mode, which were created by the developers. Users can obtain either brief or lengthy explanations for each piece of information by clicking the buttons. The practice module includes memory, matching, reading and story telling modules. The memory module is to connect each of nine kanji graphics with the equivalent one of nine pictures through memorisation, just like a card game. If correct, they stay on the screen. If not, they are hidden. At the end, users can get a report of right/wrong matchings, the total number of trials and the time taken. Similarly, the matching module is to match kanji graphics, meanings drawn in pictures and, readings written in hiragana, by clicking the equivalent. If all three are matched, they stay on the screen shown with connecting lines among the three. The same type of score report as the memory module is available. The reading module focuses on single kanji readings with three multiple choices while the story module presents compound kanji words in short, mostly independent sentences. Users can practise reading kanji by clicking unknown kanji. The answers for readings are presented for each single kanji, even for compound words. The program is now available with a textbook and user's guide.

- Evaluation:

The animated picto-morphs of the program are effective for input enhancement in particular, and are attractive to visual learners at secondary and lower tertiary levels. Sound functions for word and sentence levels are also useful for JFL learners as the natural speed is acceptable. However, access to the help function is not always available which may cause problems, especially for technically inexperienced learners who may experience difficulty utilising the several modes and modules which can create confusion. For example, users must click “Explorer mode” or “Research mode”, to get
into the pages of the basic kanji information. The definition of the short and long explanation buttons in the “Theory module” is unclear, and the distinctions are not consistent, e.g., the kun-reading *Inana* for 七 is presented in the short explanation, but there are no usage examples in the long explanation. Another is 年. There is only *Inen* as the on-reading but, even in the long explanation, no kun-reading of /toshii/. It would be more valuable for the program to invite a wider selection of learners, over and above HSC learners and those reviewing their previous learning, by including all first year university vocabulary. Further, kanji readings for the compound words in the “Story teller” module should be treated as compounds instead of single kanji characters. Otherwise, it causes problems with readings for the compound words, e.g., 今 in 今朝 is read as /kesa/ and nothing for 朝. Also, 国 in 島国 is read as /kuni/, instead of /(shima)guni/. In addition, some sentences are awkward in their use of particles\(^{68}\), and punctuation\(^{69}\). Those should be treated with more care, especially at the introductory level.

- Teacher fit (Approach)

*Kantarô* is a language tutorial program for self-study. The program features are explained as providing a “personal language program at your own pace”, with various types of tasks presented with attractive pictures. The purpose of the program is to ease the difficulty of learning kanji, especially for alphabetical learners in L1. The basic approach is that “[l]inking western methods with Japanese pattern recognition concepts

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\(^{68}\) E.g., こどもは 水よう日の四じにうまれました。(A child was born at 4 o’clock on Wednesday.) The use of は here seems inappropriate.

\(^{69}\) E.g., あしたの午後、一時にがっこに行きます。(I’ll go to school at one o’clock tomorrow afternoon.) There is no pause after 午後 gogo, but 一時に ichiji-ni.
makes kanji learning more interesting and effective for both students and teachers” (Chow et al. 1999:2). However, the program’s reliance on picture-morphs may cause non-visual (or non-picture) oriented learners to disregard them, though in general, learners may form the concept that kanji are always created from objects. Pictographs make up only 11.6 per cent (see section 2.3.2.4) of the Tôyô Kanji. In fact, some kanji in this volume are difficult to match with pictures, and users are forced to link kanji graphics and pictures which distract from memory processing at the initial input stage while interacting with the theory module, and the memory and matching modules. After using this program for her class, a secondary level teacher of Japanese mentioned that “the picture morphs are a bit off-putting, as students have to learn what each picture is meant to resemble...some of them are a little difficult to recognise. This consequently distracts them from real kanji learning time.” Pedagogically, a teacher should use it carefully in class and not insist that the mnemonics with picto-morphs be used due to individual differences in terms of learning styles. Also, the program should note somewhere the limitation of this approach and provide an explanation of the suitability of using pictographs with kanji characters.

Some of the authors, Takita et al (1995:19) report that 51 per cent of students memorised more than 90 per cent of the required kanji after using this computer program, resulting in an increase of 4 per cent of students over the 47 per cent in previous years when the program was not used. However, it is not clear whether this result is significant or not, due to the lack of other information. Inoue (1998) reported

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70 A. Windeyer is a former teacher in New South Wales in Australia.
on using volume one with first, second and third year students at university level for one semester in the US. She evaluated the program\(^{71}\) on its usefulness based on a questionnaire (using a four point scale) to determine if the program motivated learners. The modules with new information not covered in regular course lessons, or those using the technical advantages of the computer, like game modules, were the most used by students.

- **Learner fit (Design)**

This program is designed for beginning students, who know hiragana and katakana, for “self-teaching purposes” of kanji required for the HSC. Although it notes that the program is also good for college students, the majority of the stories in the “Story Teller” module are in short sentences. Some learners may expect more meaningful content in the stories for deep processing. There are various types of recognition tasks to match kanji graphics and pictures or readings written in hiragana, but no explicit direction is given for individual writing. As the program does not allow the writing of kanji, it is assumed that physical writing practice on a piece of paper is necessary in order to memorise kanji characters. This is good for self-study only if the selection of kanji matches the kanji being taught in the curriculum, usually because the selection is closely based on the producers’ institutional curricula and their goals. If not, learners are forced to move back and forth from one chapter to another. Another concern is about the over use of picture morphs in the entire program which may cause misunderstanding of kanji structure. Lastly, this program will best suit learners with a visual learning style, but not those who are poor visual learners.

\(^{71}\) They used *Kantarō*, vol. one along with *KanaKun*, produced by Macquarie University. In fact, their aim by the end of the third year is to master 600 kanji.
3.4.4. Summary

This section provided an overview of CALL since the 1980s. Many L2 CALL programs have been developed, even by language teachers, as a result of the spread of microcomputers. However, on review, the effectiveness of CALL programs was mixed; positive, negative or inconclusive, mainly because of problems with the theoretical framework of CALL and research methodologies. In the 1990s, the context of CALL has changed from traditional CALL to virtual communication through, for example, the WWW, email communication and telecommunication. As a consequence, CALL applications, program design and research have focused on the interaction between the human and the program, with more emphasis on the human. However, the types of feedback are different depending on the levels and activities.

Four kanji learning programs for JFL beginners were reviewed, subject, however, to the availability of the programs, review documents, and hardware incompatibilities. Two programs deal with kanji deductively using drill-repetition strategies, and the other two tackle kanji more inductively using either reading materials with an on-line dictionary or a more natural approach. It is considered to be a worthwhile exercise, for beginners in particular, who may have a kanji “allergy” from pressure to memorise a certain number of kanji, in order to relax and accept the existence of symbols different from those in an alphabet.

Although Kantarō was considered to be a candidate program for the present study, the final decision was reserved for three reasons. Firstly, from learners’ viewpoints, the selection of kanji is fundamental as their starting point for learning within the allocated
time, especially for full-time students. The majority of college students are motivated instrumentally to obtain better grades for the course at the end of the semester (Ely 1986). The incorporation of the CALL program with the syllabus is necessary (Hussin 1994). McCarthy also cautions that “if a task does not count in a significant way towards their end-of-semester grade its priority will always be sufficiently low...no matter how potentially useful the resource or how genuine their interest in the subject” (McCarthy 2001:4). It is obvious that the extra task of choosing appropriate kanji for the course distracts them from their goal, and the challenge of mastering the 1,945 Jōyō Kanji may further deter them from achieving a distant dream. Secondly, the main features of the picture mnemonics along with word mnemonics are based on the pictographic kanji which consist of graphics. Animated graphics or picto-morphs of the program are attractive, especially for the visual type of JFL learners, to enforce input information. However, although pictographs constitute a little over ten per cent of the Jōyō Kanji, the program may mislead the learners by forcing them to link kanji graphics and pictures, which distracts from processing. In fact, some kanji are difficult to match with pictures. Thirdly, Kantarō does not theoretically support the concept of the multiple paths of skill development, that is, DECPRO, PRODEC and PRO. In particular, the participants of the present study are a mixed group with learners from different language backgrounds in L1 and L2. The path of PRO should be more supported in the program. As a consequence, it was decided to develop a new CALL program, called CALL KanjiSensee (KS), integrated with our main textbook Yookoso! The detailed development project is described in the next chapter.
In this chapter, memory and information processing in cognitive psychology were examined to reveal the mechanism of input/output of language in terms of skill development. Based on the ACT* model (Anderson 1980, 1983), Johnson (1996) proposes the 3P sequential learning model, consisting of presentation, practice and production. Declarative (DEC) knowledge is gradually developed to proceduralised (PRO) knowledge by repeated rehearsals during these three phases. In addition to the DECPRO pattern, other types of variation such as PRODEC, and PRO are suggested for L2 learning due to the different language backgrounds among learners. In fact, L1 skills and knowledge are transferable to L2 in the interlanguage system (Odlin 1989; Selinker 1972; Koda 1997, 1998). This concept is applicable to kanji learning in JFL as the learners have various L1 backgrounds from English to Chinese and Korean in the current study. As the linguistic distance affects the transfer, it is considered to be suitable to analyse the different paths of proceduralisation of massive amount of information as in learning kanji for JFL beginners.

In addition, the dichotomy of implicit and explicit learning was analysed to determine how the knowledge is processed in relation to vocabulary learning, as kanji learning involves lexical/sub-lexical to contextual levels. Different from L1 learning, the findings in L2 learning vary depending on types of instruction, the complexity of tasks and the learners’ skills and knowledge levels. Because of that, pedagogical manipulation is significant for processing words in context and/or without context. In fact, this manipulation relates to the effective use of the limited capacity of the working memory.
Further, both internal and external prescriptions were discussed during information processing. Internally, learners should have noticing, awareness and attention at the right time for tuning practice. Externally, and partially internally too, the use of appropriate language learning strategies is indispensable. Previous studies report on the differences between skilled and unskilled learners. The former are able to select the best opportunities to exploit the most appropriate strategies and combine various strategies, while the latter are usually able to find neither the right time nor the right strategies to utilise for difficult tasks.

The SILK form (Bourke 1997), based on the Oxford's SILL model (1990), was developed specifically to help JFL beginners to learn kanji. After reviewing the studies in kanji learning strategies, it was decided to use the SILK form to investigate learning kanji by beginning JFL learners using a CALL kanji program. Prior to the present study, existing CALL kanji programs were reviewed to examine usability and appropriateness for this study. In order to maximise the effect of learning kanji, a new CALL kanji program, KS, was developed for this study project. In the next chapter, the KS program will be explained together with the learning environment.
CHAPTER FOUR: 
PROGRAM DEVELOPMENT AND THE LEARNING ENVIRONMENT

This chapter first describes the interactive multimedia CALL kanji program, *KanjiSensee* (KS) in detail since it was used as task material for this project. Then, the participants in this project, the course outline, regular class activities and computer laboratory sessions, laboratory setting and the Japanese teachers involved in this project, are described, to provide the context for this study.

4.1  Development of the CALL kanji program: *KanjiSensee* (KS)

A CALL kanji program, called *KanjiSensee* (KS) was developed in 1997 by the researcher, with the assistance of programmers, for a first year Japanese language course at university level in Australia. None of the programs reviewed in the previous chapter was considered to be satisfactory for the various types of learners and their different backgrounds. Moreover, the different selections of kanji characters in the programs and incompatibility of the software with the hardware in the CALL laboratory were serious problems. KS was designed as complementary course material for the main textbook and its workbook in order to facilitate learning kanji at the beginning stage (see section 3.3.4). At the same time, learning strategies were also grounded to facilitate L2 learning, followed by classroom

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74 The researcher has been involved in CALL development in Japanese since 1992 to assist self-directed learning, and has tested various types of materials for learning kanji using CALL methods (Van Aacken 1996, 1999).
research on their impact on students' learning (Pica 1997:54). Kanji orthography places an extra burden on JFL learners, whose L1 has a non-cognate writing system, until they reach a certain level of basic competence. The point of departure for the development of KS was to provide salient graphemic input, integrated with the semantic and phonetic information of the kanji, and then to apply that basic kanji knowledge in a contextualised manner for learners, as suggested by H. Shimizu (1997).

KS is a learner controlled, non-linear program that allows learners to plan and make decisions by themselves. The program takes both explicit and implicit approaches. Target learners of this program are primarily English speakers in L1, or in L2; learners with some, little or no background experience in learning Japanese, especially kanji characters. JFL beginner learners can obtain the new kanji information in decontextualised form, and apply it in a contextualised form, integrated with previously learned information. However, even learners with kanji backgrounds are expected to improve their processing of kanji vocabulary in context so that they can enhance their knowledge of kanji vocabulary and comprehension of the content to promote kanji learning in different ways from learners with no kanji background in L1.

4.1.1. Theoretical background of the KS program

KS is cognitively based on the three phases of presentation, practice and production of the “PPP” sequential model (Johnson 1996, see section 3.1.2) to support the developmental processes for learning kanji. It is also grounded in the processing between input and output in second language acquisition (SLA). The aforementioned theoretical and practical points of KS are outlined below.
• to assist learners individually with different kanji orthography backgrounds by offering multiple paths for proceduralisation;

• to assist the development of learning strategies through self-directed autonomous learning;

• to enhance recognition, and production indirectly, using a Japanese Word Processor, of the 174 introductory kanji at sub-lexical and lexical levels;

• to assist development of contextual learning;

• to enhance input noticing on the graphemic, phonemic, and semantic representations of kanji, explicitly and implicitly;

• to assist processing information cognitively by interacting visually, auditorily and tactically, and;

• to assist noticing the errors on the output by immediate feedback.

Further, kanji in context is to aid learners to infer the meanings and readings of kanji words using global and analytical skills and to encourage reading comprehension skills. This implicit approach is especially for those who have kanji backgrounds or experience in learning Japanese previously, and even for non-kanji backgrounders who gradually develop the skill to process kanji characters. In order to overcome the difficulties of learning kanji, various devices are available at the learner's request as well as a translation of the entire passage as the translation device assists initially in not encoding the wrong information in memory (see Grace 1998 in section 3.2.2.).

4.1.2 Framework of the KS program

Based on the skill learning model (Johnson 1996, see section 3.1.2), three components were originally designed to represent three phases; the Kanji Introduction (KI) for presentation, the Story (ST) for practice and the Quizzes (QZ) for production. Each component contains two activities; the KI includes the Kanji Introduction and Variety
(VA), the ST component includes the Story and Story Quiz (SQ), and the QZ component has a Kanji Reading Quiz (KRQ) and a Kanji Writing Quiz (KWQ), as shown in Figure 4.1 below.

<table>
<thead>
<tr>
<th>Kanji Introduction Component (KI) - Presentation phase:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>KI</strong> is to enhance recognition ability of single kanji characters through the essential information of each kanji structure by:</td>
</tr>
<tr>
<td>• noticing the salient aspects of colour-coded graphemic representation of a single kanji</td>
</tr>
<tr>
<td>• getting to know the semantic and phonemic representations of a single kanji</td>
</tr>
<tr>
<td>• integrating three representations of kanji graphics, readings and meanings</td>
</tr>
<tr>
<td>• utilising mnemonics for memorisation of kanji with meanings and/or readings</td>
</tr>
<tr>
<td>• noticing the stroke orders and counts of each kanji</td>
</tr>
<tr>
<td><strong>VA</strong> (variety) is to enhance recognition of kanji words in an authentic non-textual context using world knowledge by:</td>
</tr>
<tr>
<td>• noticing various word groups such as colours, weather, geography, family relationships, etc.</td>
</tr>
<tr>
<td>• noticing antonyms and synonyms of kanji</td>
</tr>
<tr>
<td>• noticing the structures and composites of kanji</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Story Component (ST) - Practice phase:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ST</strong> is to enhance recognition ability of kanji vocabulary in a semi-authentic textual context and gradual comprehension of the story by:</td>
</tr>
<tr>
<td>• recognising meanings and readings of kanji vocabulary using help if necessary</td>
</tr>
<tr>
<td>• comprehending phrases, sentences, paragraphs or the whole story using help if necessary</td>
</tr>
<tr>
<td>• confirming the general meaning of a story using the whole translation, if necessary</td>
</tr>
<tr>
<td>• familiarising with prominence and intonation through listening to the story</td>
</tr>
<tr>
<td><strong>SQ</strong> (Story Quiz) is to enhance gradual comprehension of the story by:</td>
</tr>
<tr>
<td>• guessing the meanings in the story using any available knowledge from L1 and L2</td>
</tr>
<tr>
<td>• choosing appropriate answers by referring to the paragraph and story, if necessary.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Kanji Quiz Component (QZ) – Practice/Production phase:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>KRQ</strong> (Kanji Reading Quiz) is to enhance kanji reading ability of a single or compound kanji at word level in a short context by:</td>
</tr>
<tr>
<td>• distinguishing the reading of a single or compound kanji as vocabulary</td>
</tr>
<tr>
<td>• guessing readings and meanings of vocabulary through the help of a sentence translation</td>
</tr>
<tr>
<td>• typing readings of kanji characters in hiragana using a Japanese word processor</td>
</tr>
<tr>
<td><strong>KWQ</strong> (Kanji Writing Quiz) is to enhance kanji graphic recognition ability of a single or compound kanji at word level in a short context by:</td>
</tr>
<tr>
<td>• matching hiragana readings with corresponding single kanji or compound kanji</td>
</tr>
<tr>
<td>• distinguishing kanji character(s) as vocabulary</td>
</tr>
<tr>
<td>• guessing the meaning of vocabulary associated with the targeted kanji through the help of a translation at sentence level.</td>
</tr>
</tbody>
</table>

Figure 4.1. Objectives of the Three Components in the KS Program
Due to the limited use of the Japanese Word processor (JWP) for kanji production during the preparation period, however, it was decided to deal with the interaction using the QZ along with the ST to be the practice phase, unless the participants submitted their outcomes to the computer for an assessment of the QZ. Instead, the handwritten quiz right after the CALL sessions replaced it as the production phase to account for working memory in this study.

During the presentation phase, the basic information of kanji characters in the KI component assists the input enhancement with its salience. Learners would notice and write on their own paper, referring to the kanji vocabulary in the workbook and textbook that they had learned during the oral activities in class. The acoustic mnemonics, colour-coded images and animated stroke orders assist students to process the declarative knowledge. Johnson (1996:109) claims that “initial declarative knowledge must be easily convertible into procedural knowledge”. Further, the VA aims to help learners recognise kanji words in authentic, but non-textual contexts, to engage them in the target language, using common sense and language-specific knowledge.

The ST in the practice phase offers abundant opportunity to challenge compound kanji words (jukugo) and phrases in context, with balloon assistance on request. The paragraphs or whole story comprehension is assisted by a scrolling translation, and is controlled syntactically and orthographically\(^\text{75}\) in order to fit the beginning level of JFL. This assistance supports the “i + 1 comprehensible input” theory (Krashen 1985) to make them comprehensible in spite of the semi-authentic contents. Of course, learners

\(^{75}\) No unknown kanji characters are used in the ST and QZ components.
can go back to the KI component easily to briefly review both new and old single kanji at any time. The ultimate goal of the ST is to learn kanji in a meaningful context to develop a contextual learning strategy (Okita 1995, 1996; Kato 2000). In addition, the SQ provides further practice for reading comprehension by the increase of reading skills in an “interactive model” (Eskey 1988) for learners with longer learning experiences of Japanese and/or kanji backgrounds.

During the practice and/or production phase, the KRQ and KWQ in short context can be used either for practice or for self-testing a single kanji as a word and also as a compound kanji word (jukugo). As with the ST, as all kanji words are dealt with as “kanji in context”, either short or long, the participants have opportunities to infer the meaning. Further, the details of the hand-written quiz as a production phase are available later in section 5.3.1.2.

4.1.3 Content of the KS program

As illustrated in the navigation diagram below, after logging into KS, learners find the objectives of the program followed by the main lesson menu. KS consists of 14 lessons, covering the 174 introductory kanji presented in the course textbook (see section 4.2.2.2). Each lesson has the same format, including lesson objectives, the assigned kanji and the related kanji vocabulary used in the lesson. It is designed specifically for a beginning JFL course, primarily to assist recognition of each kanji and of kanji words, but also production of kanji using the Japanese Word Processor. It does not, however, allow for physically writing kanji on the monitor. In fact, direct writing practice on a
piece of paper is more economical and efficient than drawing on the monitor, which
requires additional non-linguistic attention.

Figure 4.2. KanjiSensee Navigation Diagram
Learners can access any of the 14 lessons in the program for review or preview. Each lesson starts with Lesson objectives, followed by Variety activity (VA), Kanji Introduction (KI), Kanji Reading Quiz (KRQ), Kanji Writing Quiz (KWQ), the Story (ST) and Story Quiz (SQ), as explained in the following section. All interactions with each activity are recorded in a tracking file for data collection.

- **Lesson objectives**

![Lesson Objectives](image)

Figure 4.3. The “Lesson Objectives” in KS

Each lesson has two lesson objectives as shown above; one is to learn approximately 12 weekly kanji characters independently and/or in combination with other kanji explicitly, and the other is to comprehend those kanji as words in short and long contexts.

- **Variety (VA)**

The “Variety” section presents preparatory activities for warming up using various topics from a range of kanji specific activities, such as matching climate words using the world knowledge as in Figure 4.4 below.
Other activities include types of kanji elements, whole kanji or kanji words using synonyms and antonyms, daily activities, colours and place names in Japan. Those activities are presented in linguistically and/or culturally authentic context without any textual explanation for input enhancement. The selection of the kanji used in the Variety activity is from the weekly kanji, together with already familiar kanji introduced earlier. The VA can be accessed both from the Lesson objective and the “Activity menu” to reinforce the existing kanji information for better retention and recall.

- Kanji Introduction (KI)

The “Kanji Introduction” presents new information on the 12 to 14 weekly kanji in each lesson. As shown below in Figure 4.5, each kanji graphic is displayed in the centre of the screen with different colours for each element of the kanji. The kanji is enlarged to a size of 110mm x 100mm, and the learner can recall and repeat any operation in the Kanji Introduction.

Figure 4.4. The “Variety” in KS
The KI includes *on* and *kun* readings with sound and meanings in English. The different colours are to assist accurate visual encoding and processing of radical component information as chunks. By clicking the button, students can see/hear acoustic mnemonics mostly based on *A Guide to Remembering Japanese Characters* (Henshall 1988). This function assists students to associate the meanings of each kanji with its graphic elements. For example, /haru/ *spring*, 春 is composed of 三 “three horizontal lines”, 人 “people” and 日 “sun”. The acoustic mnemonic provided states “three people under sunshine in spring”. In this case, a morphographic interpretation is presented together with the meaning of this kanji, “spring”.

Depending on the kanji, the mnemonic is normally based on the etymology of the kanji. Due to the different order of presentation of Henshall’s kanji and the kanji in the textbook for the course, however, some of the mnemonics are not relevant for this study.

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76 The researcher received permission from the author.

77 KS introduces the origin of kanji through the use of mnemonics, but the explanations do not extend to the original or complicated kanji structures.
group due to the different order of the kanji presentation. The main purpose is to present hints to assist memorisation strategically. Some teachers may suggest that the learners listen to the mnemonics first as a reference, then if the ready-made mnemonics are not suitable, they create their own either by revising the originals or creating new ones which represent more personalised memory aids to the model.

Another feature of KS is animated graphic stroke order, displayed in an enlarged size of 110mm x 100 mm at the same location on the screen as the colour coded kanji elements, but presented in black-like calligraphy. Stroke order assists recognition of the flow of each piece, while radicals help to encode “chunks” of pieces visually, and mnemonics give opportunities to combine them acoustically. Tracking data are available for all interactions with the KI, but not separately for each interaction.

- The Story (ST)

The Story section (Figure 4.6) aims to familiarise learners with kanji graphemic, semantic and phonemic representations integratively, in context.

![Figure 4.6. The “Story” in KS](image-url)
The ST encourages students to progress from the recognition of kanji characters to words and, gradually, words to phrases, to sentences and paragraphs in a bottom-up approach. Also, it gives opportunities to comprehend the story by decoding kanji vocabulary in context, or even by inferring unknown kanji words from the context, using both bottom-up and top-down approaches. However, the primary purpose is practice in rapid word recognition for beginner JFL learners, not practice in guessing, as Cobb and Stevens (1996) stated. Vocabulary assistance for annotated words provides readings and meanings for kanji vocabulary and/or basic grammar within the story, as well as an audio rendition of story narration in Japanese, and English translation in a separate window.

- **Story Quiz (SQ)**

Finally, the SQ shown in Figure 4.7, is for checking comprehension of the story in the previous activity using a multiple choice comprehension quiz.

In order to ease the orthographical constraints as well as grammatical demands at the beginner’s level, the passage of the story is available by scrolling while answering the
comprehension question. Although the annotated help is available in the ST, the story in the SQ has no help at all including translation, but learners can go back to the ST again if they wish. After answering the five questions in the quizzes, scores are displayed on the monitor. Two guesses are allowed, then the correct answer is displayed after the third attempt. All questions are presented in a random order each time. During testing of their own comprehension, learners can return to any basic kanji information in the KI component to confirm uncertain areas. Although the main focus is on contextual understanding, unskilled learners can still associate kanji with a short description about a story. Learners are also encouraged to collect feedback on their progress to review and plan their learning.

- Kanji Reading Quiz (KRQ)

One of the QZ components, the KRQ, in Figure 4.8 below, is to test reading of kanji words in context at the short sentence level.

![Kanji Reading Quiz](image)

Figure 4.8. The “Kanji Reading Quiz” in KS

Prior to starting the activity, learners should change the keyboard to the Japanese Language Kit for Japanese entry. Then, learners choose the word that they intend to
interact with, type the reading alphabetically and submit it to the program. After that, the Japanese word processor changes alphabetic letters into kana automatically. Submitted answers are evaluated each time and feedback automatically provided to the learners. Feedback is either “correct” or “try again”. After interaction with four to five randomised sentences, the scores are displayed for each, with a final submission to assess individual progress. During the activities, an English translation at sentence level is available at the learner’s request.

- Kanji Writing Quiz (KWQ)

Different from the activities in the KRQ, the purpose of the KWQ, shown in Figure 4.9 below, is to test kanji recognition of homophone words as the computer displays all kanji having the same readings.

![Kanji Writing Quiz](image)

Figure 4.9. The “Kanji Writing Quiz” in KS

First, learners choose the word, type the reading of the kana alphabetically and submit it to the program. The JWP converts kana to kanji, and displays a homophone list. Then, learners have to recognise the correct kanji and choose it. As with the KRQ, feedback
and translations at the sentence level are available. One problem associated with using the JWP is that the computer often displays the correct kanji word first as previously submitted and accepted by an earlier user, as the computer remembers previous kanji input.

As observed in Chapter Three, it is expected that the more exposure to scripts written using kanji, the better and faster the recognition of characters (Segalowitz et al. 1993). Importantly however, conscious language exposure (Chapelle 1998; Skehan 1998) is necessary to accommodate the development of kanji acquisition. Passive interaction without noticing any kanji information may not help recognition. In fact, the recognition process requires active participation to encode new information while retrieving any old information. It is not easy however, to predict how learners use tasks in the program “unless [researchers and teachers] observe how the task turns out during instruction” (Chapelle 1998:28).

4.2 Learning environment

This section deals with the participants for this study and various facets of their learning context such as the course outline, main textbook, CALL sessions at the CALL laboratory and the Japanese teacher and a teaching assistant.

4.2.1 Participants

The participants for this study were university students. They took beginning Japanese for one year, in the form of two consecutive one-semester courses in 1998 under formal
instruction in Australia. They enrolled in Japanese 101 during the first semester and Japanese 102 during the second semester. Each semester had 13 weeks of instruction. As soon as instruction in hiragana and katakana finished during the first half of the first semester, kanji were introduced from the seventh week for approximately ten minutes per week. Due to the limited times to be used in class, it was strongly recommended that students participate in the CALL sessions as complementary activities to the regular sessions. Prior to the CALL kanji sessions, a CALL kana program was used at the computer laboratory in order to allow students to become familiar with using a computer for learning the Japanese language. Twenty-five students participated in the first CALL kanji session when the researcher held the initial workshop for the KS program. Prior to the computer session, each participant was asked to complete the consent form, followed by a questionnaire covering the student's demographic information. After the final examination for Japanese 101 was conducted in mid June, six students discontinued; one graduated, one returned home to Korea, one failed, and three switched from on-campus to off-campus mode. A total of 21 students started Japanese 102 in July; the 19 remaining from Japanese 101, and two students who were repeating, joined Japanese 102. Following the first semester, CALL session attendance was strongly recommended, although participation in the CALL session on the specific day of the week was flexible to accommodate timetable clashes and other factors. Two students dropped out in mid October and two completed the course while missing more than half of the weekly quizzes, one due to practice-teaching for her degree course requirement, and one for personal reasons. The two repeating Japanese 102 were among these four. The main theme in the preparation period was to develop a genuine trust.

78 Hiragana & Katakana exercises developed by K. Hatasa, P. Henstock and T. Y. Hsu (1992) were installed in the CALL laboratory.
among the participants, the researcher and the CALL kanji learning context. The two repeating the course did not receive the benefit of the confidence-building preparation period.

In the end, 17 students were selected for this study. They used KS for learning kanji and completed three questionnaires, an individual interview, weekly quizzes, three recognition tests and the final examination. The students ranged in age from 18 to 22 years. There were two males and 15 females. Their degree structures were one double major in Arts/Law, with the remaining students all enrolled in Bachelor of Arts degrees. This is a more or less typical enrolment pattern, usually with a preponderance of female Arts students.

Participants’ profiles are provided in Table 4.1 below, based on the bio-data survey (Appendix B). Names have been changed to protect anonymity. In this study, Japanese pseudonyms were given for pedagogical reasons, as is often done in a JFL classroom, to have students pretend, socio-culturally, to be L2 people. Hajime and Ken are male and the rest are female. Michie is in third year, but a first year Japanese student, the rest are in first year at university. None has previously used CALL methods for language learning. Seven have no learning experience of Japanese language, and the rest have different learning backgrounds ranging from one year to six years, and formal instruction at high schools and living experience in Japan between two weeks to one year. Hajime lived in Japan for one year and has an exposure to Japanese people in his family. Mostly, English is used at home, but other languages such as Spanish, Italian, Lao, Korean and Cantonese are also used by up to a third of this group. Finally, all except one have parental support to learn Japanese.
Table 4.1. Profile of the Participants

<table>
<thead>
<tr>
<th>Participant</th>
<th>Degrees: languages / general*</th>
<th>Japanese/kanji learning experience yes (years) &amp; no</th>
<th>Lived in Japan</th>
<th>Language used at home English=1</th>
<th>Parents' encouragement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akemi</td>
<td>languages</td>
<td>No</td>
<td>4wks</td>
<td>Spanish</td>
<td>Yes</td>
</tr>
<tr>
<td>Eiko**</td>
<td>general</td>
<td>No</td>
<td>0</td>
<td>Lao*</td>
<td>No</td>
</tr>
<tr>
<td>Fusako</td>
<td>languages</td>
<td>No</td>
<td>3wks</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Hajime</td>
<td>languages</td>
<td>Yes (1) informal</td>
<td>12mths</td>
<td>Italian, Japanese</td>
<td>Yes</td>
</tr>
<tr>
<td>Ken</td>
<td>BA/LAW</td>
<td>Yes (1) informal</td>
<td>0</td>
<td>Korean</td>
<td>Yes</td>
</tr>
<tr>
<td>Mari</td>
<td>languages</td>
<td>No</td>
<td>0</td>
<td>Cantonese</td>
<td>Yes</td>
</tr>
<tr>
<td>Mieko</td>
<td>general</td>
<td>No</td>
<td>0</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Michie</td>
<td>general</td>
<td>Yes (2)</td>
<td>0</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Noriko***</td>
<td>general</td>
<td>No**</td>
<td>0</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Orie</td>
<td>general</td>
<td>Yes (6)</td>
<td>2wks</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Reiko</td>
<td>general</td>
<td>Yes (5)</td>
<td>0</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Sayuri</td>
<td>languages</td>
<td>Yes (3)</td>
<td>0</td>
<td>Cantonese</td>
<td>Yes</td>
</tr>
<tr>
<td>Seiko</td>
<td>languages</td>
<td>Yes (2)</td>
<td>3wks</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Taeko</td>
<td>general</td>
<td>Yes (4)</td>
<td>0</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Tamie</td>
<td>general</td>
<td>No</td>
<td>0</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Tomiko</td>
<td>languages</td>
<td>Yes (1)</td>
<td>0</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Yuka</td>
<td>general</td>
<td>Yes (6)</td>
<td>0</td>
<td>1</td>
<td>Yes</td>
</tr>
</tbody>
</table>

* "General" includes Bachelor of Asian Studies and Bachelor of Arts.

** Eiko is of Asian background, but she received no education in Chinese.

*** Initially Noriko reported "yes" for her short study of Japanese. Due to a very limited period of learning conversation and a few kanji, she was placed into the "no" group for this study.

4.2.2 Learning context

This section describes the leaning context such as course outline, main textbook, CALL laboratory setting and sessions, and Japanese teachers involved in the present study.
The University of New England (UNE) in Australia has both an internal on-campus mode and an external distance education mode. A third of the student body is internal and the rest is external, studying from around Australia and overseas. As a consequence, the Japanese language program has both internal and external modes. This study, however, was carried out only with internal mode students.

Some students studying Japanese language pursue the degree of Bachelor of Languages (four years study) with three years consecutive study of Japanese language plus one year of in-country study, along with other elective subjects. Others study for the three year Bachelor of Arts degree, either general or Asian Studies specialising in the Japanese area, or a Bachelor of Teaching for primary/secondary education, or other combined degrees such as an Arts/Law degree. UNE has offered Japanese language since 1991 with slight modifications. In 1998 there were three streams in the Japanese language course: Japanese 100 level for students with no or a little background, Japanese 200 level for those who had completed the Higher School Certificate (HSC) in New South Wales or equivalent, and Japanese 300 level for those who had completed the HSC and/or lived in Japan for a reasonable length of time using the Japanese language actively. The present study was held with beginning Japanese units. They were semester courses, with Japanese 101 the prerequisite for Japanese 102.

The aims of Japanese 101 and 102 are to establish elementary socio-cultural, sociolinguistic and linguistic competence in Japanese by:
1. developing basic aural and oral skills in Japanese,
2. developing basic skills in reading and writing Japanese, and
3. introducing some relevant aspects of Japanese society and culture.

In the internal mode at UNE, classes meet four hours per week to develop the above four macro skills including nonverbal cultural aspects of Japanese language. Students have a total workload of about 200 hours per semester, 50 hours of class contact plus 150 hours of individual study. In class, almost two thirds of the time is spent on speaking and listening activities integrating grammatical explanations, the rest is used for reading and writing activities. In fact, during this research period only a small amount of time was spent on kana and kanji scripts due to time constraints. According to the curriculum, both spoken and written communication skills are intended to be developed concurrently. In general, the majority of learners expect to master conversation skills at the introductory level. However, a delayed approach is avoided because of the difficulty of acquisition of the written language, particularly with kanji characters.

4.2.2.2. Main textbook, *Yookoso, vol I*

The textbook for these courses is *Yookoso! An Invitation to Contemporary Japanese*, by Tohsaku, accompanied by audio tapes and workbooks. In addition, the video tape *Gambare! Japanese* and an interactive multimedia CD-ROM "*Tokidoki Japanese*",

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79 Spoken communication is more emphasised at the initial stage by delaying the introduction of written communication (Jorden 1967, 1987). (See 4.2.2.2 of the "main textbook" section).
developed by the staff, were used as supplementary materials to support both internal and external Japanese students.

The JFL learners in this study are required to master the introductory 174 kanji characters, at both recognition and production levels. These kanji were selected by Tohsaku (1994), the author of the textbook, *Yookoso, vol I*. This beginning Japanese book is based on the following two basic premises:

1. Proficient communication is the goal of foreign language instruction; and
2. Language’s primary function is to allow people to communicate, interact, and negotiate meaning. (Tohsaku:1994:xiii).

Further, the book aims to enhance the four language skills as well as cultural awareness through the materials provided for oral and written activities. The main pedagogical approach is based on the communicative approach in second language acquisition. There are seven main chapters and a preliminary section for preparation and/or review. This preliminary section is for two purposes; one is a phonological and cultural introduction to the Japanese language through basic spoken activities like greetings, introductions, and the other is for an orthographic introduction to the three different kinds of character sets; hiragana, katakana and kanji. Kanji characters are introduced in the main chapters.

The seven main chapters are organised in a topic-theme-based approach, with various activities integrating all four skills and cultural understanding. The methodology recommended by the author of *Yookoso*! is described below:

- The main purpose of this text is to teach students how to use language in real-life situations for different communicative purposes.
• In each chapter, all activities are related to the main theme, and students can practice listening, speaking, reading, and writing about this theme in an integrated way.
• [T]opic-based organisation presents meaningful contexts for language learning and raises students’ motivation for learning the language.
• For successful language acquisition, learners must be exposed to meaningful input.
• The acquisition of vocabulary is of great importance for achieving proficiency, especially at the early stage of language learning.
• [P]riority is given to the development of comprehension abilities over production abilities.
• Reintroduction of vocabulary, grammar, and language functions at regular intervals facilitates the development of students’ proficiency. (Tohsaku 1994:xviii-xix).

For the orthographical introduction, there are two approaches in JFL; one is to encourage the spoken language first, as in L1 acquisition; and the other is to introduce both spoken and written languages concurrently in order to develop the four skills at the same level (Jorden and Noda 1987; Unger et al.1993; Okita 1995; Nara 2003).

Tohsaku, the author of the textbook, takes the latter approach, that is, spoken language is introduced first in the oral communication activities. Immediately after that, the written language is presented in the same or similar context to corroborate it so that the four language skills are developed ideally in parallel in order for the learner to be able to comprehend and produce oral and written communication, as a real language is used.

Tohsaku comments that:

[S]tudents can best learn to read Japanese by being exposed as much as possible to normal Japanese writing from the early stages of their study of the language....The materials students use for oral and reading activities are written just as native speakers of Japanese would write them. Hurigana accompanies a kanji in the chapter in which it is first presented and also in the following chapter. Thereafter, no hurigana are provided for that kanji. (Tohsaku 1994:xvii).

Thus, the learners are expected to use kanji characters actively with the assistance of the pronunciation of the new kanji characters using furigana (annotating kana).
4.2.2.3. CALL laboratory setting and CALL sessions

While CALL sessions were scheduled for one hour per week at a computer laboratory, following a regular class meeting, participants could use computers virtually anytime, day or night, unless the laboratory was being used for other scheduled activities. The purpose was to promote autonomous, self-directed learning.

The KS complements the textbook and kanji portions of the workbooks. The seven chapters in the main textbook are each divided into two lessons so that beginning students are introduced to 12 to 14 kanji per week. The 14 lessons correspond to the chapters of the main textbook in terms of kanji selection and grammatical usage in the textbook, e.g., lessons 1A and 1B for chapter one and so forth. As a result, participants could choose to practise any lesson, but the majority followed the CALL schedule which was arranged in accordance with regular class activities. Some learners interacted with a few lessons including the scheduled lesson, mainly because the ten-minute handwritten quizzes were held right after the CALL session. When they missed a quiz, an opportunity to take it was given them within 24 hours because the quizzes were worth five per cent of the final grade.

There were 20 Macintosh Performa 5300 Executive Director computers and one LaserWriter Printer in the "Japanese" computer laboratory on the university campus. It was established in 1996 with the assistance of the Japanese government\(^8^0\). This laboratory was used jointly with Languages Other Than English (LOTE) programs in

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\(^8^0\) The Japan World Expo Commemorative Grant, affiliated with the Japanese Government, granted funding with the kind assistance of the Japanese Consulate in Sydney, Australia.
the same department and by other disciplines, as well being open to the entire university.

The computer workshops for this study were held three times as the course content progressed; the first when hiragana was introduced in the first week of the course, the next when kanji sessions started in the seventh week of the first semester and the last in the first week of the second semester. Also, a few students requested CALL instruction. During the weekly CALL sessions, the researcher was always available in the laboratory to assist with technical and pedagogical problems.

User data for each participant were collected on an access protected server (see section 3.2.1) each time the participant logged in to the KS program. The researcher downloaded the data periodically to her office computer to check for problems, and all the data were compiled at the end of November 1998, after final examinations.

4.2.2.4. Japanese teachers

The researcher taught Japanese 101 during the first semester from February through June. During the second semester, due to administrative changes, Japanese 102 was taught by a teacher who is of Anglo-Australian background, with learning experiences in Japanese as an L2. As classroom research should minimise interference with regular class activities, as Freeman (1998) warns, the staff change was arranged in advance by adapting KS, and all of the kanji instruction at the CALL laboratory was continuously managed by the researcher.
A one year teaching assistant (TA) from Japan, with a Bachelor of Arts in Japanese studies in Japan, graded all of the weekly quizzes after the study period was over. Although she did not join the team until after November, her participation helped to assure the reliability of the evaluation. Both the TA and the researcher were native Japanese, but the TA had a higher expectation for accuracy in the production of kanji, e.g. the stop (tomeru), the fade (harau) and the flick (haneru) at the end of each stroke.

4.3 Summary

The KS program was developed as an intervention tool in order to execute an experiment for the present study. Theoretically, it supports the “PPP” sequence in the skill learning model (Johnson 1996) to allow multiple paths for proceduralisation because there are participants with little or no background of Japanese in their L2 and kanji background in their L1. So, the study will examine how these different types of learners interact with the program utilising different types of kanji learning strategies, as reviewed in Chapter Three. Further, it will extend to the investigation of the mechanism of this learning process in the development of an interlanguage system as well as learning outcomes.

In the next chapter, the research method and design will be discussed to show how KS was utilised by the participants in this learning context.
CHAPTER FIVE:
RESEARCH METHOD AND DESIGN

This chapter describes the methodology used in this research project. First, the theoretical background of the research methodology is discussed from the perspective of a naturalistic inquiry (Lincoln & Guba 1985) using qualitative analysis. The main principles of the case study in the qualitative analysis are explained briefly, followed by important factors such as the reliability and validity of a qualitative analysis, triangulation of data, and trustworthiness throughout the research. Then, in the section on research design, the research schedule is explained together with the instruments used for this project and the procedures for data collection.

5.1 Research methodology

In general, a qualitative analysis is naturalistic, uncontrolled, subjective, grounded, and process-oriented while a quantitative analysis is obtrusive, controlled, objective, ungrounded and product oriented (Reichardt & Cook 1979). However, the paradigms of these analyses are indistinguishable (Chaudron 1986) and both are relevant to determining the variables in the research of SLA. Chaudron states that:

Whether the classroom research is qualitative or quantitative in orientation, the goal of researchers has been much the same: (a) to determine which classroom processes are most conducive to learning outcomes, or L2 products, and (b) to discover why these relationships exist. (Chaudron 1986:710).

Others also assure that the two approaches are complementary with much overlap and synthesis, moreover, they are moving toward convergence. Potter (1996) stresses that
insightful research should focus on questions rather than approach, because approach is only a tool.

Further, setting is important to determine how participants behave in normal situations "because phenomena of study... take their meaning as much from their contexts as they do from themselves" (Lincoln & Guba 1985:189). According to them, a naturalistic inquiry does not need to explain each procedure, but a case study must provide comprehensive resources such as interviews, observations, documents, and other data to reveal the internal values of the interactions among participants, researchers, and the context. Further, effective assessment should be based on the "principle of no surprise" (Lincoln & Guba 1985:358) to the readers, which include the following five substantive elements:

1) a clear explication of the problem;
2) a thorough description of the context or setting;
3) a thorough description of the transactions or processes observed;
4) a discussion of the saliencies at the site; and

In addition, trustworthiness should be involved in the whole research context as an important methodological concept. Trustworthiness means a mutual trust among participants in a study. According to Lincoln and Guba (1985), one of the criteria for trustworthiness is credibility which consists of three techniques; prolonged engagement, persistent observation and triangulation. Prolonged engagement is "the investment of sufficient time to achieve certain purposes: learning the 'culture,' testing for misinformation introduced by distortions either of the self or of the respondents, and building trust" (Lincoln & Guba 1985:301). So, researchers must take time to prepare a location for research like a computer laboratory, determine whether the CALL program
operates properly and participants are able to operate the computer and the program with confidence, and there is a trusting relationship between participants and researchers. In order to increase credibility, a preparation period for the usage of KS is necessary. Although the use of the program is not complicated, it takes time for some learners to learn how to navigate from one activity to another. Some need keyboard practice for Japanese input, eg. “nn” for the syllabic nasal /n/. In addition, some have trouble understanding the concept of multiple readings of the same kanji depending upon the context. Also, technological problems that occur at the laboratory have to be fixed. Consequently, persistent observations are carried out in order to examine the kanji learning process and to identify any problematic elements in the research site.

The last important research technique is triangulation (Nunan 1992; Lincoln & Guba 1985; Yin 1984; Seliger & Shohamy 1989) for improving the probability that findings and interpretations will be credible. Triangulation means “multiple sources of information or points of views on the phenomenon or question” (Freeman 1998:96). As bias usually imposes on any research, especially in qualitative analyses due to their more subjective nature, triangulation of data is vital to the stability, confidence and validity of the research processes and findings.

In the study of CALL, much research was traditionally conducted to determine the effectiveness of CALL by dividing learners into experimental and control groups. The findings were positive and negative and sometimes insignificant (Van Aacken 1996). Some studies (Dunkel 1991; Papert 1987) criticised overlooking the importance of learners’ individual qualities. Also, Chapelle, Jamieson and Park (1996) recommended a process-oriented approach for understanding SLA in a classroom in a CALL context.
Because of the limited number of participants for this study and in order to explore it in depth, it was decided to conduct a qualitative analysis on the effect of individual interaction with KS in relation to the use of kanji learning strategies in the natural setting of computer sessions for L2 learning. At the same time, quantitative data is also used to track the progress of skill development rather objectively. This study therefore attempts the use of both naturalistic and statistical techniques in the qualitative paradigms. The three research questions (see section 1.3) are addressed in this study, and the findings for them are presented and discussed in Chapters Six, Seven and Eight respectively.

5.1.1 Reliability and validity

Other important concepts are reliability and validity, especially in qualitative research. Nunan (1992:14) states that “reliability refers to the consistency of the results obtained from a piece of research” and “validity has to do with the extent to which a piece of research actually investigates what the researcher purports to investigate.” He continues:

> Internal reliability refers to the consistency of data collection, analysis, and interpretation. External reliability refers to the extent to which independent researchers can reproduce a study and obtain results similar to those obtained in the original study. ... Internal validity refers to the interpretability of research. ... External validity refers to the extent to which the results can be generalised from samples to populations. (Nunan 1992:14-15).

If the reliability of a study is high, a follow-on study is liable to reproduce the results. So, multiple sources of evidence are necessary to increase the reliability of a qualitative analysis. On the other hand, generalisability in a quantitative analysis depends on findings from the study results. Importantly, when there is only a small number of
participants, as in the present study, the quality of the data collected is a key issue in determining whether it is representative.

Further, three suggestions for dealing with the problems of validity and reliability of a case study are:

1. Using multiple sources of evidence;
2. Creating a case study data base using other multiple sources; and

Thus, in order to diminish subjectivities in a case study, it is vital to collect different types of data for different divisions by different methods while maintaining a chain of evidence, and to produce a new data base by restructuring the data in terms of kanji learning strategies using a CALL program. This study employs the SILK Test Instrument (Bourke 1997), developed for the examination of the use of kanji learning strategies, to compare with Bourke’s study which did not use computers. In the end, raw data can be analysed from a synthetic and holistic perspective which emphasises the interdependence (Seliger & Shohamy 1989) of kanji learning using the KS program. Lastly, Freeman warns teacher researchers that, during data collection, “[F]irst, you need to stick to your plan; second, you need to stick with your inquiry” (Freeman 1998:90). At the same time, he noted that as changes are part of the research process, any problems must be fixed, reasonably and systematically, within the structure and discipline of the research plan.

5.2 Research schedule
The data collection for the present study started in late April 1998 when kanji were first introduced in the regular class and CALL sessions begun at the computer laboratory, and finished in November 1998. CALL sessions were organised once a week as a non-compulsory but strongly recommended class for this research. The term of eight months is considered to be an adequate length of “treatment to measure educational outcomes” (Salaberry 1996:9). Also, partially due to the constraints of the academic school year in Australian universities and administrative changes in the institution, the study was scheduled in two periods:

(i) Preparation period:

- Late April through mid June in the first semester.
- This period was set for preparation for both learners and researchers including technological set-up for this study.
- A workshop was held at the first weekly CALL session. The navigation diagram and a weekly kanji/vocabulary list for each lesson on KS were prepared for individual learning.

(ii) Study period:

- Late July through November in the second semester.
- The main research was conducted at the laboratory where the participants learned kanji using the KS program, concurrently various types of data on their participation were collected. The instruction period was over during the first week of November. After a short break the final examination was held in late November. Until then, the computer laboratory was open for independent study.

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81 In most Australian universities, semester 1 is from late February through late June, and semester 2 from late July through late November, and there are mid-semester breaks in April and September for a few weeks.
The main reason for arranging the study period during the second semester for this research was to exclude, as much as possible, the "Hawthorne effect"\textsuperscript{82} from the study since it often occurs with the introduction of technology in foreign language classes for beginners (Majima 1992; Hsu 1994; Salaberry 2001). To prevent this phenomenon, a preparation period was arranged for three months in the first semester. In addition, the length of the study covered the whole semester in order to examine the entirety of routine learning from highly active times to somewhat passive times. This is a rather exploratory study to shed light on ordinary learning processes, instead of the examination of highly manipulated learning, in depth, for a very limited length of time at the initial stage of a course. Thirdly, but importantly, it takes time to build up a trusting relationship (see section 5.1) between the participants and the researcher. At the same time, it is to avoid "teacher/researcher's effect" because "[teacher/researcher’s] presence and their note-taking behaviour would become less obvious and less distracting to the learners, and would, in time, be ignored" (Seliger & Shohamy 1989:109-110). So, the preparation period for the CALL sessions lasted three months from when kanji was introduced in the regular class, through the non-instruction time before the final examination for the first semester.

\begin{center}
\begin{tabular}{ll}
\hline
Preparation period & April \\
& -Recognition test (1) \\
& -Questionnaire (bio-data) \\
& July \\
& -Recognition test (2) \\
& -Weekly hand-written tests (July through October) \\
& October \\
& -Recognition test (3) \\
& -Questionnaires (CALL functions, attitudes, and kanji learning strategies) \\
& -Individual interview \\
& November \\
& -Production test (only kanji section in the final exam) \\
\hline
\end{tabular}
\end{center}

\textbf{Figure 5.1 Research Schedule}

\textsuperscript{82} Künzel defines it as "a positive effect of exposure to something new" (1995:112).
The various types of data were collected from April through November as shown above. In addition, diary writing in a notebook about kanji learning was recommended to students, and the researcher held site observations at the computer laboratory to assist with learning problems, to examine learning processes and to carry out handwritten quizzes at the end of each CALL session during the preparation and study periods.

5.3 Instruments and procedures for data collection

In order to examine the variables of CALL interactions, CALL attitudes and the kanji learning strategies, multiple types of human and non-human data were collected. Human data use human sources as opposed to non-human sources such as “paper-and-pencil or brass instruments” (Lincoln & Guba 1985:39). Qualitative data from human sources were collected through individual interviews, observations, and diary writing, while non-human sources as quantitative data included weekly quizzes, recognition tests and the final examination (kanji production for reading and writing sections), three questionnaires and tracking data in the CALL program. These instruments manifest their conceptual and operational levels of research as in Figure 5.2 below.

<table>
<thead>
<tr>
<th>Non-human sources</th>
<th>Human sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognition tests (RT)</td>
<td>Interview (I)</td>
</tr>
<tr>
<td>Production test (kanji section of the final exam) (PT)</td>
<td>Observation (O)</td>
</tr>
<tr>
<td>Weekly kanji quizzes (Q)</td>
<td>Diary (D)</td>
</tr>
<tr>
<td>Questionnaires about CALL attitudes (A) &amp; KS functions (F)</td>
<td></td>
</tr>
<tr>
<td>SILK survey form (S)</td>
<td></td>
</tr>
<tr>
<td>Tracking data (T)</td>
<td></td>
</tr>
</tbody>
</table>

Figure 5.2. Instruments for Data Collection

83 The alphabetical symbols written at the end of the data in parenthesis indicate the type of data. Whenever these data are used to verify the incidents, the symbol is appended at the end of the data to identify them. For example, “yeah, because even though I’ve learned a fair bit, you just forgot it. (I).” The symbol (I) means that the comment is from an interview. Also, if applicable, an alias is used together with the type of data, ie, (Orie, I), which means that the data is from the interview with Orie.
Before the research started in April, the research activities were explained in detail in a regular class, and the consent form was given to all prospective participants and collected immediately. Again, at the first CALL session in the study period in July, the same procedure as done in April was taken for the two new participants from Japanese 102. However, these two were not included as participants due to missing information (see section 4.2.1).

5.3.1 Non-human sources

5.3.1.1 Recognition and production tests

Recognition tests (Appendix E) were conducted in April, July and October respectively, to determine general kanji proficiency and individual progress using the same kanji test. In order to prevent "test-wise" (Seliger & Shohamy 1989:102), 1) the order of the presentation was changed slightly; and 2) the presentation of reading and writing kanji in sentences was swapped around. However, the total number of kanji remained the same in each test. Out of the 174 required kanji during Japanese 101 and 102, 100 kanji words, 129 kanji characters or 74.13 per cent were tested in 30 short sentences. These were presented in a four option multiple choice test, half of them in a kanji reading test and the rest in a kanji graphic (writing) recognition test. The presentation of kanji in short sentences eliminated the problem of homophones (see section 2.2.6). The context may influence real kanji reading ability, but not kanji writing, as learners can guess the readings through the context. However, inference can be considered as part of kanji reading ability or language acquisition ability. Also, this test format has been used in the

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84 It takes place through using the same test (Seliger & Shohamy 1989:102).
Japan Foundation’s Proficiency Test, organised by the Association of International Education, Japan since 1984 to objectively determine the ability of many examinees. This has been used officially as an entrance requirement to national universities in Japan\textsuperscript{85}, like the International English Language Testing System (IELTS) in the UK and Australia or the Test of English as a Foreign Language (TOEFL) in the US.

A pre-test was held in late April using the last ten minutes of a regular class in order to establish a baseline for the kanji knowledge of participants. The mid-test was held in the first week of the second semester before the CALL session started. Two absent participants took the test in the following CALL class, and the tests were collected before students practised on the computer. The last test was held in the thirteenth week with three taking it two days later in the researcher’s office. All tests were collected and scored immediately. The participants could find out their scores as a reference in preparing for the final examination if they wished, but these tests were not included in the course grade. At the end, the TA re-marked all three tests. Because of the multiple choice questions, the results were exactly the same as the researcher’s marking.

The final examination was held in late November. It was a written test only, and covered dialogue formation including syntactical, sociolinguistic areas, composition and reading comprehension, which included the kanji section. It covered everything learned during the year, but focused on items learned in the second semester. Only the kanji section was used for this study, as the kanji section consists half of kanji recognition and half of kanji production. In fact, as all of the kanji were presented in the reading

\textsuperscript{85} Some Australian institutions use the results of this proficiency test to classify learners into an appropriate level in their own Japanese programs.
passage for reading comprehension, participants could infer the kanji readings from the context. Also, as the final examination ranged widely over the contents of the textbook, as opposed to the limited weekly quizzes, contextualisation of kanji was necessary to reduce the problem of homophones in Japanese (see section 2.2.6). Sections such as dialogue creation and grammatical sections were excluded from consideration in this study. After the teacher marked the kanji section, the researcher marked it again. Inter-rater reliability of marking is 96.67 per cent, showing a difference between the teacher (105) and the researcher (101.5).

5.3.1.2 Weekly kanji quizzes

The weekly kanji quizzes (Appendix F) required kanji production, by hand from working memory, where the participants had to reveal their basic knowledge of three kanji features; graphemic, semantic and phonemic representations at word level. As KS does not allowed writing kanji directly in the program, hand-written quizzes were chosen as a production phase along with the QZ component if the learners submitted their results on the computer (see section 4.1.2).

The quiz usually covered the seven readings, seven meanings and six writings of 20 kanji words from the weekly kanji list without context, but the problem of homophones was prevented in the quiz by giving either the meanings or kanji graphics. It was expected that the scores for recognition would be higher than those for production, as production requires more accuracy than recognition, but the scores for kanji meaning were the highest. Although the KS program accepts kanji input using JWP after
changing alphabetic letters into kanji, it does not allow the writing of kanji directly. So, the purpose of the quiz is to force participants to produce kanji by hand, to reinforce the memory of kanji and to check individual progress for full recall. The weekly kanji quizzes were held within 24 hours after the scheduled CALL session. Four out of the ten weekly quizzes, from weeks two, five, eight and eleven, were used to assess progress rates and weekly achievements. The researcher scored the quizzes and the participants were informed of the results immediately or at the following CALL session along with feedback. The TA then graded them again. As mentioned before, the results were not significantly different despite the TA being a little more strict as to details of kanji production, and the balance, left and right, or top and bottom of a character. After a thorough discussion about acceptability, the TA and the researcher agreed to make comments, but not to subtract points unless there was an obvious mistake, mainly because encouragement of learning with appropriate feedback is more important for beginning learners of JFL. Inter-rater reliability of the scores is over 99 per cent, showing the difference between the TA (1013) and the researcher (1021).

5.3.1.3 Questionnaires

Four kinds of questionnaires were administered. One collected the participants’ bio-data (see table 4.9), and the other three were: 1) the KS functions and their helpfulness, 2) attitudes toward the program, and 3) the SILK form about kanji learning strategies. The second one regarding the KS functions was to examine the helpfulness of the functions and tasks of KS (see Appendix D).
As regards the CALL interaction, Ashworth (1996, from Laurel 1991) notes the assessment of the CALL interactivity using four factors; frequency, range, significance and participatoriness. They are defined as follows:

- **Frequency:** how often do you interact?
- **Range:** how many choices are available?
- **Significance:** how much the choices really affected matters?
- **Participatoriness:** the feeling or not that one is participating in the ongoing action of the representation. (Laurel 1991:21-22).

Those were examined using tracking data (see section 5.3.1.4) and the individual interview (see section 5.3.2.4) along with this questionnaire about KS functions in terms of the learners' interaction with KS in Chapter Six. The last one, “participatoriness”, dealing with learners' feelings, is examined as attitudes toward CALL and KS, using the questionnaire (Appendix D).

The questionnaire about attitudes toward CALL and KS consists of 19 items, based on Warschauer (1996), Hsu (1994) and the ones used by the researcher in her previous study (Van Aacken 1996). Half were about general attitudes toward CALL and the other half about attitudes toward the KS program, representing “helpfulness”, “confidence”, “level”, “anxiety”, “interest”, “independence” and “preference”. Four items in the questionnaire were reverse coded which requires a negative response to indicate a positive attitude, as learners may tend to answer positively especially for a teacher/researcher's questionnaire as Warschauer (1996) indicates.
Further, these attitudes are further integrated into the CALL evaluation\textsuperscript{86}: 1) language learning potential, 2) learner fit, 3) positive impact (Chapelle 2001:55). Due to the specific features of learning kanji for JFL beginners in this study, “meaning focus” and “authenticity” were eliminated. Also, “practicality” dealing with the availability of hardware and software, has been discussed separately in Chapter Four. At the end, three criteria were selected as follows:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Sub-criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language learning potential</td>
<td>The degree of opportunity present for beneficial focus on form.</td>
</tr>
<tr>
<td>Learner fit</td>
<td>The amount of opportunity for engagement with language under appropriate conditions given learner characteristics.</td>
</tr>
<tr>
<td>Positive impact</td>
<td>The positive effects of the CALL activity on those who participate in it. (Chapelle 2001:55).</td>
</tr>
</tbody>
</table>

In other words, the raw data from the questionnaire were categorised into three criteria and seven subcategories for the judgemental evaluation in Chapter Eight, as follows:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Sub-criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language learning potential</td>
<td>Helpfulness</td>
</tr>
<tr>
<td></td>
<td>Confidence</td>
</tr>
<tr>
<td>Learner fit</td>
<td>Level</td>
</tr>
<tr>
<td></td>
<td>Anxiety</td>
</tr>
<tr>
<td>Positive impact</td>
<td>Interest</td>
</tr>
<tr>
<td></td>
<td>Independence</td>
</tr>
<tr>
<td></td>
<td>Preference</td>
</tr>
</tbody>
</table>

Figure 5.3. Criteria and Sub-Criteria for the Judgemental Evaluation

\textsuperscript{86} “Meaning focus” indicates “[t]he extent to which learners’” attention is directed toward the meaning of the language.” “Authenticity” means “[t]he degree of correspondence between the CALL activity and target language activities of interest to learners out of the classroom.” (Chapelle2001:55).
Finally, as discussed theoretically in section 3.3, the last questionnaire, called the SILK\textsuperscript{87} Test Instrument (Bourke 1997) was used to examine the kanji learning strategies used by beginning JFL learners. There are 12 subcategories in direct strategies: association, stories, radicals, frequency, experience, visualisation, self-monitoring, compensation, sequence, physical/emotional response, sound and stroke order. The three subcategories in indirect strategies are: planning your learning, evaluating your learning and co-operating with others. These 15 subcategories are covered by 55 statements (see Appendix C), and are used to gather information in order to examine how individuals use strategies for learning kanji. In this study, the SILK was used in relation to interaction with the KS and kanji learning outcomes.

Participants self-rated the five Likert scaled items\textsuperscript{88} of the SILK at the end of the second semester. As the materials used to learn kanji for Bourke’s study were mostly paper-based, the findings of the present research will be discussed in terms of strategy use relating to CALL methods. Results and discussion are presented in Chapters Seven and Eight.

5.3.1.4 Tracking data

The KS has a self-contained tracking file which allows examination of learners’ behaviours while using the program during kanji learning. The advantage of computer tracking is its objectivity. At the same time, there is one disadvantage in that the researcher cannot

\textsuperscript{87} SILK stands for the Strategy Inventory for Learning Kanji, developed by Bourke (1997).

\textsuperscript{88} Cox (1980, cited in Busch 1993) advocates a range of 59 categories, but scales with fewer than five categories tend to decrease reliability (McKelvie 1978).
eliminate the problem of distortion through human inaccuracy (Cohen & Scott 1996). So, it is important that the interpretation of the tracking data be done with caution, as the learners’ intention in choosing an activity is not recorded. They may select an activity consciously or unconsciously, however, only the data remains as the user’s record (Cohen & Scott 1996). In addition, a learner’s off-line practice is, of course, not recorded, regardless of how significant. However, it can provide a comprehensive picture of strategy use when employed with other methods such as site observation and the post interview.

The tracking system in KS is designed to collect data on each individual’s practice sessions, including duration (d), order (o) in which they accessed the activities, and the scores (s) for KRQ, KWQ, and SQ in Figure 5.4 shown below:

<table>
<thead>
<tr>
<th>Activities</th>
<th>Tracking data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variety</td>
<td>d, o</td>
</tr>
<tr>
<td>Kanji Introduction (KI)</td>
<td>d, o</td>
</tr>
<tr>
<td>Kanji Reading Quiz (KRQ)</td>
<td>d, o, s</td>
</tr>
<tr>
<td>Kanji Writing Quiz (KWQ)</td>
<td>d, o, s</td>
</tr>
<tr>
<td>The Story (ST)</td>
<td>d, o</td>
</tr>
<tr>
<td>Story Quiz (SQ)</td>
<td>d, o, s</td>
</tr>
</tbody>
</table>

Figure 5.4. Content of the Tracking File

The tracking data were downloaded periodically in order to examine the data and observe learning behaviours. The final download was conducted at the end of November after the final examination. Due to either hardware or software problems, not all scores for the KRQ, KWQ and SQ were collected. However, not many participants used the quizzes during the second half of the study period. Any data available in the tracking file were printed out (Appendix H) and used for the qualitative analysis on KS interaction in Chapter Six.
The examination of the tracking data during the preparation period showed that the majority of learners used the “variety” activity, but very briefly right after checking the “lesson objectives”. This means that they passed through it without utilising it, most likely because they ignored the features of preparatory activities in order to start the main lesson as quickly as possible. From the viewpoint of evaluation, ignoring activities means that “students… subverted the intentions of the developer” (Hubbard 1996:29) or that content preparation, such as review of old kanji used in combination with new kanji could be overlooked by the participants. Consequently, the access route to the “variety” activity was changed to include access from the “activity menu” as well as directly from “objectives”, right before the study period. If they enter it from the “activity menu” for a longer period, i.e., over five seconds, it is assumed that they used it for learning.

Lastly, in relation to the tracking data, feedback is also useful information for learners. Current computer technology is able to give textual feedback on an individual’s performance as a learning record. However, some studies (Van der Linden 1993; DeKeyser 1995; Brandl 1995) report that “correct/wrong” feedback was preferred by users. Due to the nature of kanji learning at the beginning level, basic feedback of “wrong-try again” is employed in this program. As access to the basic kanji information in the KI component is available from anywhere in the program, even from the testing section, it was considered that a “wrong” sign should be enough to encourage learners to check the basic information either from KS or their workbooks or notebooks. In addition, the percentage of correct answers is given to learners after each quiz activity so that they may evaluate their approximate level of recall and to make them aware of their progress. Regarding the SQ, however, qualitative feedback might be better if the program is focused on comprehension, instead of learning kanji characters.
5.3.2 Human sources

In keeping with the theory of naturalistic inquiry (see section 5.1), interviews, CALL class observations for every session and diary writing were conducted to obtain feedback from learners' introspective viewpoints. Because of the sensitive nature of a qualitative study, the present study followed the procedures by Seliger and Shohamy:

1. Define the phenomenon of second language to be described.
2. Use qualitative methods to gather data.
3. Look for patterns in the data.
4. Validate initial conclusions by returning to the data or collecting more data.
5. If necessary, return to step 1 and repeat the cycle, redefining the area on the basis of the first cycle. (Seliger & Shohamy 1989:122).

All of the data from interviews and observations are presented for discussion in the three following chapters.

5.3.2.1. Interviews

Interviews are an essential source for obtaining evidence with insights from participants. Due to the nature of the verbal dialogue between interviewer and interviewee, the interviewer's eliciting skill is very important. At the same time, interviewers should know that interviewees may have "the problems of bias, poor recall, and poor or inaccurate articulation" (Yin 1984:91). For this study, the researcher had practised using the interview method in her previous studies (Van Aacken 1997,1999).

The interviews were held in late October, individually, in the researcher's office with participants describing their interactions while using the KS program to demonstrate.
The main reason for holding the interviews toward the end of the study period was to get individual learner's reactions to, and comments about, what and how kanji was learned for at least half a year and, specifically, how problems were solved and obstacles in kanji learning were dealt with during this period, so far as beginning JFL learners using CALL program were concerned. As usual, the topics went back and forth within the realm of kanji learning; sometimes the participants expressed fears about learning and nervousness about the final grade. On such occasions, the interview took on the form of a counselling session to encourage them to study until the last available opportunity. Prior to the interview, the researcher obtained permission to record it on both audio and video tapes. In particular, the video camera was used to accurately record each participant's retrospective description for later interpretation since the KS program was used during the interview to illustrate how it was actually used by participants. Each interview took about 45 minutes to one hour.

The one-on-one interviews were conducted in an informal, conversational manner. Although the interviews remained mostly open-ended, they were semi-structured with three fixed questions:

1. How was learning kanji using KS?
2. Do you feel that KS was helpful in your learning?
3. How did you study kanji, especially new unknown kanji?

The rest varied, depending on participants' responses and questions about learning kanji which partially overlapped items in the questionnaires. At the end of the interview period, all interviews were transcribed for further analysis.
The advantage of on-site observation is to gain insight into the participants’ direct behaviours and experiences, although the outcomes depend on the researcher’s abilities, skills and interests. Guba and Lincoln stated that observation is:

1. to maximise the inquirer’s ability to grasp motives, beliefs, concerns, interest, unconscious behaviours, customs, and the like;
2. to allow the inquirer to see the world as his subjects see it, to live in their time frames, to capture the phenomenon in and on its own terms, and to grasp the culture in its own natural, ongoing environment;
3. to provide the inquirer with access to the emotional reactions of the group introspectively and;
4. to build on tacit knowledge, both his own and that of members of the group. (Guba & Lincoln 1981:193).

Bearing these points in mind, the researcher observed all of the CALL sessions from the first semester for eight months in order to build trusting relationships. During the preparation period, there were several technical questions and problems with KS, as well as the linguistic problems with kanji and learning Japanese in general. Consequently, observation notes were unstructured, basically filled with chronological incidents together with other informal episodes. During the study period, however, observation entries focused on the kanji learning strategies from the SILK Test Instrument that learners used while using KS.

Observational data were used in a parallel mode with tracking data, to compensate for the minor loss of tracking data caused by technical problems. Conversely, as the observation could not cover all participants’ behaviours or even insights simultaneously, the track data helped to provide a fuller picture of students’ behaviours. The data are presented for discussion in the following three chapters.
In addition to the interview and observations, a letter explaining how to keep a kanji learning diary (Appendix G) was handed out in class along with the first questionnaire when kanji was introduced in the seventh week. As the researcher noticed that only two participants wrote short diary entries at the end of the preparation period, she asked again in the first CALL session of the second semester, that participants keep a diary, even weekly or monthly. Since the researcher discovered that diaries were still not being kept, partially because diary writing is worth nothing for the final grade, in early September the specific twelve kanji for that week were printed out and participants asked how they learned each of them. Only three were returned. In November the researcher collected three kanji diaries, one very brief. As a consequence, it was decided to use diaries only as a reference, if the relevant participants’ descriptions fitted the context of the qualitative analysis.

5.4 Summary

In Chapter Five, all aspects of the project method and design were described in detail for the present study. First, the research methodology was briefly discussed in terms of a case study in qualitative analysis, in particular, in the paradigm of a naturalistic inquiry (Lincoln et al. 1985). At the same time, reliability and validity, especially in the case of qualitative analyses, must be cautiously examined. Two other issues were also of concern; one was trust between participants and researchers as an important philosophy throughout the context of the study, and the other was the triangulation of data, specifically, the mix of human and non-human sources necessary to increase the reliability and validity of the study.
Second, the research design was explained in detail, following the principles of research methodology. The study was carried out in the natural setting of the CALL laboratory to find out how JFL learners learn kanji using their own kanji learning strategies with the introduction of the KS program. In particular, this exploratory study tries to avoid manipulation of the learning process by selecting an early, short period during the semester as the novelty effect often causes unreliable results in CALL experiments. The description extended to the research schedule, research procedures for data collection as well as human and non-human instruments needed to conduct holistic research using KS as an instructional tool for learning kanji.

In the following three chapters, the results and findings are discussed in terms of: 1) KS interaction and skill development; 2) the comparison of the use of kanji learning strategies in the conventional approach and in CALL methods; and 3) the learning outcomes in relation to KS interaction and kanji learning strategies during the learning process.
This chapter presents the results of an experiment using the KS program at a CALL laboratory over a four-month period after a preparation period of three months. Due to the limited number of participants, there were no experimental or control groups in this study. Instead, all 17 participants were treated as one group. Their CALL interactions are analysed and discussed in regard to how JFL learners utilise information from KS to learn kanji characters in terms of skill development.

All of the research questions in Chapters Six, Seven and Eight were categorised, using the same parameters, to organise participants into three groups based on the different stages of learner development:

i) “No-J” group: no previous learning experience of Japanese language in L2

ii) “Yes-J” group: previous learning experience of Japanese language in L2

iii) “Yes-K” group\(^{89}\) kanji background in L1 with/without learning experience of Japanese language in L2

This is justified by previous research studies (Koda 1989, Kato 2000) showing that kanji knowledge and its orthographic processing skills in L1 and L2 are the most influential factors for learning kanji characters at the beginner level in the JFL environment. Moreover, the differences, whether they have a little or no experience in

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\(^{89}\) There are approximately 40 per cent “Asian” students in larger universities in Australia (Stockwin 1997), although all do not necessarily have a kanji background.

6.1. Research question one: Interaction with KS

*To what extent do JFL learners use the KS program in learning kanji in terms of skill development?*

The analysis was conducted to investigate how JFL beginners use the program for learning kanji in terms of orthographic processing skill development. The three components in the program are considered to be roughly equivalent to the developmental processes from the input stage through to output: the Kanji Introduction (KI) component including Variety (VA) for presentation, the Story (ST) component followed by Story Quiz (SQ) for practice, and the Quiz component (QZ) with the Kanji Writing Quiz (KWQ) and the Kanji Reading Quiz (KRQ) for practice and/or production. However, these stages are not fixed, due to the different backgrounds of learners. For example, the KI component can be used for practice or to confirm single kanji characters in the KI while working with the ST component, then return to the same part of the story. At the end, the hand-written quizzes occurring immediately after the interaction are considered to be a production phase in the skill learning model in this study.

In the following sections, overall access to the program followed by the interaction with
each component will be explored in relation to learners’ language backgrounds in L1 and L2.

### 6.2 Frequency of access to KS

First, access to KS at the laboratory was investigated to see how JFL learners used the KS program. CALL sessions were organised once a week during the second semester, the study period being a non-compulsory, but recommended class for this research. Tracking data were collected on the frequencies of access to the KS program by all 17 participants, as shown below.

<table>
<thead>
<tr>
<th>Learners</th>
<th>Total access: over 13</th>
<th>Learners</th>
<th>Total access: More than half of sessions</th>
<th>Learners</th>
<th>Total access: Less than half of sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fusako</td>
<td>19</td>
<td>Seiko</td>
<td>12</td>
<td>Eiko</td>
<td>6</td>
</tr>
<tr>
<td>Taeko</td>
<td>16</td>
<td>Mari</td>
<td>11</td>
<td>Yuka</td>
<td>5</td>
</tr>
<tr>
<td>Noriko</td>
<td>14</td>
<td>Tomiko</td>
<td>11</td>
<td>Akemi</td>
<td>4</td>
</tr>
<tr>
<td>Orie</td>
<td>14</td>
<td>Tamie</td>
<td>10</td>
<td>Hajime</td>
<td>4</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>Sayuri</td>
<td>9</td>
<td>Mieko</td>
<td>3</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>Michie</td>
<td>8</td>
<td>Reiko</td>
<td>1</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>Ken</td>
<td>7</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

The result of the data revealed that the learners accessed KS from as many as 19 times, to a minimum of once, during the 13 week study period. Any number higher than 13 indicates voluntary access outside of class sessions as the lab was generally available anytime. The total number of accessions was 164 by all 17 participants. The average frequency was 9.6 times per person. Some accessed the program more often than others during the semester. What is the reason for these divergent figures? Learners’ participation in the program depends on factors such as their ability level and their
interest and desire to learn the materials as Chapelle (2001) notes. Individual interviews about CALL use for learning kanji and the observations during the CALL sessions may reveal possible reasons for varying participation rates within this group.

First, the four most active users shown in the left column revealed that each made over 13 accessions. Fusako, the most active, accessed KS 19 times, twice a week for half of the study period. In fact, she utilised the program enthusiastically, every session, from the first day of the introduction, even during the preparation period (O), and commented:

Computer is good. So, I just go to the lab from 10 to 11. And then, I practise writing kanji and memorise it, and then in class at 11 on Thursday... Computer makes learning kanji very interesting. I like kanji, but not love it. (Fusako, I)

Apparently, she tried to take the initiative by maximising her interaction with the program so that she could obtain kanji information at her own pace before class started. Taeko used it 16 times, followed by Noriko and Orie at 14 times each. As with Fusako, Taeko and Noriko also have quite positive attitudes:

I think the computer is really helpful, and makes it a lot easier. I think it’s good. I like it much better than learning it by book. (Taeko, I)

Computer is helpful and makes [learning kanji] easier...Because you use it in a different context and that helps you to remember it. And it gives you combinations and also tests you...It’s nice and easy to use. (Noriko, I)

They acknowledged the helpfulness and easy paths of KS in learning kanji. Orie also seems very enthusiastic using the program (O) because of its integrated activities:

It was really good to be able to have the kanji bit, and how you go into the reading bit, the comprehension, that not only helps with kanji but also it’s good in understanding vocab. So, that’s really good. (Orie, I)
Thus, these four most active learners share the common view that KS is helpful, because CALL makes learning kanji interesting and easier, and they believe that the more they access it the more they learn.

Next, those who accessed KS during more than half of the 13 CALL sessions, between seven and 12 times as detailed in the middle column of Table 6.1, could be considered the-mid users. Firstly, Tamie and Tomiko agreed with the easy and helpful facilities of CALL for the “no-J’ learners:

I like it. I’m enjoying it...yeah, I think KS is easier. Umm, it really helped at the start when we were learning hiragana and katakana, and kanji as well, I think. (Tamie, I)

For the amount of kanji we have to learn, I think it’s good. It’s very helpful. (Tomiko, I)

In spite of the program’s helpfulness, the latter assessed that her learning was not as high as she expected because of the difficulty of kanji characters. Michie commented in a more detailed manner, differentiating recognition from production of kanji:

It’s good, but I still have to write kanji down as well. But, it was good to know how to recognise them... I learned how to recognise them. That’s a big thing. (Michie, I)

Seiko, who participated in all sessions except for the first session due to an unexpected event, also mentioned practising writing them down immediately to encode kanji information in storage, and added her comments about the merits of CALL in a slightly different way:

I like to use KS as a tool... It just creates a balance. You do your workbook and then, go into the classroom... You also go into the computer room. It’s good to have a balance... gives a bit of variety. (Seiko, I)

Her approach is to integrate use of KS with other activities such as oral/aural interactions in class and homework like reading and writing practice. In fact, the program was expected to be used integratively like this to maximise kanji learning.
Sayuri, Mari and Ken have kanji backgrounds, but stated it differently. Sayuri commented positively while Mari and Ken were negative in their comments:

I’m enjoying it because sometimes some Chinese characters are different from Japanese ones...I think it’s really good. (Sayuri, I)

Using computer for learning kanji is not really helpful for me...I don’t think I use computer for learning kanji. (Mari, I)

I don’t get much help from the program because I already know kanji. (Ken, I)

Ken and Mari did not acknowledge the helpfulness of CALL for learning kanji because Ken knew most of the kanji graphics introduced in the first year course, while Mari denies the helpfulness, possibly because of her reliance on familiar L1 learning habits.

Among the low users who attended fewer than half of the sessions shown in the right column in Table 6.1, Yuka commented positively for the access she made:

Well, I actually think the computer has been really good. It’s definitely been interesting. It’s probably a bit of a break. (Yuka, I)

On the other hand, Eiko was rather modest in her statement, as she has struggled with Japanese language in general:

I think it’s helpful, because I didn’t turn up to class for this kanji test. But I can catch up with the computer. So, I think it’s helpful. (Eiko, I)

The remaining four were clearly negative. Firstly, both Akemi and Reiko absolutely do not like using a computer, as follows:

I really don’t like using a computer much...I don’t really use the computer that much. I’ve already learnt a lot of kanji on a piece of paper, and I found it a lot easier to learn it off the piece of paper. (Akemi, I)

I don’t like it. I don’t know why. I wanted to go home and I’ll just do it at home. Sometimes I just find it easier to do it at home. (Reiko, I)
Mieko stated her case of learning kanji by comparing learning with and without the computer:

Computer is not necessarily useful for me. Because you can look at the computer screen and just gaze in there like that, and I have to do it like manually, like I can't just look at something. I have to write because I learn visually and manually...When I did the first few quizzes, I didn't prepare and I just did it on the computer and the lessons, and I didn't do very well. But I found that when I did it manually and did it through the computer to check my memory, I did better. (Mieko, I)

She found that the complementary approaches of preceding manual writing and checking with the program afterward were useful. Although she used CALL for testing her memory, somehow she did not feel the computer was helpful for learning kanji. She still expected, unrealistically, that CALL would replace repetitive practice. In fact, many hope CALL has a certain magical power.

In contrast, Hajime expected the content should include more diversified and dimensional information about kanji, just like “learning kanji while living in Japan” with more visual information:

With this system, because everything was in the same place, it was very easy to use. The only problem is that this is static. It's single. Therefore, you don't get the sense that it lives. Kanji is just more than visual, I think. (Hajime, I)

So, in his case, he would access it more if the contents satisfied his expectations by providing more information dynamically.

In short, the different frequencies of KS use indicate individual differences in attitude toward KS for learning kanji. All of the voluntarily high users note the helpfulness of CALL for their learning of kanji. The common, positive patterns of 11 of the participants indicate KS is helpful, interesting, and easier to use to learn kanji due to its attractive presentation. Pennington also highlighted in her CALL studies that “the
presentation on computer is an especially memorable form of input" (Pennington 1996:8). Also, those in the high access group believe that repeated exposure to kanji script facilitates better processing in the L2 as suggested in another study (Segalowitz & Segalowitz 1993). It even provides a “fun time” for Yuka, but it “forces one to learn” for Eiko. Michie and Seiko make their additional comments; “good for recognition of kanji characters” for Michie, and “good as one of the tools” maintaining a balance with other activities in the classroom, workbook and CALL use for Seiko. On the other hand, negative feedback from six indicates that KS is neither helpful nor useful for learning kanji. Reiko and Akemi do not like using the computer at all, and prefer to learn with “book and pen”. Mieko found that integral use with handwriting followed by testing with KS is better although she expects that a powerful CALL program can assist and replace repetitive writing practice for retaining kanji information, while Hajime expects to interact with more dimensional content. The three learners with kanji backgrounds vary in their attitudes towards learning Japanese kanji using a computer.

6.3 Interaction with components

Based on the aims of the three components explained in Chapter Four (see section 4.1.2), the interactions with the components/sub-components are examined in terms of overall frequency along with their attitudes toward the function of the components.

6.3.1 Overall frequency of interaction with the components

More detailed data were collected from the tracking file to examine the interactions with each of the sub-components of the program by all during the study period, as shown
below. The result shows that all sub-components were accessed. The KI was accessed most frequently, followed by the VA, KRQ, ST and KWQ in order, while the SQ was least utilised by everyone. Six tasks for the different stages of kanji processing ranged from recognising the basic kanji information, to practising single kanji and kanji word, and examining the comprehension of a story written using a mixture of the current and previous kanji characters.

Table 6.2. Frequency and Use Times for Interactions with KS

<table>
<thead>
<tr>
<th>Sub-components</th>
<th>Frequency</th>
<th>Use times (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>KI</td>
<td>227</td>
<td>6310</td>
</tr>
<tr>
<td>VA</td>
<td>184</td>
<td>270</td>
</tr>
<tr>
<td>ST</td>
<td>144</td>
<td>1349</td>
</tr>
<tr>
<td>SQ</td>
<td>95</td>
<td>149</td>
</tr>
<tr>
<td>KRQ</td>
<td>168</td>
<td>531</td>
</tr>
<tr>
<td>KWQ</td>
<td>128</td>
<td>394</td>
</tr>
</tbody>
</table>

The participants accessed the KI most for input information 227 times, spending approximately 6310 minutes during the study period. It is understandable for JFL beginners to spend the most time obtaining kanji information. KRQ follows KI at 168 times; however, its use time is almost a third of ST’s. This came about because of the content of the interactions; ST is utilised for practice processing at both surface and deep levels of semantic interaction which requires more time than processing kanji information with KRQ in a short context. Although KRQ was designed for the production phase, along with KWQ and SQ, these limited figures indicate they were mostly used for practice. The tracking file data indicate these use times for KRQ and KWQ were used mainly for practice, but some are for a mixture of practice and production phases at a premature stage of production for self-testing. Then, rather high
frequency but very short periods of interaction with the VA is partially due to the design of the program, that is, the VA played the role of a transitional phases from presentation to practice depending on how learners interacted with them. Finally, SQ is interacted with the least frequently, but it is apparent that the use time is much shorter, because of its difficulty for beginners, and is to some extent, to be expected. Those difficulties will be examined later by group.

6.3.2 Helpfulness of the functions in KS

First, the participants self-reported the helpfulness in five Likert scales from 5 (strongly agree) to 1 (strongly disagree), about functions (F) in the program (Appendix D). The results displayed below in Table 6.3 indicate the learners’ evaluations of the tasks and functions of KS.

Table 6.3. Helpfulness of Tasks and Functions of KS

<table>
<thead>
<tr>
<th>Tasks &amp; Functions</th>
<th>All</th>
<th>No-J</th>
<th>Yes-J</th>
<th>Yes-K</th>
</tr>
</thead>
<tbody>
<tr>
<td>KI: Colour coded radicals</td>
<td>4.1</td>
<td>4.2</td>
<td>4.3</td>
<td>3.3</td>
</tr>
<tr>
<td>On/Kun readings &amp; meanings</td>
<td>4.1</td>
<td>3.8</td>
<td>4.4</td>
<td>4.0</td>
</tr>
<tr>
<td>Animated stroke order</td>
<td>4.3</td>
<td>3.8</td>
<td>4.9</td>
<td>3.7</td>
</tr>
<tr>
<td>Mnemonics</td>
<td>2.9</td>
<td>3.3</td>
<td>2.5</td>
<td>3.0</td>
</tr>
<tr>
<td>ST: Story (content)</td>
<td>3.8</td>
<td>3.8</td>
<td>3.6</td>
<td>4.0</td>
</tr>
<tr>
<td>Balloon</td>
<td>4.4</td>
<td>4.2</td>
<td>4.4</td>
<td>5.0</td>
</tr>
<tr>
<td>Translation</td>
<td>3.5</td>
<td>4.0</td>
<td>3.0</td>
<td>4.0</td>
</tr>
<tr>
<td>SQ</td>
<td>3.9</td>
<td>3.7</td>
<td>4.1</td>
<td>4.0</td>
</tr>
<tr>
<td>KRQ</td>
<td>4.2</td>
<td>4.0</td>
<td>4.6</td>
<td>3.3</td>
</tr>
<tr>
<td>KWQ</td>
<td>3.9</td>
<td>4.0</td>
<td>4.1</td>
<td>3.3</td>
</tr>
<tr>
<td>Translation for KRQ &amp; KWQ</td>
<td>3.7</td>
<td>3.8</td>
<td>3.6</td>
<td>3.7</td>
</tr>
<tr>
<td>Scores for QZ on the screen</td>
<td>3.2</td>
<td>3.5</td>
<td>3.0</td>
<td>3.3</td>
</tr>
<tr>
<td>VA</td>
<td>3.4</td>
<td>2.8</td>
<td>3.6</td>
<td>4.0</td>
</tr>
<tr>
<td>Japanese Word Processor</td>
<td>3.0</td>
<td>2.7</td>
<td>3.1</td>
<td>3.3</td>
</tr>
</tbody>
</table>

The functions in the KI are positively assessed as the most “helpful” by all, but mnemonics are not much appreciated. The “yes-J” assessed the animated stroke orders...
as a highly useful tool, followed by the basic information of readings and meanings, and
the colour display of components or radicals. The "yes-K" put the value on the
availability of the semantic and phonemic information to match it with what they had in
their L1 and to distinguish the different information. Due to a different level of skill
processing, the "no-J" appreciated the colour-coded presentation the most. Being able to
discriminate between one radical of a complex kanji and another, e.g., over ten strokes,
needs some skill at first, especially for students whose L1 is based on Roman script.
Mnemonics were assessed to be of least value by all, although the "no-J" group tried
them and felt they were a little more helpful than the other groups did.

The next most helpful component is the ST. In fact, the balloons in the ST are evaluated
highly by all. The "no-J" and "yes-K" thought it to be a little more helpful than On-/Kun
and meaning information in the KI. One function in the KI is to obtain information for
single kanji while another in the ST is for compound kanji word information in context.
The learners consider those two functions as beneficial for learning kanji. In fact, the
interactions with the components including these functions are high\(^90\) and longer in their
use time by all (see Table 6.2), although the tasks with which they interacted in the KI
can not be specified from the tracking data. However, this behaviour of interaction was
observed frequently during the observation (O).

In addition, the "yes-J" tend to feel more positive toward the QZ, but not scores, as they
may be ready for self-testing while the "yes-K" are less interested in QZ. Although the
SQ requires more grammatical knowledge along with lexical knowledge, the "yes-J" are

\(^90\) Strictly speaking, the KRQ (168 times) was interacted with third most frequently, more than the ST
(144 times).
more supportive than the “yes-K”. The “no-J” tend to be favourable toward any immediate help like translations and scores. Perhaps they are trying to find, without any prejudice, some approach that works for them due to no previous experience in the learning of kanji.

Lastly, the reaction to the VA activity varies among them, but as mentioned initially, the interaction was rather limited in general. The high score by the “yes-K” may relate to their readiness to the task due to their previous kanji knowledge while the low score by the “no-J” means newness for them. Another is the use of the Japanese Word Processor which was assessed as less value or unknown by all, especially for the “no-J” probably because too early application without the basic knowledge and skills is too demanding.

To summarize the frequency of interaction with components and attitudes of helpfulness toward the components, in general, the participants’ interaction associates with their attitudes of helpfulness. In other words, their active interactions with the KI and use of the balloons in the ST show the parameter of their belief that their noticeable presentations were helpful for learning kanji. This is supported by Pennington (1996:8) saying that this is a “memorable form of input which can assist both conscious and unconscious intake and uptake of information”. Another is the varied patterns in frequency of interaction with each activity. This may possibly relate to clear differences in “helpfulness” among groups and their processing competence of kanji information.

In the next section, the interactions with each component by three groups are examined to scrutinise the learning process, to learn how they react for better recognition and retention of kanji. Besides the figurative data, two other data sets are used in the section,
the individual interviews using the KS program, and the researcher’s observations throughout the CALL sessions. The analysis starts from the presentation phase of the KI including VA, then proceeds to the ST and SQ/KRQ/KWQ as the practice phase and the weekly hand-written quizzes as the production phase, by the three groups.

6.4 Interactions by the “No-J” group

Table 6.4 below indicates the frequency of interactions with each sub-component individually, along with overall frequency to further examine their learning patterns.

<table>
<thead>
<tr>
<th>Learners</th>
<th>Overall frequency of access to KS</th>
<th>[KI]</th>
<th>VA</th>
<th>COMPONENTS [ST]</th>
<th>SUB-COMPONENTS [SQ]</th>
<th>KRQ</th>
<th>KWQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fusako</td>
<td>19</td>
<td>17</td>
<td>10</td>
<td>8</td>
<td>1</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Noriko</td>
<td>14</td>
<td>21</td>
<td>13</td>
<td>14</td>
<td>4</td>
<td>31</td>
<td>26</td>
</tr>
<tr>
<td>Tamie</td>
<td>10</td>
<td>9</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Eiko</td>
<td>6</td>
<td>12</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Akemi</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Mieko</td>
<td>3</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

Fusako and Noriko accessed KS actively overall, but Fusako concentrated on the KI components to obtain the basic kanji information, especially during the second half of the session, while Noriko made a zigzag pattern among KI, ST, and QZ, except SQ sub-component, but utilised the VA more during the last quarter session. She moves back and forth to the KI, for example, to make sure of the individual characters in KI during

91 The QZ component could be considered as production phase. However, as the use of the Japanese Word Processor for production was quite low, it was decided to categorise the QZ in the practice phase in this study (see section 4.1.2.)
her interactions with the QZ. The ST seems to be manageable due to the balloon assistance (O), but the SQ is extremely limited. Her major pattern is “input-practice” using VA-KI-KWQ-KWQ-KI-KRQ-KRQ-KI. Tamie, missing three sessions, and Eiko, missing half of the sessions, share their interaction patterns with most activities in a moderate way. However, a clear difference is found in that Tamie focused on the KI like VA-KI-ST (ST, usually but briefly) while Eiko seemingly interacted more with the QZ for self-testing. On the contrary, Akemi and Mieko participated in only a third of the sessions mainly during the first half, and their interactions were limited either VA-KRQ-KI or VA-KWQ-KI.

The individual’s processing skill development is examined through the interactions, together with the scores of the written quizzes from working memory in the production phase. As use of the three phases with the three components in KS does not always match, and may create confusion due to the different paths among learners, the sub-section is called by the component of the program.

6.4.1. The KI component (KI & VA)

Firstly, Noriko commented on how she interacted with the KI:

I just write them down a lot, and I look at them and write them down and I look at them and write them down. Just by seeing them when I see my textbook, that’s the only way I learn them...I just write down one, two three, in the box, that’s a part. And then, just write word to say and then the on-yomi and kun-yomi, and then try and write it again. (Noriko, I)

Copying the graphics and readings in one’s notes is a common behaviour. Then, she reads them aloud to facilitate their integration. This increases retention as the dual coding using visual and verbal input provides more recall cues (Paivio 1971; Okita
1996). However, she processes each piece separately due to being slightly lacking in her ability to see chunks. In fact, “piece” processing requires more memory than “chunks”, as discussed in Hue and Erickson’s study (1988), because each piece must be recorded separately in memory storage.

Large colour coded kanji in the middle of the screen were only utilised passively by Noriko and Fusako. Fusako utilised the three basic pieces of information; the kanji symbol, meanings and readings, to create her own mnemonics or memory devices along with the colour coded kanji:

First I go through each one and write down the kanji, on-yomi and kun-yomi readings and meaning...Colours are good. When you see different parts of it they make it clear...While practising, sometimes I use mnemonics, but usually I make up my own. And then if it’s really difficult, I’ll use the stroke order. (Fusako, I)

After collecting the basic information, she practised writing kanji in order to integrate them for activation of processing. Noriko also utilised them all in order to remember kanji, but she did not put much value on mnemonics because they did not help her memory:

I guess, that kind of looks like “ka” in katakana without the little extra bit, but that just sounds like getting me more confused. (Noriko, I)

Noriko could not find the stroke order patterns as she said, “I don’t like that [stroke order] because I don’t know what the stroke order for that one is...I can’t remember (I)”.
Possibly she clicked on the button for “stroke order” on the monitor just because it was there as this often happens in multimedia environments.

Tamie explained how she spent most of her time on the KI gaining input information from the computer:
Tamie started to interact with the graphics by copying the single kanji into her kanji notes and looking for any distinctive features of the target object. Then, the phonological information was obtained and added to the graphics. From the interview, it is not clear whether she understood the role of the two readings, merely copying the kanji and one, but not all of the readings. In her diary she wrote that, “I only write down the sound for the single kanji, not for the joint kanji (D)”. In other words, she wrote only the *kun*-reading. No doubt she faced a problem with readings for compound kanji soon after that in the hand-written quiz. For example, 男子 /dan-shi/, “adult male” was read as /*otoko-ko /using *kun*-readings for both kanji. After determining the meaning, she pronounced the kanji again to internalise the meaning and sound together. Further, she visually checked the graphic configuration, first by clicking the stroke order, then adding the stroke numbers to the kanji graphic, in order, for input enhancement (Sharwood-Smith 1993). Certainly she spent a lot of time on the stroke order.

The visual recognition of stroke orders is passive, but the concurrent motion of production is considered to reinforce memory. At the same time, she recognises the whole kanji symbol on the screen by sight to differentiate between parts of a kanji before copying the bits of basic information by “practising a lot...over and over to recognise the different parts of it (I)”. It is fundamental to be able to distinguish one
from another, especially among the similar pieces and patterns in kanji characters. This skill is trainable by repeated practice such as she did. It seems that the different colours gave her some amount of help in distinguishing between them, although she had “never really thought about it (I)”.

Eiko also did not use the colour distinctions of the kanji form. She interacted with the KI to “just write out all these kanji, and put all this Japanese writing and the Japanese meaning along with the meaning”. Basically, she copied them all for writing practice later, and she continued:

Write it down first, and then memorise it, ...try to. But within one hour’s time you can’t memorise all of this. So, I picked on some that’s like easy one, like kanji of female や /my/. So I add these up, and so I know it’s “cheap”...I had to definitely memorise some, probably a few, but not even half. (Eiko, I)

She does not use mnemonics often because “just listening is not enough to memorise. So, unless I have more time to do it I pass”. In fact, her big problem is memorising all in one hour:

Sometimes I learn how to write kanji, but it’s hard to memorise, but I know what to write because I’ve seen it. I know which one is the first order and things like that. I compared to different kanji characters. Yeah, but I don’t think I can memorise all of it. (Eiko I)

Overwhelmed by the number of kanji to be mastered every week, she re-evaluates the current state of her study load. Rather than trying to find time for practising any other time, she set her own goal to learn only a few kanji. This may be a strategic choice. She reduced her goal to something she could achieve in order to overcome the difficulty.

Mieko and Akemi interacted with the program much less than the others. During interaction with the KI, they did not copy the information. Instead, while watching, Mieko tried to break down the kanji and use the colour coding sometimes like this:
Well, a lot of kanji, these two here are similar. See how they are sort of across at the bottom and there’s that. And those two are crossing, but they still have two and those ones must have divided into four...yeah, I just break it down. Then, I usually focus on the top. Because if you don’t remember the first few strokes, then you can get the rest muddled up. Some of the middle parts are the same if you start from the top... Also, I like visual arts, so I like things like colour and I like shape, and that’s how I memorise things and learn things like art or something. (Mieko, I)

As in her comment, Mieko takes a visual approach, noticing the irregularity of kanji graphics to find the features of each kanji. But she does not use the stroke orders because, “I didn’t find stroke order too necessary to us”. Saying that, she admitted the value of the whole flow, because “the stroke order takes a bit of time, it forces you to notice. So, it does help a bit.” Similarly, Akemi also utilised mainly stroke order in the KI and said:

I just go through it just to make sure that I have it right after I study it from the book…I found the stroke order really helpful to just check myself. (Akemi, I)

She tried only the activities that were suitable for her like the stroke order and disregarded the rest, as she does not like to use computers anyway. There is a certain degree of freedom in the CALL environment. Unless the exposure is conscious and purposeful, it is meaningless to have any involvement. At least Akemi’s interaction, though very limited, was useful, if only for stroke orders.

In summary, the presentation phase seems very short, but a decisive stage to affect the competence of recognition in a new language. Some of the salient features of KS do not necessarily assist all for their input enhancement, because their readiness may be different. Some students utilise the memory devices in the KI separately without integration. Some try to utilise them in dual coding to increase retention. The majority used the VA a little, probably due to the hand-written quizzes afterwards. Common to all of the “no-J” group is that declarative knowledge during the presentation phase
requires a tremendous amount of rehearsal right after this phase as it is not yet proceduralised. Probably an explicit warning of the necessity of practice on the monitor might trigger a learner’s attention prior to moving to the next phase.

6.4.2. The ST component (ST and SQ)

The majority of students interacted with the ST (see Table 6.4) in order to look through the highlighted parts to collect kanji words which are accompanied by their meanings, readings, and sometimes, short grammatical notes. Because of their limited kanji knowledge, as well as their undeveloped processing skills, the explicit vocabulary assistance of the balloons is considered to be useful for the “no-J” learners to observe kanji in context (see Table 6.3). Further, as the story is written with a combined usage of already learned kanji vocabulary and newly introduced vocabulary items, some tried to comprehend it using the “help” function.

Eiko and Akemi stated how they interacted with the story:

I looked at the highlights, and I just looked at the meaning and then, tried to read it. So, I know the meaning of the word, but I didn’t write it down. Also, sometimes I just read the translation [of the story]. (Eiko, I)

There are a lot of words I didn’t know. So, I could just check the vocabulary. That’s what I usually do. Like if I knew it, then I wouldn’t check the vocabulary, but if I didn’t know them, I just make sure that I had it right so that I could remember it. (Akemi, I)

They complained that there were more weekly kanji during the study period than before, although the numbers were the same. However, once they learnt the new information, they forgot the old, as in the law of learning and forgetting effects (Anderson 1995). If there is insufficient practice, information is not processed and stored in working memory. As a consequence, much of the old information often looks new to the “no-J” learners. Basically, they checked through the highlighted words
without taking notes. Tamie also audited only the highlighted parts and wrote them in her list:

Just clicked on all the words to get the story. Then, I went back and wrote these on the back of kanji cards. Basically it's the same again. But they're just like tools to learn kanji. (Tamie, I)

Knowing that some of the kanji were already written on her list from interaction with the KI, she tried to confirm the words she knew in order not to miss any words. Also, after obtaining kanji information, Tamie tried to put them in context in order to link them with their contextual meanings:

I think learning kanji straight off with the KI is more difficult. Because with this one [story], I can recognise...like 素い /samu-i/, “cold” or whatever. The story is more interesting than that [KI]. Because you’ve got a story as well...I think the story helps you to understand what it means, but I have to guess here and there...yeah, it’s interesting, but it took a lot of time. (Tamie, I)

Utilising the context, she tried to maximise the opportunity to associate the new kanji words with the content in order to enhance comprehension. The balloons assist the semantic and phonemic activation of words quickly so that learners can continue to comprehend the context without stopping for the unknown words. Through the practice of quick word recognition, even the “no-J” learners gradually try to expand their processing skills, provided the opportunity and materials for training are available, however, it is very time consuming, as she comments. By exploring the ST for up to about 100 minutes during the second half of the study period, as shown below, her interaction pattern changed from VA-KI-KRQ-KWQ to VA-KI-ST.

Table 6.5. Frequency of Access and Interaction Times with ST by three “No-J” learners

<table>
<thead>
<tr>
<th>Learners</th>
<th>Frequency of access (times)</th>
<th>Interaction times (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tamie</td>
<td>5</td>
<td>99.3</td>
</tr>
<tr>
<td>Fusako</td>
<td>8</td>
<td>200</td>
</tr>
<tr>
<td>Noriko</td>
<td>14</td>
<td>123</td>
</tr>
</tbody>
</table>
By replacing the interaction with the QZ, Fusako interacted with the ST longer than Tamie, simply using the balloons to make sure of the readings and meanings of the words, and occasionally using “my own translation first, and then checking it”. But she felt it was too much for her and the overload “frustrated” her.

Sometimes I can’t remember. Frustrating! It’s too time consuming and I don’t have enough time to do that. But it’s better if I write down the whole story, I can just look through it at home. But if I don’t write the story down, then I don’t look at it at home. (Fusako, I)

Noriko was in and out of the ST frequently, checking KI and returning, and learning katakana words in context. Noriko commented about the merits of them:

It’s good when there’s katakana words because my katakana is terrible. That’s hard to learn. Also, the story is good because there are other words that I don’t know. So, I’ll learn it. But it took a lot of time. That’s the only problem. So, I feel that it doesn’t help that much, (Noriko, I)

Thus, during the practice phase, the “no-J” group utilised the ST only for collecting kanji vocabulary using the balloons, but had little interaction with the SQ because of its difficulty. The aural reading of the whole story was rarely used as some complained it was too long. It is apparent that the text modification of the KS program helps the “no-J” learners to easily recognise kanji words in the ST, but the majority tend to “part practise” instead of “whole practise” due to too much information, and it is observable that information is not yet internalised. Nevertheless, moving toward the end of the study period, one encountered a new approach to learn kanji from the story, instead of a single kanji in isolation like in the KI. This will be discussed further in the section on the “yes-J” group.

6.4.3. The QZ component (KRQ and KWQ)
Interactions with the KRQ and KWQ deal with single or compound kanji vocabulary or *jukugo* in short sentences using a Japanese Word Processor (JWP). In order to challenge the next phase, Fusako explained how she used the KRQ:

I read the sentence, and then read the highlighted part ... Sometimes I write down the whole sentence. So it can help me through exams. So, it's good for when you're thinking on kanji, just to look it over. That's really good. (Fusako, I)

Starting with reading the whole sentence is the preferred way to grasp the general meaning before narrowing it down to the highlighted word. During her “thinking” process, she was guessing as to which single kanji would fit in the gap in combination with other kanji, without interacting with the tasks directly. But, it is unclear how well she understood the whole sentence, and inferred the appropriate readings through the context. Possibly she did not realise how to apply rules and previous information as she continued guessing, and noted during the observation that this process was frustrating just like the interaction with the ST. In fact, frustration itself is not a negative process, but an interesting indication if she can find the solutions to the problems. If she cannot, the information may be displaced from the interlanguage system. Noriko also encountered difficulties with kanji readings when one or two candidate answers were recalled before production:

This is hard because you've got to try and remember it. I know the meaning, but I don't remember the reading... (Noriko, I)

In the end, all “no-J” learners expressed difficulty as they had not practised single kanji long enough to be able to visualise them in kanji *jukugo* or independently as a word. In order to overcome this difficulty, an English translation of the sentence is provided for comprehension of the sentence. In spite of that, the focus rapidly moved from the whole sentence to a word, as Eiko said:
This one is more complicated as you have to do the reading of the compound word exactly in Japanese...there is the English for the whole sentence, but no meaning for a word. So, it was hard because I don’t know the meaning for the kanji words. I tried to answer looking at my notes sometimes. (Eiko, I)

Noriko also said, “If I don’t know, I usually want to know what it means in English”.

Tamie also pointed out the same problem:

Sometimes when I don’t know the word, I’m in real trouble. I think we need to be able to go to somewhere that tells you. It was helpful when I was using it. (Tamie, I)

Text modification might be necessary at the lexical level, as provided in the ST by the balloons. The other problem was the JWP. As the keyboard should be changed from English to Japanese, she decided not to use it often and used vocabulary cards which suited her:

[During the preparation period], I used it a lot. But now, usually I don’t have time for them as I just try to remember all single kanji [from the KI]. Also, when I do the cards, I can usually recognise these kanji better and have time to do more. (Tamie, I)

Akemi also used the quizzes without typing and said that, “I just read through it and saw where it fitted in, and then, so that I could write it in”. Mieko also tested them once or twice but then she did not use the program any more. In the end, all except Noriko did not submit the answers to the computer for self-testing (T). Apart from the problem of the JWP, it is clear that, kanji reading is the most difficult for beginner JFL learners as the literature review of kanji learning states (Ishida 1989).

In spite of an easier activity, interaction with the KWQ is also limited both in frequency and interaction times. Eiko used KWQ more than KRQ and said:

I think this is a bit easier because you just copy that, by typing it and just put it up to kanji. So, this one is easier than the other one. I used the translation after reading it. (Eiko, I)
Although the activity itself is easy, she utilised the “help” function to make sure of the meaning. As with Eiko, Akemi also used it for reading comprehension and she commented, “I read the whole sentence first, and then, I checked the English at the end”. They decided not to type, mainly because of the troublesome process of conversion with the JWP. However, Fusako and Noriko participated in the activities as follows:

This one can be easier, because you can just write it down. But, when you are not sure of things, it helps you say /ongaku/ and you write it down “ongaku” 音楽, “music”, and “Oh, that’s what it looks like”, and it helps you remember it then. (Fusako, I)

I just keep typing until I get it right, if I don’t get it right. Then, I write it down in my notes to study at home. (Noriko, I)

Both are active KS users, but they show different patterns. Fusako tries to link two single kanji, 音 and 楽, learned in the KI, with /on-gaku/ as one word and makes sure of it for the next step of memorisation. This is an expected usage of the program by the “no-J” learner. It also indicates that she tried to maximise her interactions by giving her full attention. Fusako interacted with the KWQ eight times over about 40 minutes. On the other hand, Noriko’s pattern of interaction is to explore widely by typing and clicking all available choices. She interacted with it 26 times over about 70 minutes. Her typical pattern of interactions is VA-KI-KWQ-KWQ-KRQ-VA. Apparently, she processes information at a shallow level without making linkages with other information. At least she checked the English translation before interacting with the highlighted parts. However, she busily types at random in order to get quick answers. Once she finds the answer, she copies it, out of context. This pattern is seen often while playing computer games. Seemingly, she likes the speed and movement rather than staying in one place, and clicks the mouse very often during activities (O), “just looking
for something to do for a minute, but not in the mood for cognitive engagement” as Cobb et al. (1996:132) describe it.

In short, the KRQ was tried in spite of its difficulty, due primarily to a lack of individual practice prior to interaction with it and also no clear directions on how to deal with kanji words in terms of on- and kun- readings unless learners refer to the textbook. Also, it can be said that guessing the meanings of unknown words from a sentential context is still difficult for the “no-J” learners. Although a sentential translation is available, it was not digested well by all. As regards the use of the JWP, some used the KRQ for recognition only, without interacting with it in order to avoid trouble with the processor, as reported in another study of an electronic correspondence using a JWP with beginning JFL learners (Lynch 2000).

The KWQ is easier than the KRQ, but it was used by only half of the participants, seemingly because it just assists with only recognising the kanji character. In spite of that, Fusako discovered that she could use KWQ to confirm the appropriate kanji word form when she could not remember it exactly, by typing in the kana. As with the KRQ, however, the JWP should be examined further as a suitable tool for beginner JFL learners.

6.4.4. Weekly quizzes

Firstly, the students' weekly development of kanji learning in weeks 2, 5, 8 and 11 is examined individually.
Figure 6.1. Scores on Weekly Quizzes by the “No-J” group

In general, the scores of the “no-J” group indicate that their processing skills are not yet established at this stage. As the declarative knowledge is “slow” and “heavy on channel capacity” (Johnson 1996:83-84), learners have to devote their whole attention beyond the capacity of their working memory. As a consequence, the difficulty occurs in insufficient processing. Most likely, it depends on how much they practised and retrieved from working memory. Akemi is the most reliable and is improving her memory retention, so are Tamie and Noriko, while Fusako is not consistent. Eiko has been improving regularly, moving towards the end, although her learning speed is very slow. Mieko worked well in week 8, but the rest of the time her results varied. Akemi interacted much less than Eiko as she does not like CALL. Apparently she practises more than before, and at least she used to know how to process kanji using her “non-CALL” approach, except that she occasionally checked the stroke orders.
Further, the results of the ten weekly, hand-written kanji quizzes right after the CALL sessions, shown in Table 6.5 below, show their average scores on kanji forms, readings and meanings respectively during the study period.

Table 6.6. Average of Ten Weekly Handwritten Quizzes (%)

<table>
<thead>
<tr>
<th>Participants</th>
<th>Kanji form %</th>
<th>Kanji reading %</th>
<th>Kanji meaning %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tamie</td>
<td>67.8</td>
<td>63.8</td>
<td>86.5</td>
</tr>
<tr>
<td>Fusako</td>
<td>68.6</td>
<td>65.5</td>
<td>76.2</td>
</tr>
<tr>
<td>Noriko</td>
<td>58.5</td>
<td>65.5</td>
<td>73.0</td>
</tr>
<tr>
<td>Akemi</td>
<td>66.1</td>
<td>63.8</td>
<td>86.5</td>
</tr>
<tr>
<td>Mieko</td>
<td>50.8</td>
<td>44.8</td>
<td>51.6</td>
</tr>
<tr>
<td>Eiko</td>
<td>38.1</td>
<td>17.2</td>
<td>64.3</td>
</tr>
<tr>
<td>Average</td>
<td>58.3</td>
<td>53.4</td>
<td>73</td>
</tr>
</tbody>
</table>

The results reveal retrieval from working memory. Inconsistent processing among the three representations of kanji indicates that kanji meaning is decoded the most by all the participants. Most, however, showed more difficulty with the readings rather than writing the kanji form due to multiple kanji readings. This result is consistent with the other studies of kanji learning for beginning JFL learners (Ishida 1989; Shimizu 1993).

Tamie, Fusako, Noriko and Akemi retained approximately 60 per cent in working memory. Tamie increased her processing skills gradually but steadily through constant practice (see Figure 6.1). Among the processing examples as an interlanguage, she translated 書道 /shodō/, “calligraphy” as *writing on the road, because 書 denotes “writing” and 道, “road”. It shows her skill of a partial analysis. Noriko and Fusako are good competitors for each other as their common errors show:

eg., 雪 /yuki/, “snow”, was written *書 by Fusako and *道 by Noriko.

味 /aji/, “taste”, was *味 for Fusako and *道 for Noriko.
Compared to their current state of processing skills, Fusako’s production ability is slightly better than Noriko’s. Their recognition abilities are not different, but Noriko has a problem in transferring sounds to the hiragana syllabary. This is another common burden while learning kanji, especially for JFL beginners.

Akemi made a good effort to practise kanji repeatedly, in particular, her semantic processing was as high as 86 per cent from working memory. Her problems during the first couple of quizzes resulted from a slightly inaccurate memorisation of the kanji form; for example, *音 for 音 /oto/, “sound”. However, her performance improved towards the end.

Eiko’s recallability of the semantic representation is over 60 per cent which is, at least a positive sign in one dimension of kanji learning. At first she had no idea how to manage the quiz for kanji learning, and could answer only one kanji form, 雨, “rain”, without its reading /ame/. Gradually through mid-level but constant interaction with KS she learned how to process meaning, and then, readings and forms. In the last quiz, she could analyse a compound word by separating the two kanji characters in order to infer the meanings from either one of the single kanji, eg., 花屋 /hanaya/, “flower shop”, was answered as “shop roof” because she knows the last kanji 屋 /ya/ although there may be interference with 店 /mise/, “shop”, introduced at the same time, while processing 花 /hana/, “flower”. Also, she made the effort to even write a radical, 月, for 服 /fuku/ “clothes”, leaving a space at the right side as she remembered that 月 comes at the left side. However, her phonemic and graphemic processing skills, even after eight months,
are still at the cognitive stage where the declarative knowledge has not yet been processed, obviously due to lack of practice. Mieko did better in the production of the kanji form than she did with the readings, as she commented:

First of all, I’ll just write the symbol. And, I’ll memorise the symbol so that I won’t have to look at it again and I’d just be able to remember where everything goes and I’ll memorise the symbols. And hopefully I won’t have to look at it and be able to know where everything goes and gradually I’ll put in the word and the meaning and the hiragana [reading]. The most difficult is probably the hiragana part. (Mieko, I)

During the first couple of quizzes, she showed great effort in retrieving any available information from her memory, eg., 天気 /tenki/, “weather”, was guessed as *“heaven’s spirit” because 天 means “heaven” and 気 means “spirit”. Another was 料理 /ryoori/, “cooking”, which was answered as *“materials’ reason” because of the original meanings of 料 “materials” and 理 “reason” respectively. Thus, she could divide kanji words into single kanji in order to find the basic meanings and try to guess the meanings of the unknown kanji word utilising their schemata as a guessing technique (Rumelhart 1980; Coady 1993).

To summarise, Eiko showed the most difficulty in learning kanji although her semantic processing is not much different from other learners in this group. She overlooked the importance of repetitive practice of kanji characters due to lack of consideration of the language being learned as Oxford (1989) warned. Mieko, initially, revealed her potential to recognise and process the kanji as chunks. However, lack of interaction and practice decreased her retention dramatically during the second half of the study period. Fusako and Noriko interacted very actively during the study period. Fusako is more analytical, paying attention to kanji features such as the colour distinctions of radicals, and making her own mnemonics and the like, while Noriko is less analytical and less-focused, liking
speed and movement in interaction. She increased her exposure to the scripts without particularly noticing it. The scores of the weekly quizzes indicate the participants’ inconsistent practice. It is important to have consistent practice for developing processing skills from the cognitive to the associative stage (Anderson 1995). If learners do not devote enough time to practice, the developed skills and knowledge will decrease or fade away. Akemi and Tamie tried to practise hard until the last week of the instruction period during the study period, however, questions remain as to whether information was processed deeply enough to be stored in long-term memory.
6.5 Interaction by the “Yes-J” group

There are eight participants with previous learning experience in the Japanese language in the “yes-J” group as shown below. Previous experience ranges from one to six years in secondary school, as well as one year of experience living and working in Japan (see Table 4.1).

Table 6.7. Frequency of Interaction with KS by the “Yes-J” Group

<table>
<thead>
<tr>
<th>Learners</th>
<th>Overall frequency of access to KS</th>
<th>COMPONENTS [KI]</th>
<th>SUB-COMPONENTS [ST]</th>
<th>[QZ]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[KI]</td>
<td>[ST]</td>
<td>[QZ]</td>
<td></td>
</tr>
<tr>
<td>Taeko</td>
<td>16</td>
<td>26</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>Orie</td>
<td>14</td>
<td>44</td>
<td>5</td>
<td>17</td>
</tr>
<tr>
<td>Seiko</td>
<td>12</td>
<td>13</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Tomiko</td>
<td>11</td>
<td>17</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Michie</td>
<td>8</td>
<td>10</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Yuka</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Hajime</td>
<td>4</td>
<td>5</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Reiko</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

All learners accessed all sub-components, except Hajime, who did not access either ST or SQ. Reiko's access was also limited. Taeko and Orie accessed the program actively with KI, KRQ and KWQ at first, but their interaction patterns changed to KI-ST-SQ at the end of the study. Orie in particular, used KI very actively moving back to the KI from the ST, KRQ or KWQ to make sure of the single kanji in the KI and then returned to the working components. Michie and Seiko interacted with the sub-components rather evenly. Different from the “no-J” group, VA was a little more utilised by this group. Orie accessed it as a problem solving practice, while VA facilitated as a presentation phase for Tomiko. According to the interview, Yuka did not participate.
much during the first half of the study period, but joined during the last several weeks. Further observation was conducted with each component in the following section, as in the “no-J” group.

6.5.1. The KI component (KI & VA)

Similarities and dissimilarities in behaviours and interactions from the “no-J” group are found in five areas; stroke order, multiple readings, graphemic discrimination, colour-coded radicals and mnemonics. Then, the findings with VA are reported briefly.

- Stroke order

Interviews revealed that all participants gained benefit from interaction with the stroke order. Seiko commented that the stroke order was one of the most useful activities in the program and utilised it in this way:

I just leave the screen like that, and then look at my own list that I made on the previous day. When I come across one that I can’t do, then I click and see that one and go straight to the stroke order to see how it’s done and write it on the desk with a finger as it’s just doing it. (Seiko, I)

After exploring the program during the preparation period, she focused on the most useful activities of KS that other resources do not provide for learning kanji.

When I first started the Colour, “colour”, I started down the side like that. When I looked at the stroke order, I saw that I have to do like that at the end. So, I had to go and do that a few times. So, it was in my head to go like that, but after that it’s much easier. (Seiko, I)

Immediate practice with a finger assists self-confirmation, but more important is the reason she noticed the differences. Her awareness came from the kanji list she prepared before coming to the CALL session:
All I do is just write it down beforehand and that’s it...I don’t look at it or anything like that. I just go okay, so it’s easy for me to learn later, yeah. (Seiko, I)

Strategically, a little preparation triggers recognition of the irregularities between her handwritten kanji and the ones on the screen under processing, cognitively. The factual knowledge of graphemic information is under her full attention. Reed (1968, cited in Johnson 1996:47) noted that skilled performers “anticipate” and “quickly detect and throw out errors”. Here, planning and preparing for the specific task also facilitate activation in any representation of kanji characters.

Michie always checks stroke orders after getting the basic information about unknown kanji. Orie and Tomiko also follow the program and write down kanji “to check to make sure that I do it right”(Tomiko, I). Reiko also said:

I look at the stroke order and then I stare at it for a while. And then write down. Keep on screening, and keep writing on a piece of a paper until I got it. And then, I do the stroke order once more. (Reiko, I)

Agreeing with her, Yuka emphasised the importance of stroke order:

I think if you do the right stroke order, then you can flow...Generally it’s just practising stroke order over and over again, at least ten times. (Yuka, I)

Repetitive writing along with recognition of stroke order by animation assists her to make a natural flow in her mind. Taeko utilises stroke order visually and kinematically by “writing along with the screen using a pen”. Similarly, Hajime also interacts with stroke order by imitating kusho 空書, (finger writing in the air). He noticed when he lived in Japan, that Japanese children often used it for kanji learning:

I do it in the air, or scribble with a pencil, not because that seems to work better, but repeat until I get that right. Then, I’d do all of these. (Hajime, I)
According to Kess et al.'s study about a dual strategy by finger writing along with saying the stroke number aloud, "[t]his activity recalls the motoric strategy inculcated by teachers and students alike when internalising characters as a series of strokes which must be exactly memorised in respect to number and order" (Kess et al. 1999:79). In fact, Noriko in the "no-J" also utilised kusho 空書, but she found that it did not help her at all. Possibly a “mouse” takes a different role from a “finger”.

- Multiple readings

Yuka encountered difficulties differentiating among multiple readings while going back and forth between the KI and the KRQ and commented:

This is where...for here it is the 和 /wa/, "Japan", but that’s the Japanese reading (?), but that’s what got me confused, because I wasn’t sure what I was supposed to be looking at. Looking here, this one is in the context of this, it is わ /wa/ and that’s why I couldn’t understand why, I had to rely on this one for this context. (Yuka, I)

Probably, as the program has no clear explanation about the usage of on- and kun-readings, confusion occurred, although the basic rules were briefed during the CALL session. In fact, this is one of the most difficult areas in learning kanji as there are no precise rules to differentiate between the usages (see section 2.2.1) except that ample exposure to reading materials is highly recommended, since an appropriate reading is determined in context. Therefore, Seiko decided to disregard the distinction between the on- and kun-readings for the time being in order to escape this problem.

Before, in the very beginning when I wasn’t so sure about on-reading and kun-reading it was good. But then, I just found that it's just easier to learn them in the combination which way you use them rather than trying to remembering it like that. I don’t know all on- and kun-readings yet...But, just continual seeing it all the time, and it just sticks in your head. (Seiko, I)
In fact, one kanji character may have over ten different on- and kun-readings (see section 2.2.1), and their usages are different depending upon the context. Rather than being too analytical of the kanji structure, Seiko found an easy solution, sticking to the lexicon level which has already fixed the appropriate on- or kun-reading. So, her kanji list is not an exhaustive on- and kun-reading list for each kanji, but a simple vocabulary list. Apparently, as Skehan (1998) corroborates, the rule-based approach needs more memory for rules than the exemplar-based approach does, at least during the beginning stage.

- Graphemic discrimination

Besides the operational problems with multiple readings, the individuals’ awareness of the graphemic irregularities of the L2 were found in their ability to recognise kanji symbols for input enhancement (Sharwood-Smith 1993). Seiko put her effort into carefully examining the character in order to find patterns within it. Then she reassembled the special features along with meanings for memorisation, for example:

Well, you look for patterns which we’ve already learned, like this one服 /fuku/, “clothes”. The moon 月 and also it’s got something on the other side balancing it. So, you remember that you have to know that sort of stuff, which is kind of in a set pattern compared to this返 /kae-su/, “to return”, which jumps all over the place. So, it’s something balancing it totally, and this, the bottom part is just something fun to do. You flick up and going down and it’s just like moving like in食 /ta-beru/, “to eat”. Basically, I just kind of break it up into different patterns. (Seiko, I)

The process proceeds by recognising patterns first, analysing pieces to find irregularities, and assembling them together as chunks for cost-effective retention in her memory. Michie agreed with her up to a point, although she still has problems differentiating one from another with similar characters, and commented:
Like these ones are quite similar. The shape and these ones are similar, and the shape for these ones are different...but see, I have trouble remembering the difference between this one and that one, because they're very similar. These bits look the same. (Michie, I)

Discriminability in learning skills is developed internally through a learner’s regular and frequent practice and, externally, by immediate correction and feedback through self-testing in the QZ component and hand-written quizzes. In addition, the learner’s noticing is necessary for awareness of the differences, or Intraword Awareness (Koda 2002), especially during the input stage (Schmidt 1990,1994; Skehan 1998), although noticing alone would be “questionable” for learning (Laufer & Hill 2000:59).

- Colour-coded radicals

Colour-coded kanji images were intended to enhance input with their salience, but the abilities of many of the learners were not well enough established to take advantage of the distinctions. Tomiko, Reiko, Taeko and Hajime indicated no specific use of it for kanji recognition. Yuka, at first expressed some confusion with the coloured components and stroke orders since they did not exactly coincide with each other, e.g., 国 /kuni/, “country”. However, Orie commented positively that the “colour coordination is easy to remember” as she used it for her kanji list. Michie briefly gave it credit, saying:

It's good to start with, when you first see it. Because you separate the different parts of the kanji, but after you learnt it once, then it doesn't matter much. (Michie, I)

Seiko utilised colour distinctions in relation to the stroke order and noted:

When you first look at it, you go, “oh, okay so I do it like that”. (Seiko, I)

Her flexible attitude allows her to integrate other related information including existing knowledge. Importantly, this kind of flexibility is a “characteristic of the better students
that they evidence adaptability in their processing” (Johnson 1996:88). Importantly however, few commented about the phonetic radicals, possibly due to lack of explanation of colour codes in the program.

- Mnemonics

With regard to interactions with the mnemonics, the reaction was quite similar to the “no-J” group without previous experience. This group, however, was more self-reliant; Tomiko, Seiko, Michie, Reiko and Orie listened to them “sometimes” to “hardly at all”, but made their own because it better assisted their memorisation, as Reiko’s comment notes:

If someone else tells me like this, what would be a clue, I don’t like that, because I like to have my own, it’s easier to remember if I make it up. (Reiko, I)

Yuka and Hajime did not use them at all. Instead, they employed repeated writing as their favourite method for memorisation. Hajime said:

If you have one thing to memorise, like a catch phrase to go, mnemonics are good. But if you’re going to study 500 or 600 kanji, how much of this are you going to have? I think it’s amazing. ...it’s more work for me. It doesn’t trigger memory in any shape or form. (Hajime, I)

Likewise, Taeko also employed frequent writing practice without using mnemonics at all, possibly due to slightly longer experience of learning Japanese. During the interaction with the KI, she left the kanji graphics for the last activity in order to confirm her ability to recognise kanji, as Anderson notes, “information can be stored away in our long-term memory and yet can not be retrieved in some circumstances” (Anderson 1995:273). After practising at home using kanji cards and a kanji list, she tested her memory, using the program during the CALL sessions. This process was to strengthen her memory by repeated practice.
Besides the five tasks in the KI, an examination of VA in the presentation phase revealed some interesting interaction patterns. Tomiko, with the longest interaction times with VA, comments that it triggers output from working memory, while Michie used it only for input, excluding the practice activities:

I usually do it. Oh, yeah, it's really good. Sometimes I just do it before the test to bring back the memory again. (Tomiko, I)

I usually finish, yeah. But I mean I look at it and I think “oh, I know that one and I know that one”, but when they're separate [in radical and word matching], I wouldn’t have put them together. (Michie, I)

Summarising the interactions with the KI component, all of the “yes-J” group utilised stroke orders more than the “no-J” group did, but the basic information about kanji graphics, readings and meanings was utilised in the similar way as the “no-J” group. Concerning the dichotomy of on- and kun-readings, some tried to employ the rule-based approach using all of the readings while others applied the exemplar-based approach using either the on- or kun-reading as used in each word. Colour-coded radicals were not used by most, while two used them only the first time. It is clear that none noticed phonetic and/or semantic radicals while discriminating graphic components. Half of the group applied the ready-made mnemonics, the other half did not, partly because they had already established their own methods of memorisation.

6.5.2. The ST component (ST and SQ)

Different patterns emerged among those in the “yes-J” group. Some focused on kanji vocabulary in context while others concentrated on a general comprehension of the story. Seiko and Tomiko belong to the former, while Yuka, Michie, and Reiko fit the latter. Taeko and Orie wanted to know more about the kanji words, but did work to
comprehend the story afterward, as the program was intended. Hajime did not use it at all.

First, Seiko had a clear objective for using the program to obtain better scores in the handwritten tests after the CALL sessions, and said:

[I] just check whether I haven’t got any combinations that I haven’t got here. It’s good because I always go for little kanji, and make sure that I remembered it. So, I go to the end of the story just make sure that there’s no more kanji I don’t understand. Like today, I couldn’t remember that was 着物/kimono/, “traditional Japanese clothes”. I could remember 物/mono/, “things”, but not 睝/ki-ru/, “to wear” at all. So, I had a look at that even it’s the last week’s kanji. Then, I just click back to the KI and just keep it there while I’m going through these, just for my stroke order to look up again, yeah. (Seiko, I)

As her main concern was with kanji words, she re-examined the forgotten kanji which had been introduced in the previous week as single kanji, in isolation, but then re-introduced as part of compound kanji words. She made sure that she got “a general understanding of the ST”, but she decided not to interact with the SQ for further comprehension of the ST. Tomiko also hardly ever worked with the SQ. Later she concentrated on the kanji in the ST, instead of trying to comprehend the story, which she wanted to do, but was unable to because of its relative difficulty:

I tried reading it, and wrote down little things that I didn’t know. If I couldn’t understand what it was, then I looked at the highlight. But, if there wasn’t a balloon, I’d have to go down to the “translation” and see what it means… [But], I like the story better than the quiz component, because it’s got more vocabulary and grammar. And if I can’t understand it, then I can speculate on it. So, I got more out of it, I think. (Tomiko, I)

Apparently the story was not easy for her, but she liked that there was a story. In fact, this is meaningful practice for internalising the kanji words, concentrating on semantic activation in a broader context. Multiple exposure in context, instead of isolated words, help learners develop word knowledge in an L2 environment where exposure to the target language is more limited (Stoller & Grabe 1993:33).
Taeko and Orie also focused on kanji words because of the handwritten quiz after the CALL sessions, but both used the SQ too, right after the ST, to check their comprehension following the program directions.

I went through it and read it. If I didn’t know the words, I tried to think about it first, but if I haven’t been sure, I used the balloon just to check to make sure. After I read it all, I did the questions on the SQ. Yeah, it took me ages, so I went to the lab in my own time. (Taeko, I)

The problem with contextual learning is the time it takes for internalisation. It seems not to be cost-effective, however, that is a rather myopic view. Yuka and Michie explain their approaches:

I read the whole thing and tried to get the basic idea of what the story was saying...The sentence structure is a huge thing to understand, but I don’t write down the words, because I’ll probably retain it if it’s interesting. (Yuka, I)

When I read the story, I don’t particularly pay attention to kanji, more the meaning of the sentence, rather than the actual kanji. (Michie, I)

Yuka emphasises understanding the contents based on the sentence structure while Michie places weight on the meaning of the sentence instead of the kanji characters. Furthermore, she acknowledges the implicit merit of learning kanji words in context:

Sometimes reading the story makes me see the connection between the story and other things...like, I might remember it being used in one sentence, and what sentence it was used in. That might get me to remember the meaning, whereas I won’t remember it, just having one single kanji outside as well. So it’s good. (Michie, I)

It has been argued that contextual understanding can be improved by associating the meaning of words with their kanji through the deep processing required by a story. It is time-consuming at first, but invaluable for vocabulary development as Nation (1990) notes. In effect, this is the major issue in how to deal with language learning behaviour. Johnson states that language skills are “goal-directed behaviour” and “involve evaluation of data” (Johnson 1996:35), and effectiveness is important to achieve automatisation. Possibly this deep processing approach could be more explicitly
presented, by highlighting in a different way from the balloon technique, at least for beginning JFL learners.

In addition, there are two other positive and negative comments about interactions with the ST; Orie spent time listening to the story, integrating “sound” with the written text while moving the mouse on the text. At the same time, she noticed katakana words for comprehension of the content, like Noriko in the “no-J”. On the other hand, Hajime stated his reasons for not interacting with the ST:

Too much to read in small letters and you are already threatened, I think. In addition, the Japanese system [JWP] had a problem... and I have many other courses ...so, I couldn’t continue...(Hajime, I)

As mentioned above, cutting the length into half and presenting two stories, one explicitly and the other implicitly, might produce different effects.

Thus, all except Hajime demonstrated their ability to recognise kanji vocabulary in context. Four interacted with the ST concentrating on searching for the kanji vocabulary, whereas three focused on comprehension of the content of the ST, mainly because their previous experience learning Japanese allowed them to be able to process kanji in context. The role of the ST in the practice phase is to assist integration of declarative knowledge.

6.5.3. The QZ component (KRQ and KWQ)

This group also interacted with the KRQ more than the KWQ (see Table 6.6). So, we shall first look at the interactions with the KRQ. Michie, Taeko and Tomiko worked
with highlighted words, while Yuka, Orie and Hajime concerned themselves more with
the sentences. At first, Michie and Taeko commented respectively:

I don’t actually read the sentence. I check to see if I know these...If I’m not sure of the
meaning, then I click that English translation. Then, I usually put an asterisk next to it or
something to where I’ve written it earlier so that I can learn it a bit better, because I need
to know it a bit better. (Michie, I)

If I don’t remember the word, I just think about the word and guess. But if I don’t know,
then I hit the space bar and it gives me the answer. Then, if I still don’t know, I just write
it down in my notes. (Taeko, I)

While testing themselves, both Michie and Taeko gave attention to the unknown words
and prepared for practice afterward, while Tomiko interacted in a slightly more
mechanical way:

If I don’t know, I keep typing until it gives me the right answer...I don’t remember that
kanji. Actually I don’t know how I learn these things. Sometimes I just remember them
and sometimes I just can’t for the life of me remember it all. If I think I know that
tomorrow, then I’ll just learn it...Usually quiz drives me nuts! Because I don’t know what
they are. I’ve got no idea. (Tomiko, I)

Even after obtaining the right answer, she just looked and moved on to the next without
confirming the answer. Similar to Noriko’s behaviour among the “no-J” learners,
Tomiko also tends to explore widely as for L1 word acquisition through repeated
exposure, like “window shopping”, perhaps because of the easy access to the help
function. Cobb and Stevens found that “students working under self-access conditions
tend to abuse help features rather than to apply more self-reliant cognitive strategies in
solving the problems they encounter” (Cobb et al. 1996:132). Open exploration contains
two sides; freedom and mistreatment.

Repeated exposure may help recognition up to a point, but the quality of the exposure is
the key issue in learning an L2, especially in a relatively free-browsing CALL
environment. Hajime, Orie and Yuka read a whole sentence first, without using the translation:

First read the whole sentence with no assistance of translation. Then, I have to type in the gap. So, you see it as a part of a picture where it can fit in a sentence. If you see a certain pattern, developing like 二月/nigatsu/, “February”, and if it happens many many times, it will just put in your brain. (Hajime, I)

I actually try to understand it myself first, and generally I can work out what it really means. But then, I’ll check the English meanings and I would write down so that I know the exact meanings of words and the sentence. (Yuka, I)

Orie interacts with words more analytically, finding special features and utilising any available knowledge and said, “強 is ‘strong’, because for ‘weak’ there are two of 弱 in 弱/yowa-i/, (weak)”. They try to infer the meanings both at word and sentence levels, but the use of the translation is different among them, although they initially try to understand the sentence without it. Orie uses it as “the last resort”, so does Yuka, while Hajime has never used it. However, Reiko mentioned the difficulty of handling the kanji vocabulary:

What’s hardest is the combination. If you don’t learn them, they’re tricky. I look at the workbook, too. I write them down too, but sometimes I forget to learn them when I’m doing something else. (Reiko, I)

In fact, as Reiko used the KRQ only once, it is not clear whether her problem came from the interaction with the quiz component or other resources.

Another related issue causing confusion is the selection of either on- or kun-readings in compound kanji words (jukugo), as discussed in the KI component. Further, Yuka noticed the usage problem with the readings again as she was interacting with the KRQ:

Actually that’s where I have trouble, when two kanji are put together. I think generally how I learn two kanji is by recognising that word. I would always like 大学/daigaku/, “university” is I just know that. Because that’s a certain word, and I’ll learn it like as word, rather than separate. I recognise it because I see those two kanji and I know what those two kanji together mean “university”, but I wasn’t sure what I was supposed to be looking at for two or more kanji. (Yuka, I)
The “no-J” learners also raised the problem of difficulty, but Yuka noticed why and how the multiple readings are used in the context. Noticing gives her an opportunity to try to solve the problem for further internalisation, “utilising information consciously brought to mind from memory store” (Johnson 1996:89). As described for interlanguage (Selinker 1972), individuals may develop their own rules for how the language functions, applying the problem-solving technique.

The majority did not use the KWQ because of the JWP, as the “no-J” group mentioned. Only Yuka commented rather positively:

This is pretty good, because it’s probably easy. But I like to check the score just to see what I get. It’s good if you get a good score. Also, I always like to see what it’s saying. (Yuka, I)

She likes to know familiar and useful expressions written in familiar kanji words in short sentences, as she can use them in her essays or papers, as in the case of the KRQ. Knowing that the KWQ activities are easy, Yuka enjoys seeing her scores. Orie also said, “scores encourage learning”. In contrast, Hajime does not care about the score at all. As for the content, Orie types into the box “just the word without reading the rest, because I find that a little bit easier” (Orie, I). Taeko also stated that she read only the highlighted words and occasionally used the translation:

I just do the red bit or word, but normally I try and read it myself. If I can’t understand the word, I use translation. (Taeko, I)

Michie had negative feelings about the merits of the JWP:

I don’t find this one as helpful though, because I got that one, and I’ll just type it and make sure of the kanji. So, it doesn’t test me as much as the other one. I might know the meaning of that word...So, I, just to see whether I could recognise the right kanji when it came here, just to double check. But, I didn’t really learn anything from it though. (Michie, I)
As with the "no-J" group, the use of the JWP was not appreciated because the word processor presents the appropriate kanji out of the homophones, especially if a previous user or entry was correct, the processor chooses that one automatically. Seiko also indicated that she rarely interacted with it:

I used to do the exercises in the quiz component during the first semester, but I don't do that any more. I think because I don't want to learn to remember any other kanji. It's just quick to do the ones that we have to do for that week. And also, I prefer to write things as well, rather than having to just type them. (Seiko, I)

As Table 6.3 reveals the unfavourable attitudes toward JWP, the use of the word processor should be re-examined to determine whether it is an appropriate tool for activities at this level. Another problem is how to deal with the kanji vocabulary to fill the gap between the KI and the QZ components apart from guessing the nearest context. The program may include some kind of activities for beginners to assist with the recognition of single/compound kanji words in isolation, without using a JWP, since the majority did not often refer to the vocabulary sheet or the workbook (O).

6.5.4. Weekly quizzes

Figure 6.3 below indicates the results of the weekly hand-written production quizzes right after the CALL session in weeks 2, 5, 8 and 11.

In contrast with the "no-J" group, the majority obtained over 60 per cent. The last test shows better performance than the first half, although the data varies individually. In particular, Tomiko's performance is not stable yet as she stated her learning style is very "moody". It suggests the importance of regular practice.
Further, the average of the weekly hand written quizzes in Table 6.8, below, records the performance in graphemic, phonemic and semantic representations of kanji information respectively.

<table>
<thead>
<tr>
<th>Participants</th>
<th>Kanji form %</th>
<th>Kanji reading %</th>
<th>Kanji meaning %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seiko</td>
<td>98.3</td>
<td>96.6</td>
<td>98.4</td>
</tr>
<tr>
<td>Michie</td>
<td>76.3</td>
<td>83.6</td>
<td>76.2</td>
</tr>
<tr>
<td>Taeko</td>
<td>88.1</td>
<td>98.3</td>
<td>98.4</td>
</tr>
<tr>
<td>Hajime</td>
<td>85.6</td>
<td>81.9</td>
<td>85.7</td>
</tr>
<tr>
<td>Tomiko</td>
<td>40.7</td>
<td>44.8</td>
<td>60.3</td>
</tr>
<tr>
<td>Orie</td>
<td>70.3</td>
<td>90.5</td>
<td>92.1</td>
</tr>
<tr>
<td>Reiko</td>
<td>66.1</td>
<td>77.6</td>
<td>88.1</td>
</tr>
<tr>
<td>Yuka</td>
<td>79.7</td>
<td>81.0</td>
<td>90.5</td>
</tr>
<tr>
<td>average</td>
<td>75.6</td>
<td>81.8</td>
<td>86.2</td>
</tr>
</tbody>
</table>

In general, the outcomes are reasonably even among the three domains of kanji, but kanji reading is better than kanji form, different from the “no-J” group which leans
toward semantic representations. Seiko, Hajime and Michie’s scores are relatively level, but Taeko, and Orie retained less in production of kanji forms from working memory. Production demands a more accurate memory than recognition as learners need to fully recall the whole kanji, without clues, for this quiz. So, constant and effective practice of discriminating among similar components is necessary for learners to achieve their goal. Orie had many small problems with similar forms. 茶 /cha/, “green tea”, and 服 /fuku/, “clothes”, were written as * 茶 and * 服 respectively. It appears that Seiko’s strategic approach, a combined use of stroke order and “part practice” of the radical, discriminating one from the other, is considered to be helpful for her to develop her ability to recall. Michie’s contextual learning may need more evaluation time, but she is doing well, especially in her performance in the phonemic representation, which is the most difficult area for JFL beginners. For example, 洋食 was read correctly as /yōshoku/, however, using her schemata, she tried to interpret 洋食 /yōshoku/, “western food” as “*seafood”, because 洋 means “sea” and 食 means “eat”. Hajime’s repetitive writing practice seems to be helping his learning. But, because of the direct influence of living in Japan, he learned Japanese via the oral-aural method. As a result, his problem occurs during transferring the sound into script, e.g. 雨 /ame/, “rain”, is read as /* ami/, and 黄色 /kiro/, “yellow colour”, is read as /*kiruhiro/.

Reiko seems to survive on her basic knowledge which she gained during her previous experience in high school. Even so, forgetting can not be prevented unless she practises more in order to maintain her retention. Her problems are in inaccurate memorisation of both the kanji form and the reading in hiragana, as well as unbalanced kanji forms due
to a lack of feedback or less impact from feedback through the “book and pen” method she prefers, e.g., 茶 /cha, ちゃ/ “green tea” is written as /* ちお/.

Tomiko also needs more regular practice, instead of “moody” practice. Her performance pattern is close to Reiko’s performance, although one has long experience while the other does not. Consequently, Tomiko can not survive on her limited experience. During the first half of the study period, she showed good effort retrieving kanji forms and readings eg., 天気 /tenki/, “weather” was written *天気 and 雪 /yuki/, “snow” was written *雪. In written quizzes, however, she gave up searching out any available information from her working memory, and gradually left blanks in the sheet. Her interaction pattern with KS changed from VA-KWQ-KRQ to VA-KI-ST, showing her effort to find her own learning style with KS as she thought they were helpful for her learning kanji. In spite of her attempt, the graphemic and phonemic representations of kanji were not integrated into the semantic dimension of her memory, as found among the “no-J” group. During the cognitive stage, factual knowledge has not been transformed unless “the problem can be conceived of as being in some current state” (Anderson 1995:320).

In summarising, the recognisability among the “yes-J” is higher than that in the “no-J” group, as the different lengths of exposure to the scripts reveals clearly different processing skills as well as basic kanji knowledge during interaction with the three phases in KS. One of the most remarkable cases is found in phonemic and graphemic processing of kanji. First, the “yes-J” group tend to interact more with the ST than the “no-J” group. This suggests that the interaction with the ST assists them to process the
pieces obtained in the KI as chunks, which helps the limited capacity of working memory. Consequently, they can use the saved memory for other activities. In fact, the results of phonemic processing scores range from 77(44\textsuperscript{92})-98 per cent among the “yes-J” and from 44 (17\textsuperscript{93})-65 per cent among the “no-J” group. On the other hand, graphemic processing scores range from 66 (40)-98 per cent among the “yes-J” and 50 (38)-68 per cent among the “no-J” groups. Learning skills of language needs hierarchical organisation along with combinational skills (Johnson 1996:38-42). Even a little preparation may encourage meaningful interaction to promote processing skills, as in Seiko’s case. There is no short cut for developing the skills except repetitive rehearsal because practice enhances noticing the irregularities, and helps to solve the problems. Lack of practice easily downgrades learners to the previous level.

\textsuperscript{92} The result by Tomiko in the “yes-J” is in parenthesis due to extremely low scores.

\textsuperscript{93} As with Tomiko, the result by Eiko in the “no-J” is in parenthesis due to extremely low scores.
6.6. Interactions by the “Yes-K” group

There were three participants with kanji backgrounds, Ken, Mari and Sayuri. They had learned kanji characters in their L1s, Chinese or Korean, although the readings in Japanese are new for them and some of the meanings are different. As a consequence, their interactions with KS were expected to be different from the other groups. As with the other groups, their interactions are examined first in the three developmental phases as shown below.

Table 6.9. Frequency of Interaction with KS by the “Yes-K” group

<table>
<thead>
<tr>
<th>Learners</th>
<th>Overall frequency of access to KS</th>
<th>[KI]</th>
<th>VA</th>
<th>COMPONENTS [ST]</th>
<th>SUB-COMPONENTS [SQ]</th>
<th>[QZ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sayuri</td>
<td>9</td>
<td>18</td>
<td>12</td>
<td>16</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Mari</td>
<td>8</td>
<td>7</td>
<td>9</td>
<td>15</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Ken</td>
<td>7</td>
<td>8</td>
<td>12</td>
<td>11</td>
<td>1</td>
<td>8</td>
</tr>
</tbody>
</table>

6.6.1. The KI component (KI and VA)

Ken, of Korean background, had a big advantage in learning kanji, as well as Japanese, because Japanese and Korean are considered to be close cognate languages. During the interview, he said that he did not have enough knowledge about the Korean language since he immigrated to Australia when he was ten years old. Because of his continuing exposure to Korean books containing Chinese characters, however, he said he could fill

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94 Kanji forms are also different, but not as different as from Alphabets for the rest.
in the unknown parts in learning kanji, such as readings in Japanese, as soon as he learned hiragana and katakana during the preparation period. Therefore, he did not use the KI much except for wandering around to check the information and see if there was any information unknown to him. Instead he used the workbook and checked what he might need before the CALL session and said:

I go through each kanji and I visually write it out. It's much easier for me to work with. (Ken, I)

Mari and Sayuri, with Chinese backgrounds, usually studied together to help each other. They explained how they used KI:

I usually prepare 12 kanji per week. I just learn all that before going to the CALL session. Then, again every time I go through the program and check every character, and just go through the meaning and readings. (Mari, I)

I focus on readings, and then do the meaning, yeah. If I don't know, I just check like this. Then, try to memorise and sometimes go straight to stroke order and see it briefly and memorise it. And sometimes write it on paper several times until I memorise it. (Sayuri, I)

Their main concerns are the readings and meanings of kanji, and apparently, they used slightly different weighting, Sayuri focusing on readings, and Mari on both. Also, Sayuri reviewed the available information more carefully than Mari, but Mari utilised the VA more. However, neither had a serious problem with recognition of the kanji graphics. Neither mnemonics nor stroke orders and colour distinctions were used as recognition and memory devices since they were already at the associative stage of information processing skills (Anderson 1983,1995) as encoding the graphic representation was not much of a concern. A short practice satisfied their study without slimming down the workload, but they still need to work with the phonetic and semantic representations in order to integrate them with the rest of the kanji information for proceduralisation. Their total interaction times with the KI were approximately 100 minutes on average which is only a fifth of the “no-J” group.
The different frequency and times with the KI between them indicates that the skills for processing essential orthographical information are not the same between those with or without kanji backgrounds at the beginners’ level. The “yes-K” group can transfer this skill from their L1, while the “no-J” group has to develop from the cognitive stage accompanied by repeated practice. It is obvious that the KI including the VA takes the role of practice phase to fill in the missing information, instead of presentation phase, for the “yes-K” group.

6.6.2. The ST component (ST and SQ)

All three participants interacted with the ST because of their advantageous kanji vocabulary knowledge which is the “single most significant factor” (Koda 1989:533) to distinguish between the kanji and non-kanji groups. Sayuri explains about her interaction with the ST and SQ:

First, I checked all the meanings and readings using balloons. It was really helpful. Actually I know most of kanji, but sometimes I didn't know what it means. Also, if I don't know the word, I write it down, and read it. I didn't write a whole sentence, just the vocabulary and practised it later...I had to read the story twice first, and then I went to the SQ. I tried to finish it, yeah, because it's really helpful for the final exam, I think. (Sayuri, I)

Being already familiar with the kanji form, she confirmed the readings and meanings of the kanji vocabulary. After reading the story, she tested her comprehension because she thought this was good practice “for the final exam”. Seiko in the “yes-J” group concentrated on preparing for the hand-written kanji vocabulary test following the CALL session, while Sayuri ‘s practice targeted the final exam. Due to different L1 backgrounds, their goals were also different. Further, Sayuri commented about the structure:
I thought the story is helpful because you can read the grammar like particles. I tried to find my problems of particles to figure out again. I got it sometimes and sometimes I didn’t. Oh, particles are difficult. (Sayuri, I)

Obviously, comprehension of the content requires not only kanji vocabulary but also understanding the grammatical issues as Yuka also indicated earlier. Here is the difference between Sayuri and Mari. Although both have kanji backgrounds, Sayuri has a few years of experience in Japanese while Mari does not have any. As a consequence, comprehension for the SQ, following the ST, was “difficult” for Mari, but Mari thought the ST was “helpful”, and said:

I mainly used the story, and checked everything, making sure I know what that means and how to read it as well. I focused on the harder ones like words that are easy to forget. Also, if there is a different meaning, I pay more attention to that. (Mari, I)

Thus, Mari’s focus is still on the kanji words in preparation for the handwritten kanji quiz, but she tried the SQ, scrolling the passage frequently (O) due to weak recall and uncertainty of comprehension.

Ken has a different advantage from Mari due to the grammatical similarity between Japanese as an L2 and Korean as his L1:

It was quite easy for me... just like revision, because I checked with the workbook before the CALL. But, I would have to reassure myself through the story. Sometimes, I guessed and checked up on it. If I’m not sure, I go through combinations like 和風, /wafū/, “Japanese style”, saying /wafū/, /wafū/, Japanese style Japanese style ...Then, I looked through it again without checking words, and read it fluently. (Ken, I)

Learners with kanji backgrounds already know how to write kanji, however, practice writing greatly assists the activation of processing the meanings and readings in Japanese by replacing their L1 kanji usage. Ken, for example, draws kanji repeatedly while mumbling readings in Japanese and meanings in English. As mentioned previously, Ken’s problem at first was mainly learning hiragana and katakana. Once he
mastered the kana he could concentrate on kanji vocabulary at his level. After the preparation period, he was confident in kanji tests, and just briefly said:

I remember one of the lessons had a sort of like a phrase that was purely Japanese, and that was quite new. It was good to pick up new things that we haven’t learnt before. (Ken, I)

Evidently his interaction is different from the others, even from Sayuri who has a kanji background and previous experience of Japanese. He did not use the SQ because it is “easier and faster” to comprehend the story without the physical interaction. In addition, he thought he knew most for this course, and did not have strong desire to develop further, mainly because CALL methods are not his favourite approach.

6.6.3. The QZ component (KRQ and KWQ)

Their interaction with KRQ and KWQ were much less than that of the “yes-J” group (see Table 6.5), although these tasks were intended to assist their kanji knowledge for further development. Mari and Ken commented about their reluctance to use the computer:

Sometimes I looked at quizzes, but not really. Instead, I tested and reviewed with my list of kanji from the KI. I think, it doesn’t matter for me. (Mari, I)

I sometimes look at the KRQ, but I’m sort of like working by myself through workbook. I just go through and see if I know any without typing in. But, if I didn’t do my previous revision, then this would help me to be prepared for the hand-written quiz. (Ken, I)

Possibly the different types of activities might fit their learning styles. Sayuri used the QZ more than the other two, and said:

I used the KRQ a little. I read the sentence first, click that part and typed in. If I don’t know, I think it again. Then, I just check my sheets and my notes...I did not use translation. And, I did not use the KWQ much. (Sayuri, I)
Pedagogically, the KRQ and KWQ are intended to offer opportunities to test a learner’s memory of the kanji readings and graphics as well as inferring the meanings from the sentential translation. However, the JWP requires an unnecessary procedure for the kanji group, converting a phonemic representation to an alphabetic one by typing alphabetical letters on the keyboard. This conversion from kanji graphics to kana in KRQ and from kana to alphabet in KWQ was not appreciated, and probably created obstacles to mental processing. Possibly that is one of the strong reasons that Mari confirmed her traditional way of dealing with kanji:

I think I feel my handwriting is better than using computer. (Mari, I)

However, this is not always a problem for alphabetic users like Fusako. On the contrary, it may be useful for confirming the phonetic change from an alphabetic orthography to a totally different orthography, kanji and kana characters. Further research is necessary to confirm it.

6.6.4. Weekly quizzes

Figure 6.4 below illustrates the scores of hand written quizzes by the “yes-K” group. All three participants demonstrated their excellent recall from working memory. Both Ken and Sayuri made high scores (95 per cent), and Mari, without previous learning experience of Japanese, achieved 85 per cent on the week two quiz. After a few weeks in the study period, all increased and maintained high outputs. It means that their processing skills developed rapidly to the associative stage by transferring the skill of kanji graphic processing from an L1. It is obvious that “yes-K” learners show a much greater capability in processing than the other two groups, even for the week two quiz.
This is especially true of the “no-J” who are still in the cognitive stage (Anderson 1983; McLaughlin et al. 1983). The “yes-K” group routinely processes various pieces of information concurrently using “whole practice” for reduction of the burden while the “no-J” has to deal with information separately using “part practice” (Johnson 1996).

![Weekly Quizzes - "Yes-K" group](image)

**Figure 6.3. Scores on Weekly Quizzes by the “Yes-K” Group**

Further, as shown in Table 6.10 below, the average of all quizzes, representing the graphic, phonemic and semantic information, substantiates that Ken and Sayuri developed from declarative knowledge to procedural knowledge in the three dimensions of kanji processing. Mari follows them, revealing slightly weakness in phonemic representation like other groups. Ken’s problem is not kanji graphics, but the usage of *okurigana* (annotating kana) for the *wago* in the *kun*-reading. This area is often overlooked, but he tried to integrate it while practicing kanji writing by mumbling the whole vocabulary at the associative stage. The errors and corrections in immediate quizzes after the practice phase are useful feedback during the production phase, and
these types of errors decreased moving towards the end as he could concentrate on just those limited items.

Table 6.10. Average of Ten Weekly Handwritten Quizzes (%)

<table>
<thead>
<tr>
<th>Participants</th>
<th>Kanji form</th>
<th>Kanji reading</th>
<th>Kanji meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ken</td>
<td>100</td>
<td>98.3</td>
<td>99.2</td>
</tr>
<tr>
<td>Mari</td>
<td>98.3</td>
<td>89.7</td>
<td>98.4</td>
</tr>
<tr>
<td>Sayuri</td>
<td>98.3</td>
<td>98.3</td>
<td>99.2</td>
</tr>
<tr>
<td>Average</td>
<td>98.8</td>
<td>95.4</td>
<td>98.9</td>
</tr>
</tbody>
</table>

Sayuri encountered a problem caused by the phonological interference of Chinese as an L1, e.g., 台風 /taifū, たいふう/ was read as /*taifun, たいふん/. Mari's result indicates a big improvement through practice, especially in the phonemic dimension, but she also had a similar problem as Sayuri with interference. For example, 洋食 /yōshoku, ようしょく/ was read as /*yōshō ようしょく/. Another is that recognition of 冬 /fuyu, ふゆ/ was interfered with by a similar sound as /*yutsu, ゆつ/ before it was completely processed. Due to the dual systems of on- and kun-readings and the L1 interference with on-readings, the interlanguage for “yes-K” learners reveals outcomes different from the other groups. Realising this problem, Mari adds furigana (annotating kana) for all kanji whenever she encounters unknown kanji95. A follow-up study will find if these errors are categorised as an interlanguage or fossilised as errors.

6.7 Summary of research question one

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95 Mari took intermediate Japanese in 2001, and she still used the furigana, just as some native English speakers use Roma-ji as a quick pronunciation device.
Based on "PPP" sequential learning; presentation, practice and production (Johnson 1996), these three processes were designed into KS, followed by hand written quizzes, to examine the kanji learning process of the JFL beginners. However, the learning paths of the sequence are not fixed due to different kanji backgrounds in L1 and L2.

The KI including the VA represents the presentation phase in sequence learning. As soon as they obtain the basic information, some practise it immediately. The KI is utilised by all; actively and primarily by the "no-J" group, actively by "yes-J" and moderately by "yes-K" group.

- Several types of devices were employed to promote recognition, by activating visual and phonological processing (Gathercole et al. 1993; Paivio 1971) in combination with other types of tasks to activate better and faster processing of kanji.

- Basic kanji information was utilised for input enhancement (Skehan 1998; Chapelle 1998) along with either copying it to the individual's kanji list or carefully examining it for direct encoding due to its "memorable form of input" (Pennington 1996:8).

- Those who prepared a weekly kanji list prior to the session checked and compared for any different or missing information on their list in order to notice and fill in gaps in their interlanguage knowledge. Some made a list while interacting with the KI, because they felt it to be easier to make a list from the KS than from the other resources.

- Because of the animated presentation, stroke order was actively utilised to confirm precise recognition as well as accurate kanji production. The "yes-J" group used it actively, but only half of the "no-J" group used it. Also, one of the "yes-K" group glanced through it. The low level of recognition ability caused severe problems at the production phase later, because production requires greater accuracy than recognition.

- Mnemonics are a device to memorise kanji, but their use varied. Some learners used them if the ready-made mnemonics appealed to them. Some modified them or created their own from scratch without listening to the ones on the program. Others did not like the mnemonics, and relied on the repeated writing method without using mnemonics. None of the "yes-K" group used them.
• The colour coding of radicals and components, expected to promote radical sensitivity, was not used by most of the learners. Some students thought they were good for recognition, but some agreed with it only the first time. One student also used it, only when the colours and meanings seemed to match. On the other hand, another student expressed confusion about the coloured components and stroke orders.

• The interaction with the VA was not as high as with the KI, but some in the “yes-J” engaged rather actively using their world knowledge.

The ST as a practice phase was intended to enhance recognition ability of kanji words in context, and gradually develop the skills to comprehend the whole story, and the SQ was to further activate and confirm comprehension by inferring meaning from the context.

• The ST component was actively utilised by the “yes-J” group. The “yes-K” group also used the ST, but not all used the SQ. The “no-J” group also used the ST to collect kanji words, but not the SQ.

• The ST was interacted with in two ways, confirmation of the kanji words and comprehension of the story.

• The “no-J” group focused on the kanji words as an explicit reference (Knight 1994) whereas the “yes-J” and “yes-K” groups concentrated on kanji words and/or story comprehension.

• The kanji words were collected to confirm the meanings and readings, including short grammatical notes using balloons. Without totally disrupting the flow, some returned to the kanji words in the story in order to link words and meanings in a wider context for deep processing.

• Some in the “yes-J” group focused more on the kanji forms, referring back to the KI to review them as new combinations with single kanji that were learnt previously.

• Some in the “yes-J” group concentrated on the content of the story and extended to the structure of sentences, but some looked for kanji words in isolation.

• Some reviewed katakana using the loanwords in the stories.

• The sound device in the story was rarely used during the study period, although it was utilised more by the “no-J” group during the preparation period.
The KRQ/KWQ in the QZ component were used much less often than the other components. The “yes-K” group hardly used them at all.

- The KRQ was difficult but some challenged it, while the KWQ was easy but not well received. However, one in the “no-J” benefited by matching the hiragana readings with their kanji graphemics.

- The KRQ was used by the “yes-J” group, but not very much by the “no-J” group due to its perceived high level without prior practice.

- Translation at sentence level was used, but the “no-J” group and one in the “yes-J” group, in particular, expected to be given the meanings of the kanji words because it is difficult to guess meanings from a sentential translation.

- Short sentences in the KRQ and KWQ, using kanji words along with their translations, were used as model sentences to write essays and assignments for individual study. One copied them into her notes.

- The Japanese word processor (JWP) may not necessarily be helpful at the beginners’ level for learning kanji, as another study in electronic correspondence also reports negative attitudes (Lynch 2000). They do not like it for learning kanji. In addition, as the correct kanji tend to appear first if the previous user of KS typed correctly, opportunities for selecting among homophonic kanji are diminished during the recognition processing.

- The use of the JWP may cause mental obstacles for learners in the “yes-K” group to process kanji orthographies during the conversion of kanji pronunciation from alphabetic letters to kanji orthographies.

Thus, the different components were used by the learners to enhance their learning stages. They evaluated the functions in KS as helpful. Apparently however, there is a gap between their perceptions and actions in the SQ, colour coded radical presentations and the use of the JWP. There is also a gap in focal attention between a teacher and students as Long and Robinson state, “teachers’ intended pedagogical focus and students’ actual attentive focus often differ substantially” (Long & Robinson 1998:24).
Further, the four weekly quiz scores in weeks 2, 5, 8 and 11, and the average of the hand-written quizzes right after the CALL sessions were examined as outcomes from working memory. As the review of the literature shows, kanji reading is the most difficult due to the multiple readings, and the majority of participants gained better scores in kanji meaning. This can be interpreted as JFL beginners process kanji through the semantic representation before processing the phonemic representation.

- The "yes-K" group revealed a high competence from the early stage, as expected, because of the direct import of the processing skills and knowledge from their L1 although sometimes there was interference from the L1 in the phonemic and semantic representations as part of the interlanguage.

- All in the "yes-J" group show slight but constant progress except for a "moody" learner.

- The "no-J" group varies depending on individual differences; four made progress of around 60 per cent in three dimensions of kanji representation and, one lost motivation for learning kanji due to a change in degree structure and, the other made agonisingly slow progress. It is questionable whether she will make much progress during the next term because her average score for kanji reading is only 17 per cent, although she managed over 60 per cent on kanji meaning.

Thus, the three groups showed different progressions due to their background knowledge and processing skills. In particular, kanji vocabulary knowledge among the "yes-K" is significantly different from others (Koda 1989). Commonly, however, repetitive practice of reading and writing kanji is necessary, as De Keyser notes. It allows "the combination of co-occurring elements into larger chunks that reduce the working memory load" (De Keyser 1998:49). Initially, most of the "no-J" group processed kanji in pieces, up to as many strokes as kanji have. However, they learned to recognise and produce radicals slowly and gradually in the weekly handwritten quizzes, although many of the kanji characters were still unbalanced or disappeared from the
working memory mainly due to the accumulative effects of new information every week.

6.8 Discussion

Within the framework of input to output in SLA (R. Ellis 1994a), the interactions with the KS, followed by the weekly handwritten quizzes, were examined to determine skill development by the three different groups in terms of the sequential learning approach of presentation, practice and production (Johnson 1996). Several of the findings listed below are discussed further.

- Different progressions of knowledge development by the three groups
- Input enhancement and noticing at the presentation phase
- Part practice and whole practice in the practice phase
- Order of kanji information processing among graphemic, phonemic, and semantic representations at the production phase
- Frequency of access and exposure to kanji characters in the CALL program.

6.8.1 Different progressions of knowledge development by the three groups

The quality of the interactions reveals the different development of declarative/procedural knowledge among the three groups, that is, different patterns of progression were found in the interactions, facilitating the development of their own routes due to the different levels of kanji knowledge and processing skills among the groups.
• The “no-J” group concentrated on the KI in the presentation phase, followed by the ST, and QZ which was mainly used by only two individuals. During the practice phase, they copied one by one in their own notes, as other studies report as a common pattern of kanji learning among L1 and L2 learners (Takebe 1989; Kess et al. 1999). During the production phase, two showed lower retention (44 per cent) in working memory, but the rest attained up to 65 per cent. The process shows the natural development of taking the regular “DEC” and “DECPRO” progressions in terms of development of DEClarative and PROcedural knowledge, starting interaction with the KI and gradually moving back and forth between the ST and the KI during the practice phase. It is obvious that proceduralisation has not occurred yet, but one learner performed “PRODEC” for a while starting with the ST using a contextual approach. Two learners demonstrated “DEC” with little progress. As a whole, however, discriminability of the kanji meanings, graphics, and readings increased gradually, in order, although confusion with similar kanji occurred frequently.

• The “yes-J” also interacted intensely, though not all. To some extent, elaborately active with the KI, they utilised the ST and QZ as well. During interaction with the ST in particular, some only detected kanji words, while others tended to place more weight on kanji in context. This group shows the “PRODEC” and the “DECPRO” progressions, depending on their processing skills, influenced by their previous experience of learning Japanese. Some with longer experience of learning Japanese could start to process procedural knowledge in a “naturalistic approach” (Johnson 1996:103) with the assistance of the “help” function and the basic information in the KI, but the level of two participants who interacted little with KS is uncertain. However, one with limited learning experience dealt with the declarative knowledge like the “no-J” group.

• The “yes-K” group interacted with the ST directly at the end of the study, referring to the KI for filling gaps or confirming single kanji, mainly because of the direct import of an L1 skill and knowledge of learning kanji characters. Their patterns represent “PRO” or “PRODEC”. One of the three participants could develop the
initial procedural knowledge using “PRO” mainly because of an L1 language background cognate to Japanese. So could the other with previous experience learning Japanese, but she chose the secure route of “PRODEC”. The third applied only “PRODEC”, after developing from “DECPRO”, as she still needed to refer back to a database of knowledge, especially the on and kun-readings of kanji in order to add furigana, anticipating interference from her L1 pronunciation of kanji in Chinese.

Thus, four main patterns were found among these beginning JFL learners: DEC, DECPRO, PRODEC and PRO. This finding of multi-paths is consistent with Johnson’s proposal (1996) for the development of knowledge. His argument is for the existence of more than one route in L2 acquisition, as opposed to “one path” in Anderson’s model (1983), “[o]ne learns declaratively first, then automizes over time” (Johnson 1996:97).

As the majority among the “yes-J” and “yes-K” demonstrated, beginners can start to apply kanji knowledge to the context of the ST so as to learn kanji in context using the “PRODEC” instead of the “DECPRO” progression. Even one in the “no-J” tried the ST briefly using the “PRODEC” progression and reported a positive attitude toward learning kanji contextually by deep processing. The biggest problem is cost-effectiveness in terms of time for learning. The ST is not as explicit as the KI. However, any learning device such as the balloon function in the ST takes a bridging role without intervening obstructions. As a consequence, the kanji in the ST may be more digestible in spite of the heavy processing loads, and best of all, more memorable than single kanji in isolation in the KI. In any case, it is worthwhile to give learners the opportunity to develop processing skills and knowledge, especially in a mixed group as in this study.

96 Anderson acknowledged the multiple paths later. (Anderson et al. 1994, see section 3.1.2.3)
so that learners can try contextual learning from the beginner’s level rather than waiting until a higher level has been achieved. Even the “no-J” learners are able to gradually carry out the “PRODEC” progression in parallel with the “DECPRO”.

6.8.2 Input enhancement and noticing at the presentation phase

The second issue is the salience of input quality (see Figure 3.7 in section 3.1.3). The “no-J” and “yes-J” groups interacted with the KI for input modification, e.g., animated stroke orders, colour coded components and mnemonics, as they noted. Information as a data base from the ST is also considered to be an influential “input” to enhance input quality. The balloon function in the ST facilitates explicit comprehensible input, Pennington also states “CALL makes for better quality of input” (Pennington 1996:1). In particular, the input stage requires the most demanding conscious attention or noticing for JFL beginners. Schmidt states “[m]ore learning with more noticing and less learning with less noticing” (Schmidt 1995:22), distinguishing noticing from understanding in vocabulary learning as follows:

In foreign language vocabulary learning, conscious registration of the form (phonological or orthographic) of a word is an example of noticing. Knowing the meaning of a word and knowing its syntactic privileges of occurrence (other than in collocations and fixed expressions) are matters of understanding. (Schmidt 1995:29).

Noticing occurs at the surface level, but more careful exposure to the examples lets L2 learners become more sensitive to noticing irregularities. This means that the strong impact of the computer triggers, explicitly, the learners’ hidden attention in order to raise the discriminability of complicated or unfamiliar kanji characters, deductively or
inductively. For instance, the movement of the stroke order on the monitor gets learners’ extra attention to perceive the stroke orders different from what they expected, as found among some of the “no-J” and “yes-J” groups. Especially, as pointed out in another study (Hirose 1992), the first stroke is unquestionably noticed, provided the learner was prepared for the session.

Similarly, colour coded components or radicals were expected to help in encoding the graphics for input. Some in the present study group became accustomed to the colour presentation as Forester (2002) states regarding habituation. However, the majority revealed no specific reactions, possibly due to the lack of explicit explanations in the program. Only moderate comments were found among some of the “yes-J” group, as in another study of kanji learning (Toyoda et al. 1993). The effect of colour on different instructions in ESL (Doughty 1991) also indicates that the combined technique is more likely to produce an influence than is a purely colour effect. More study on the effects of colour coding the radical elements is necessary to find any association with the visual system in terms of discriminability of kanji graphemic representations and awareness of semantic and phonetic radicals.

Mnemonics are a widely used technique to assist memory, especially as a result of salient encoding information, associating new objects with familiar words, letters or even sounds and, to facilitate retention in memory (see 3.1, Rumelhart 1980; Atkinson 1975; Lawson & Hogben 1996; Wang & Thomas 1992,1995). As expected, the acoustic mnemonics in KS were highly utilised to stimulate the phonological and visual codes in working memory, with full sound in the CALL laboratory during the preparation period.
However, the usage of the mnemonics decreased dramatically once the study period began (O). In fact, it was recommended that they create their own if the computer’s ready-made mnemonics did not fit their perceptions. As this is a strategic issue, it will be discussed further in the next chapter.

6.8.3 Part practice and whole practice in the practice phase

Practice is indispensable for automatisation in skill development (Anderson 1983, 1995; Johnson 1996). Two types of practice are used, part practice and whole practice. Generally, “part practice,” one by one, is used by unskilled learners while “whole practice” is used by skilled learners (Hue & Erickson 1988; Johnson 1996). As far as memory is concerned, information processing by bits and pieces needs more space in working memory as each piece is dealt with separately without any networking. Chunk processing, like radicals instead of each stroke, is more economical in terms of skill acquisition because learners can form traces linking other components or word elements. This concept of part/whole practice relates to the progression of declarative/procedural knowledge as “[l]anguage is hierarchically organised” (Johnson 1996:38). In general, part practice is used more during the declaratisation. Then, a mixture of part and whole practice continues in the development of processing skills. Gradually utilising schema, learners can anticipate and work speedily (Reed 1968, cited in Johnson 1996:47) until whole practice dominates during procedularisation.

The majority of learners in the “no-J” group chose part practice of the basic information in extensive practice at the cognitive stage. The “yes-J” also used a similar process, but
a quick shift occurs from presentation to practice phases, and “part practice” moves from piece to chunk processing although there is still active interaction between the KI and the ST or QZ components for confirmation of the readings/meanings of kanji. At the same time, some learners make the transition from the cognitive stage to the associative stage, smoothing the flow and improving understanding using combinational skills (Johnson 1996). Meanwhile, the “yes-K” group pursued “whole practice” by interacting with the ST at the associative stage instead of the cognitive stage. Any conscious effort on graphemic recognition has almost disappeared due to the transferability of the common kanji orthography for the “yes-K” group. However, they still have to pay attention to the phonetic and semantic representations, using better processing skills including high anticipation. This superiority allows them to solve the lexical problems semantically which leads to deep processing (Craik & Lockhart 1972; Anderson 1995) using whole practice.

6.8.4 Order of processing: graphemic, phonemic, and semantic representations at the production phase

A previous study (Perfetti, Zhang & Bernet 1992) indicates that kanji are processed phonologically by native speakers of Chinese as native English speakers process words phonologically in their L1. So, it was expected that the majority of this study group would utilise phonological processing more than other processing since they have English or Chinese as their L1. However, the outcomes in working memory in this study show that phonemic processing is more difficult than semantic and graphemic processing. Consequently, it is assumed that most of the alphabetic learners in the “no-J” and “yes-J” groups may not transfer the phonological processing skill from their L1s.
at this stage due to the linguistic distance between the L1 and L2, as reported in Koda’s study (1997). Instead, the semantic representation of kanji information is used as the main clue for memorisation, while the phonemic representation is the most difficult to integrate with other information and to retrieve from working memory. The “yes-K” also revealed results similar to the other group although their processing skill levels differ greatly. Another related issue is the multiple readings for the “yes-K” group. Through the data in this study, it is difficult to determine whether the on-reading was easier than the kun-reading due to its phonological similarity in the L1 and L2 which may cause negative transfer. Perhaps phonological interference may exceed the credit of transferability. Further study is necessary to determine it.

6.8.5 Frequency of access and exposure to kanji characters in the CALL program

One of the assumptions regarding interaction stands on the concept of input frequency relating to accurate production in SLA (Larsen-Freeman & Long 1991). Although these studies relate to the production order of grammatical forms and morphemes, the findings are applicable for kanji learning. The more exposure learners have to the L2 scripts, the more accurate the kanji they produce, especially for beginners. The results of the hand-written quizzes show the current linguistic knowledge of the L2, retrieved from working memory. This temporary outcome may lead to the further development of accuracy through continuous repetitive practice, or it may be fossilised as errors. Some errors are considered to be an interlanguage (Selinker 1972), but learners develop and systematically amend errors over time, as learners become more flexible in information processing (N. Ellis 1994) due to their ability to manage problems by way of analysing, synthesising, and matching skills, as Klein (1986) has pointed out.
Frequent exposure to a new word in language input reinforces learning as Laufer and Hill (2000) claim, but exposure alone is not enough to develop the processing skills. Exposure with attention is helpful in increasing recognisability, as some did in this study. Two in the “no-J” and two in the “yes-J” groups actively interacted with KS. The results of handwritten weekly quizzes revealed that they produced relatively accurate output through their broad exposure to KS with a positive attitude toward CALL. At the same time, some in the “no-J” and “yes-J” groups who interacted with KS moderately also demonstrated high achievement. As a result, it will be safe to suggest that the exposure to KS can provide some assistance for learning kanji.

Further, as regards the authenticity of resources for the exposure, Garrett (1995) repeatedly declares the value of authentic material in incidental learning, based on the natural approach (Krashen et al. 1983). Krashen’s concept of comprehensible input97 is rather well received by practitioners because of the complicated mechanism of SLA, as in this case of kanji learning. It is indispensable for beginner JFL learners to compensate with semi-authentic materials until they acquire, at least, the first 500 kanji (Saiga 1988:50) or 440 kanji until the introduction of a kanji dictionary as Bourke recommends (1997:224). Until reaching this level, a “help” function in the program is useful to provide a certain authenticity on one hand, while easing the difficulty of the content on the other, so that even the “no-J” learners may try to manage the content and overcome the challenge of learning kanji in context. In the end, it is not clear that comprehensible input alone can assist accurate kanji cognition and recall, but certainly the balloons

97 The Input Hypothesis (Krashen 1982, 1985) has been strongly rejected, mainly due to a lack of data to substantiate whether input occurs only when the input is comprehensible.
assist input frequency for obtaining modified semantic and phonemic information, as well as contextual understanding, in this study group. These textual modifications in CALL programs provide one of the more promising areas to encourage frequent exposure by beginner JFL learners to kanji characters.
CHAPTER SEVEN:  
ANALYSIS OF FINDINGS RELATING TO  
KANJI LEARNING STRATEGIES

The results from the first research question in Chapter Six revealed that there are multiple paths for procedurisation in learning kanji characters due to the participants’ previous experience in learning Japanese and/or having a kanji background, especially at the beginning stage as suggested by other studies (Koda 1997; Ishida 1989; Kato 2000). The key roles of CALL are to enhance the ability to recognise kanji, to improve processing skills, and to assist retrieving kanji from storage in one’s memory for accurate production, which normally follows the various recognition activities. Another important issue concerns what types of kanji learning strategies learners use and how learners use them to promote learning kanji during the processing of kanji information.

7.1 Research question two: Kanji learning strategies

This chapter investigates learners’ learning strategies qualitatively and, partially quantitatively, in the second research question:

\textit{What kind of kanji learning strategies do JFL learners employ and how do they utilise them while using the KS program?}

Learning strategies are "specific actions taken by the learner to make learning easier, faster, more enjoyable, more self-directed, more effective, and more transferable to new situations" (Oxford 1990:8). As kanji learning is considered to be one of the most difficult and time-consuming areas for JFL learners, it is appropriate to determine which
strategies they use and how they employ them in a "new situation" such as learning kanji using the KS program. This study also aims to examine the similarities and dissimilarities of kanji learning strategies used by learners with three different backgrounds, and compare them with Bourke's study (1997) in which the strategy study did not focus on interactions with a computer program. Because of the learners' different backgrounds in their L1s, it was assumed that a self-directed, self-paced and individualised CALL method, by explicit instruction as other studies suggest (Koda 1997; H. Simizu 1997), would be suitable to enhance kanji learning.

7.2. Kanji learning strategy survey form (SILK)

This study concentrates specifically on the strategies for the orthographic acquisition of Japanese in a foreign language environment.

Table 7.1 Categorisation of 15 Kanji Learning Strategies in the SILK

<table>
<thead>
<tr>
<th>Group I: Direct strategies</th>
<th>number of subcategories</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Association strategy</td>
<td>9</td>
</tr>
<tr>
<td>B. Stories strategy</td>
<td>4</td>
</tr>
<tr>
<td>C. Radicals strategy</td>
<td>3</td>
</tr>
<tr>
<td>D. Frequency strategy</td>
<td>2</td>
</tr>
<tr>
<td>E. Experience strategy</td>
<td>2</td>
</tr>
<tr>
<td>F. Visualisation strategy</td>
<td>2</td>
</tr>
<tr>
<td>G. Self-monitoring strategy</td>
<td>3</td>
</tr>
<tr>
<td>H. Compensation strategy</td>
<td>2</td>
</tr>
<tr>
<td>I. Sequence strategy</td>
<td>2</td>
</tr>
<tr>
<td>J. Physical/emotional strategy</td>
<td>4</td>
</tr>
<tr>
<td>K. Sound strategy</td>
<td>4</td>
</tr>
<tr>
<td>L. Stroke order strategy</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group II: Indirect strategies</th>
<th>number of subcategories</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. Planning your learning strategy</td>
<td>10</td>
</tr>
<tr>
<td>N. Evaluating your learning strategy</td>
<td>3</td>
</tr>
<tr>
<td>O. Co-operating with others strategy</td>
<td>3</td>
</tr>
</tbody>
</table>

As discussed in Chapters Three and Five, the survey form for kanji learning strategies,
Strategy Inventory for Learning Kanji (SILK, Table 7.1), developed by Bourke (1997), was used for part of the data collection for this study.

The SILK, originally based on Oxford’s SILL (Strategy Inventory for Learning Language), consists of two groups, direct strategies, dealing directly with the kanji learning task and, indirect strategies, relating to the management of kanji learning. It contains 12 strategies under direct strategies and three under indirect strategies, as shown above. Further, these 15 strategies consist of 55 statements (Appendix C) which are used to gather information in order to examine how individuals use strategies for learning kanji characters. It should be noted that there are various numbers of items in the sub-categorisations in the SILK form. During the examination, these specific strategies for learning kanji often refer to the general terminology used in Oxford (1990), if appropriate.

7.3 High and low use of kanji learning strategies

After studying kanji characters using KS during the study period at the CALL laboratory, the participants reported the self-rated scores of their kanji learning strategies, individually, on the SILK test instrument in late October. The total use of strategies is examined first to look for general tendencies in learning kanji characters. Then, the average use of each strategy is explored to compare and contrast the 15 subcategories, regardless of the number of items in each strategy, to determine what kind of strategies were used, and how they were used individually in order to learn kanji. Finally, the results of this study will be compared with Bourke’s study (1997) to
find any similarities and differences between the two groups and to find out the effects of CALL methods.

The data from the kanji learning strategies using KS were collected and the total use of each of the direct and indirect strategies was calculated as a percentage, as shown in Table 7.2 below.

Table 7.2. Basic summaries of Kanji Learning Strategies

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>%</th>
<th>Mean</th>
<th>STD</th>
<th>Median</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct strategies:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Association</td>
<td>17</td>
<td>15.5</td>
<td>26.588</td>
<td>4.108</td>
<td>26</td>
<td>21</td>
<td>35</td>
</tr>
<tr>
<td>Stories</td>
<td>17</td>
<td>6.8</td>
<td>11.705</td>
<td>3.274</td>
<td>11</td>
<td>5</td>
<td>17</td>
</tr>
<tr>
<td>Radicals</td>
<td>17</td>
<td>5.4</td>
<td>9.352</td>
<td>3.019</td>
<td>9</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Frequency</td>
<td>17</td>
<td>5.5</td>
<td>9.529</td>
<td>0.943</td>
<td>10</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Experience</td>
<td>17</td>
<td>4.1</td>
<td>7.058</td>
<td>1.784</td>
<td>7</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Visualisation</td>
<td>17</td>
<td>4.4</td>
<td>7.529</td>
<td>2.294</td>
<td>8</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Self-monitoring</td>
<td>17</td>
<td>6.7</td>
<td>11.588</td>
<td>1.502</td>
<td>11</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>Compensation</td>
<td>17</td>
<td>4.3</td>
<td>7.411</td>
<td>1.660</td>
<td>7</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Sequence</td>
<td>17</td>
<td>3.7</td>
<td>6.294</td>
<td>1.263</td>
<td>6</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Physical/emotional response</td>
<td>17</td>
<td>8.5</td>
<td>14.647</td>
<td>2.977</td>
<td>14</td>
<td>9</td>
<td>20</td>
</tr>
<tr>
<td>Sound</td>
<td>17</td>
<td>5.5</td>
<td>9.470</td>
<td>3.726</td>
<td>10</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Stroke order</td>
<td>17</td>
<td>3.8</td>
<td>6.529</td>
<td>2.401</td>
<td>7</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Indirect strategies:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning your learning</td>
<td>17</td>
<td>16.5</td>
<td>28.352</td>
<td>7.549</td>
<td>29</td>
<td>29</td>
<td>42</td>
</tr>
<tr>
<td>Evaluating your learning</td>
<td>17</td>
<td>4.6</td>
<td>7.823</td>
<td>2.455</td>
<td>7</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>Co-operating with others</td>
<td>17</td>
<td>4.7</td>
<td>8.000</td>
<td>2.850</td>
<td>8</td>
<td>8</td>
<td>13</td>
</tr>
</tbody>
</table>

First, the planning your learning strategy was used the most, 16.5 per cent, among all of the direct and indirect strategies, mainly because this strategy takes the role of "manager" through setting goals and using any suitable learning methods and resources. Although the metacognitive strategy includes more than the planning your learning strategy, the high use of metacognitive strategies is consistent with other studies (O’Malley et al. 1990; Takahashi 1993; Maingard 1999). The second most highly used strategy is association, at 15.5 per cent. Again, it is not surprising that the association strategy is highly used to memorise kanji, probably because many learners are familiar
with using association in their L1 learning (Stroller & Grabe 1993; Pressley, Levin & McDaniel 1987). Moreover, partially because both the planning your learning and the association strategies are composed of nine and ten statements respectively in the SILK form (see Table 7.1), the total use of those strategies becomes high, compared to the stroke order and sequence strategies which have only two statements. Then, physical/emotional response at 8.5 per cent, and stories at 6.8 per cent, while the least used were sequence, 3.7 per cent, and stroke orders, 3.8 per cent in direct strategies. Those strategies are examined further in the next sections in regard to how they were used, and which background learners utilised them more often.

7.3.1. Planning your learning strategy

The planning your learning strategy takes a major role as Oxford states that it provides "a way for learners to coordinate their own learning process" (Oxford 1990:136), because of too much "newness" (Oxford 1990:136) in learning new, non-cognate, language components like kanji characters. It also involves creating many opportunities to "practise and maintain knowledge" (Bourke 1997:372). Table 7.3 below indicates the average use of the planning your learning strategy by the groups respectively. Although there are few differences among them, the "yes-J" and "yes-K" groups utilise the planning strategy more than the "no-J" groups possibly because of their previous experience in learning kanji and Japanese.

Table 7.3. Use of the Planning Your Learning Strategy by the Three Groups

<table>
<thead>
<tr>
<th></th>
<th>&quot;No-J&quot; group</th>
<th>&quot;Yes-J&quot; group</th>
<th>&quot;Yes-K&quot; group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50%</td>
<td>62%</td>
<td>65%</td>
</tr>
</tbody>
</table>
In order to find the differences among them, the ten statements in the planning your learning strategy were scrutinised further. Four areas are included in the statements: (a) setting time, and short and long term goals, (b) using CALL methods, (c) using other specific methods, and (d) using other resources. (b) and (c) could be grouped into the same category, however, since CALL is the specific method used in this study, they are dealt with separately.

(a) Setting a time and goals

First of all, the majority of learners set times and accomplished both short and long term aims, with little differences among these three items, as follows:

(M1) I have a set time each day/week which I spend learning kanji. (67%)
(M9) I set myself goals and objectives for what I wish to achieve each week. (60%)
(M10) I set myself a long term goal on how many kanji I want to learn. (64%)

At the beginner’s level, it is important to set aside time, especially for kanji learning, which requires a massive amount of practice over time, on the principle of practice by regularity, recency and frequency. Up to 67 per cent of this study group set a time for learning kanji daily or weekly, because it is much easier to start with a practical task, but a slightly lower rate (60–64 per cent) set short and long term goals which need more managerial skills. Learning kanji also requires continuous effort, especially for JFL learners with little or no kanji background in L2 due to the linguistic distance from L1, as pointed out by Koda (1997). It looks easy to master only about 12 single kanji weekly, but the cumulative combinations of compound kanji characters, along with new and previously learned kanji, increase the number of different readings and meanings. Learning kanji may be “difficult and time-consuming” for some (Eiko, I), “not difficult
but time-consuming” for some (Fusako, I), and “not difficult but challengeable” for others (Seiko, I), depending on the previous experience of learning kanji and processing skills. In any case, it is essential to practise constantly to increase familiarity with the kanji visually and verbally, so that the declarative knowledge of kanji characters at the cognitive stage, turns gradually into procedural knowledge at the associative stage through rehearsal (Anderson 1983) during an introductory JFL course. Little or no practice easily leads to forgetting information.

Further study of those rates was carried out to determine the differences in learners’ backgrounds as shown in Table 7.4.

Table 7.4. Use of M1, M9 and M10 in the Planning Your Learning Strategy by the Three Groups

<table>
<thead>
<tr>
<th>Learners’ background</th>
<th>M1 Set a time each day/week %</th>
<th>M9 Set goals and objectives weekly %</th>
<th>M10 Set a long term goal %</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-J</td>
<td>60</td>
<td>53</td>
<td>63.3</td>
</tr>
<tr>
<td>Yes-J</td>
<td>67.5</td>
<td>55</td>
<td>65</td>
</tr>
<tr>
<td>Yes-K</td>
<td>80</td>
<td>86.7</td>
<td>60</td>
</tr>
</tbody>
</table>

Because of their kanji background in L1, the “yes-K” group shows over 80 per cent for setting a time, goals and objectives in the short term. This is due to the fact that they check the kanji list to see if there are unfamiliar kanji, and they assume they can manage them in the short term as they already know kanji graphics at beginner’s level. However, major differences were not found in setting long term goals among the three groups because many do not realise the importance of setting long term goals as there are so many kanji to be mastered. Some in the “yes-J” group put more effort into setting long term goals than the “yes-K” group, as Taeko in the “yes-J” group explained:
To remember kanji for me, I have to always keep studying, almost studying every
day...by writing and looking at the cards to recognise them. (Taeko, I)

She realises through her past experience that she is unable to reach her goals without
setting clear learning objectives. However, the rest revealed a slightly lower effort in
management probably due to a lack of experience with such a difficult language as
Japanese (see Chapter Two).

(b) Using CALL

Computer use (M3 in the SILK) scores highly (72 per cent) for learning kanji because of
the recommendation for use in this study as shown below.

(M3) I use a computer program to practise kanji. (71.8%)

As discussed, along with the detailed interactions with the program in the previous
chapter, the majority of the participants utilised the KS program for learning kanji, but
the rest did not, for various reasons; no additional comments are noted.

(c) Using other specific methods

Besides CALL, other special methods such as active use of kanji for writing notes and
assignments (72 per cent) were reported.

(M2) I use flashcards repeatedly to practise kanji. (60%)
(M4) I use kanji as often as I can. (eg., in class notes, homework assignments, etc). (72%)
(M5) I use a highlighter to organise the information in my kanji learning book. (42%)
(M6) I try to find better ways of learning kanji from books or by talking to others. (51%)

Ken and Seiko frequently used kanji in assignments. Tamie agreed that using kanji in
assignments is “definitely good”(I). Reiko also mentioned:

When we started to get into the more complicated ones, where a lot of them look the same,
then it’s confusing. So, you have to keep looking at the stuff and using them more.
(Reiko, I)
Flashcards are also popular (60 per cent) for repetitive practice among kanji and/or vocabulary learners. Some learners make their own and others buy kanji cards. After spending what she considered to be too much time making kanji cards, Noriko switched to using a kanji list of one page or so, but she said she still kept forgetting kanji, except when she “used kanji several times in an assignment. I still remember it, 酒 /sake/ “Japanese alcohol” (I). While using a kanji list, Noriko also tries to find opportunities to use kanji in assignments. Other studies (de Courcy et al. 1993; Kato 2000) also report the usage of supplementary devices like kanji cards and lists. This integrative approach using multiple strategies is highly desirable to encourage students’ learning attitudes. Having more strategies ready to use, one is able to manage the difficulties of learning more effectively as Oxford et al. (1996) state, although the selection of appropriate strategies for various tasks is another matter.

With regard to using a highlighter, the majority did not report using them actively, the exceptions being Orie and Reiko. However, colourful highlighters are used as a popular technique, even in non-language subjects to indicate extra attention. So, it is surprising that they did not use them much for learning kanji.

Another strategy “to find a better way” for kanji learning was utilised only up to 51 per cent. Hajime was seeking a more dynamic kanji learning approach, with all sorts of sensual inputs such as seeing, hearing, touching and just like “living in Japan”. On the other hand, Mari said that repeated practice by handwriting is much better than using CALL for her because she learned that way in her L1. Sayuri, with the same L1 as Mari, commented, “yeah, it’s easy to learn. So, computer is faster than handwriting. But, I
prefer the handwriting because it’s easier to memorise”(I). Probably the habits learned in
the L1 in the traditional way make them feel safe and comfortable. Thus, it is helpful to
find a somewhat better way to manage individual learning capabilities because regular
practice is inescapable for kanji learning, just like vocabulary learning, as N. Ellis
(1994) warns.

Only a few JFL learners are eager to obtain other resources from the beginning in order
to enrich their kanji knowledge, as shown below.

(M7) I buy kanji learning resources additional to those required in my course. (42.4%)  
(M8) I borrow kanji learning resources from the library/friends. (37.6%)

One of the reasons for taking Japanese as an L2 is the mystery of, and curiosity about,
kanji characters and the challenge of overcoming the difficulties or “kanji myths”
(Kaiser 1994:61). In spite of that, the main textbook covers only a limited amount of
information. Hence, curious JFL learners expand their interest beyond the text and
classroom activities. Mari reported using her Chinese dictionary, and Hajime self-
reported using other resources like a dictionary, and still looks for other resources such
as Japanese children’s books mainly due to his family situation where Japanese is used
among family members. The majority, however, are satisfied with the materials
required for the unit, such as the text and workbook at the introductory level.

7.3.2. Association strategy

The second most widely used strategy was association. The association strategy itself is
widely used in learning L1 for native English speakers. The majority used association of
new kanji and other known kanji, as used in the schema theory (Rumelhart 1980; Anderson 1983) in which new information is linked with existing knowledge. The range of association in learning kanji characters covers association of kanji with the same pronunciation, but different meanings due to the presence of numerous homophones in the language (see section 2.2.6). As well, it covers kanji with the same, similar or opposite meanings and readings of kanji, and the same or similar meanings but different readings. As shown below, there are no significant differences among the groups.

Table. 7.5. Use of the Association Strategy by the Three Groups

<table>
<thead>
<tr>
<th></th>
<th>“No-J” group</th>
<th>“Yes-J” group</th>
<th>“Yes-K” group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>58%</td>
<td>62%</td>
<td>53%</td>
</tr>
</tbody>
</table>

Further inspection found that the following four items are utilised more than others in the association strategy, as shown below in the parentheses.

- A1. I create associations between the new kanji and other kanji already known. (74%)
- A3. I create associations between the new kanji and other known symbols. (67%)
- A5. I associate kanji with other kanji from the same meaning group. (66%)
- A9. I compare and contrast kanji that look similar so as not to confuse them. (73%)

The high use of A1 indicates that the learners try to involve any already known kanji using schemata to maximise memory so that they can use more memory space for others. A3 and A9 focus on graphemic association, while A5 focuses on semantic information. In other words, this group used the association strategy focusing more on graphemic and semantic representations, and less on phonological cues as shown below.

- A7. I associate kanji with other kanji that look different but have the same reading. (48%)

This finding is consistent with other studies (Okita 1995; Yamashita et al. 2000) mainly
because the beginner JFL learners are not so familiar with systematic phonological associations with other kanji. This means that, as discussed in Chapter Six, firstly, the transfer of language learning strategies in the L1 has not yet occurred among JFL beginners with phonemic oriented language backgrounds, even though the majority of this study group are L1 English speakers, possibly because of the great distance from their L1, as Koda (1998) states. Secondly, most of the words presented during the beginner's level are wago which have no phonemic-graphemic correspondence, while kango presented at the upper level are more phonemic-graphemic correspondent (see Chapter Two). This is why the phonemic information is not actively sought during the beginning stage (Yamashita et al. 2000). Further examination of data was carried out to find any differences among the three groups.

Table 7.6. Use of A1, A3, A5 A7 and A9 in the Association Strategy by the Three Groups

<table>
<thead>
<tr>
<th>Learners</th>
<th>A1 Association with already known kanji</th>
<th>A3 Association with other known symbols</th>
<th>A5 Association with same meaning group</th>
<th>A7 Association with other kanji: look same but different reading</th>
<th>A9 Comparison and contrasting of similar kanji</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-J</td>
<td>67</td>
<td>70</td>
<td>75</td>
<td>53</td>
<td>75</td>
</tr>
<tr>
<td>Yes-J</td>
<td>78</td>
<td>80</td>
<td>71</td>
<td>45</td>
<td>80</td>
</tr>
<tr>
<td>Yes-K</td>
<td>80</td>
<td>27</td>
<td>53</td>
<td>47</td>
<td>63</td>
</tr>
</tbody>
</table>

In general, all groups use the association strategy, as shown in Table 7.6, but not much phonemic association (A7). However, significant differences are found in the use of association with other known symbols in A3 between the “yes-K” and the others. In fact, the “yes-J” and “no-J” groups utilise the association strategy as much as possible not only A3 but the remaining strategies with symbols, meanings and even sounds. There is little need for the “yes-K” group to associate with other known symbols (27 per cent) as
they have abundant kanji graphic knowledge. Instead, the “yes-K” group utilises
association of new kanji with old kanji (A1), up to 80 per cent, as expected. Semantic
association is also attempted for confirmation (A5), up to 53 per cent, due to the fact that
Japanese and Chinese kanji share only up to 60 per cent of meaning at the lexical level,
as Mari commented “I know the kanji 湯 /yu/, ‘hot water’, but the meaning is different” (I).

The “no-J” group use semantic association slightly more because semantic activation is a
basic tool to differentiate kanji, as the results of weekly handwritten quizzes show in the
previous chapter (Table 6.6). For example, Mieko in the “no-J” group comments:

There are some symbols that are similar, or two meanings that are quite similar… I
generally put the groupings of meanings together…I’ll have to work out and remember
which two they are. (Mieko, I)

At the initial stage, Mieko utilised more semantic distinctions before processing kanji,
while Orie and Michie in the “yes-J” group tended to focus on the graphic distinctions.

If you use your imagination a bit, you could see it. See look at this, upside down! Upside
down! It’s just the little things. (Orie, I)

Like these ones are quite similar. The shape and these ones are similar, and the shapes for
these ones are different (Michie, I)

Noriko in the “no-J” group also comments, “What’s this…Oh, I remember 言, because
it’s the half of 話 /hana-su/ ‘to speak’”(I). Integrating those association techniques,
Seiko first looked at the graphical images to find any “known kanji” components, such
as the basic radicals, among the 12–13 weekly kanji, then compared and contrasted them:

Umm, I just thought again anything I knew, and found there’s a box, ☐ down at the
bottom whereas this one had the sun, ☐. So, I remembered that one had the sun and one
didn’t. (Seiko, I)
Thus, even for these beginner JFL learners, the basic components are utilised as discriminants for accurate association. The more kanji they learn, the more they try to associate a new one with a whole kanji or the kanji components already known. This is another reason the association strategy is widely used due to overlapping with other strategies such as story, physical/emotional response, radical and sound strategies.

7.3.3. Physical/emotional response strategy

The next most used strategy was the physical/emotional response strategy (8.5 per cent, see Table 7.2). This strategy is defined as “sometimes a learner will have a physical or emotional response to a kanji for some personal reason which, in effect, helps him/her to remember the kanji” (Bourke 1997:370). Some learners associated kanji with their physical motions in drawing them “to get up and wake up myself by running (Seiko, I)” in起きる/o-kiru/ “to get up” or emotional responses such as liking and disliking kanji characters. It was somewhat surprising to discover that the learners reacted so emotionally to kanji, though not much physically. One of the possible reasons is that this strategy is an undemanding task cognitively, compared to other active strategies like frequency strategy. Mieko utilises the physical/emotional response strategy very often saying that:

This one had lots of these little [lines]...because I like doing arts and so I like lines and doing da la la laa...like all the lines, stuff like that. And so, it’s easier to remember and pick out these things for whatever. (Mieko, I)

Ken and Noriko also use this strategy very often and reported:

I like writing characters. I like to write them neatly and nicely, but some characters look really ugly and those ones I don’t like. (Ken, I)

It just looks cool, and I like the way it looks. It’s interesting, I like it...I like “birds” [as] I thought that one was pretty...but, that’s just boring. (Noriko, I)
Ken as a “yes-K” group member has little problem in graphic recognition, but expressed his emotional reaction towards characters in terms of neat and well-balanced graphics. However, this strategy is used more for individual inspiration by Mieko and Noriko, and that is why they could not explain verbally exactly why they felt so. On the other hand, Tamie commented:

I really like 肉/niku/, “meat” because I can just recognise it, whereas I have real trouble with 読む/yo-mu/,”to read”. I just don’t like that one! (Tamie, I)

It is clear that for Tamie recognisability of kanji is one of the elements for an emotional reaction over whether she likes or dislikes a kanji.

7.3.4. Stories strategy

The stories strategy for kanji learning is defined as creating a story about a kanji. In fact, stories have been used along with the “key word” and “mnemonics” approaches for vocabulary acquisition (Levin & Pressley 1985; Meara 1980), as mentioned previously in relation to association. As learning kanji involves morphological and lexical levels due to the nature of kanji, a key word may link a radical or a smaller piece of kanji information with the whole kanji to facilitate the initial input of single kanji characters. Therefore, a short story ties up each piece of information for easy memorisation. The differences between these two strategies are that the association strategy deals with a part of the kanji, while the stories strategy deals with the information contained within the whole kanji character. However, they naturally overlap each other as stories are created by an association technique which relates to the kanji elements like graphics, readings and meanings.
Tamie used stories to distinguish between similar kanji:

Basically [they are] the same except that this one has the extra bit at the bottom. So, I've just made this one a story that I have to write a lot of lines on the paper (Tamie, I)

Seiko applied stories in order to memorise compound kanji vocabulary by creating a story where she links the reading in L2 with the sound in L1:

There's "ten-in" [店員, /ten-in/, "clerks"] there, there's ten in the room, there's ten clerks somewhere. That's all I say to remember in my mind. (Seiko, I)

The key word approach is to create "an associative link between a new word and a known word, phrase, or image which is acoustically and/or visually similar" (Stoller et al. 1992:34) by using mnemonics or a story in the student's L1, to aid memory and focus attention. In fact, the KS program contains acoustic mnemonics, based on a dictionary (Henshall 1988) containing epistemological descriptions in order to supply examples as memory aids (see section 4.1). Some learners listen to them first and decide whether they fit their feelings. If they do not appeal to their emotions, they create their own.

I listen to the mnemonics and I can see how they get that...but I have to make up some silly little rhymes sometimes, because just the really detailed ones are hard to remember. (Orie, I)

Usually I would make a thing like [終 /o-waru/] "to finish", like it sort of looks like sunrise (at the left side), and that's like winter (at the right side). So, sunrise comes out and finish off winter, sort of like that...but, if I can't make up my own, then I'd use one of the mnemonics [on the KS]. (Fusako, I)

I'd remember differently. It's like 雨 /ame/, "rain", and I'd remember it by doing like there's rain on the window, and so, that's how I'd remember it in my little ways. (Akemi, I)

On the other hand, some, like Reiko, do not like to use others' mnemonics at all and make up their own:

This is the roof, and this is a chimney or something, and I don't know where I got this from, but I just think this is sort of a lady who is bent over and this is one leg and this is
the other, and she’s washing dishes. I don’t know how I got it, but it just look like that to me. If someone else tells me like this, what it would be a clue, I don’t like that, because I like to have my own. It’s easier to remember if I make it up. (Reiko, I)

This is supported by the counter-argument by Wang and Thomas (1995), that is, mnemonics, especially teacher-made ones, do not necessarily lead to long-term retention compared to rote-memorisation.

Akemi gives a different reason for gradually ceasing to use mnemonics:

The ones that I couldn’t make easy features out of, like I remember the pictures easily. Otherwise the other ones that, I’d usually made up some sort for each kanji, and so the ones that I couldn’t really remember the story of, I just kind of didn’t really like them that much. So, I didn’t do much with them. (Akemi, I)

Pictographs, introduced first, are easier to make up stories for recalling kanji because visual information can be easily linked with meanings as other studies (Hatasa 1989; Yamashita et al. 2000) indicate. Also, some comments suggest difficulties with morphing pictures used throughout the Kantarō kanji program (1995, see section 3.4.3.4.). In some cases, for example, 色 /iro/, “colour”, stories are not at all helpful for connecting kanji. Hajime did not use stories or mnemonics because:

Mnemonics is only good for [a few things]. If you have 12 kanji, then you have 12 stories, yeah? It’s least to remember, like a catch phrase to go. But, if you’re going to study 500 or 600, how much of this are you going to have? I think it’s amazing...It doesn’t trigger memory in any shape or form. (Hajime, I)

His approach is to go directly to the kanji graphics without utilising visual-verbal connections, as he thinks they may increase the information to be memorised. In fact, Anderson (1980) suggests in a study on learning vocabulary that a verbal-imagery linkage “dismisses the usefulness of connections between visual images and meaningful verbal information” (O’Malley et al. 1990:49) because of the limited capacity of working memory. This happens in recalling kanji. Some can recall the story about the
kanji clearly, but can not retrieve the kanji graphic exactly, due to a distortion induced during processing of the image.

7.3.5. Sequence strategy

The least used were sequence (3.7 per cent) and stroke orders (3.8 per cent, see Table 7.2) strategies. In fact, the former requires some amount of kanji knowledge in order to seek sequences in kanji words. For example, the sequence strategy was used to memorise a multiple kanji character word, 図書館 /toshokan/, “library”. Instead of memorising all three kanji in isolation, the first learned kanji, or the middle kanji 書 /sho/, “books” mostly in this case⁹⁸ triggers recall of the rest. Mieko explained about her experience:

I don’t know 族 /zoku/ “tribe” in the combinations of 家族 /kazoku/, “family”, but I remember it when it comes together like this. (Mieko, I)

As the majority of kango or Sino-Japanese words consists of two or more kanji characters, using the sequence strategy is practical. However, words at the beginner’s level cover more wago or traditional Japanese words containing single kanji, with or without okurigana (hiragana used for inflectional endings in words). Consequently, its use depends on knowledge of compound kanji. Further, the sequence strategy was scrutinised to find differences among the groups by their L1 and L2 backgrounds.

Table 7.7. Use of I1 and I2 in Sequence Strategy by the Three Groups

<table>
<thead>
<tr>
<th></th>
<th>I1. Associate kanji with other kanji in sequence</th>
<th>I2. Remember kanji in sequence in that context</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>No-J</td>
<td>63</td>
<td>57</td>
</tr>
<tr>
<td>Yes-J</td>
<td>73</td>
<td>55</td>
</tr>
<tr>
<td>Yes-K</td>
<td>80</td>
<td>53</td>
</tr>
</tbody>
</table>

⁹⁸ Most of the textbooks for JFL introduce 書 /ka-ku/ “to write” in wago (traditional Japanese words) as one of the frequently used words for daily life. However, 書 /sho/, “book” in kango (Sino-Japanese words) comes later due to the combination with unknown kanji.
The “yes-K” group used association of kanji with other known kanji in a sequence up to 80 per cent, as expected. In particular, Ken and Sayuri use sequencing very often. But, the “no-J” group used it least due to their limited knowledge of compound kanji words or *jukugo*, but they are still showing an effort to utilise it, up to 63 per cent. On the other hand, the “no-J” group use the second strategy of remembering kanji in sequence, in context as Mieko mentioned above, but there is not much difference among them. Further inspection of this strategy use suggests that learners with longer experience of learning Japanese in the “yes-J” tend to use the sequence strategy more often, while learners with short experience in “yes-J” use it less, similar to the “no-J” group. Potentially, the sequence strategy will be extended from word level to context level at a later stage. When learners increase their kanji knowledge to the upper level, the sequence strategies will be used more as inferability increases from both the neighbourhood and higher context levels (Mori 1998; Mori et al 1999). At the same time, the sequence strategy eases the problem of selection between *on*-readings and *kun*-readings at the sub-lexical level of multiple kanji words when learners already know kanji vocabulary as spoken words. Further discussion will be carried out later (section 7.5.1).

7.3.6. Stroke order strategy

The stroke order strategy was least used by all, without much difference among three groups as shown below.
It is a strategy unfamiliar to those whose L1 is based on Roman scripts. Those learners, however, also practised how to write alphabetical letters in the right order, sometimes by tracing a dotted line in a practice book. However, the stroke numbers are different, the average stroke number of the Jōyō Kanji being over five times that of alphabet letters (see section 2.2.5). Most likely, the figures indicate that the “no-J” and “yes-J” groups are not familiar with following accurate orders for many stroke numbers, while the “yes-K” draw strokes unconsciously because they are at an autonomous stage of skill development (Anderson 1983,1995) as far as the kanji drawing strategy is concerned.

The animated and repeatable presentation of “stroke order” in the KS program was expected to be used a little more frequently, as they indicated the animation to be helpful (see Table 6.3). In addition, classroom instruction of “stroke orders” for each kanji is very boring and time consuming, as another study also reports (Inoue 1998).

Some, however, used stroke order quite actively as follows:

> Generally I have an idea of what goes first...I think by knowing the stroke order, then you can flow on, if you don’t know the stroke order then you are going to forget kanji. Because if I say okay, I can put this one first and then this and this...and then by that time you’ve forgotten. I think if you do the right stroke order, then you can flow. Then, you’ll also remember in your head, because you’re doing the stroke order, it’ll flow like “one, two, three, four”. (Yuka, I)

Yuka used stroke order to input kanji information accurately into her memory so that she could remember the kanji in the end for fluent production, while Mieko did not put
much weight on stroke order except for the first stroke, as Hirose (1992) noted regarding importance of the initial stroke.

I didn’t find it too necessary to use the order because you start from the top or you start from where the first place is logical. (Mieko, I)

The stroke orders determine the flow of a kanji graphic as a whole and maintain the balance of the entire character, while radicals take semantic and/or phonetic roles in the kanji. Also, the stroke order does not always correspond with its radical when multiple constituents are combined to form a single kanji, e.g., 国/kuni/, “country”, consists of two constituents; 国 and 玉. In this case, after completing the first two strokes of 国, one must complete the inside constituent, 玉, and then draw the horizontal line at the bottom as the last stroke. Thus, it is necessary to be aware of the importance of stroke order in relation to stroke counts while using a dictionary at the upper level.

In a short summation, the most used strategies by all participants are the planning your learning and the association strategies, whereas the least used are the sequence and the stroke orders strategies. Further examination of those strategies revealed that the previous experience of learning kanji in L1 and L2 evidently affects the selection of kanji learning strategies. The “yes-K” made short term goals in planning while the “yes-J” and “no-J” groups did not show any significant differences between short and long term planning due to their perception of kanji difficulty. Similarly, the sequence strategy was utilised more by the “yes-K”, because of their long experience and knowledge in their L1. The stroke order strategy was used least by the “yes-K”, possibly because they have unconsciously integrated the graphic representation and was not aware of the use of this strategy in an associative stage of skill development.
(Anderson 1995). On the other hand, the “no-J” group copy each stroke one by one with full attention while watching the animation on the screen because they are at the cognitive stage.

In the following section, the rest of the kanji learning strategies are examined to see how the three groups with different learning backgrounds use them.
7.4 Comparison of other strategy use among three groups

So far, kanji learning strategies have been examined in order to find a general tendency among this study group. As mentioned earlier, the SILK questionnaire consists of differing numbers of statements among the strategies, e.g., ten in the planning strategy, nine in association, but only three in the radicals strategy, two in the stroke order strategy, and so on (see Table 7.1). Strategies with more statements could possibly indicate higher use than strategies with fewer statements. Therefore, it is appropriate to examine the average use of each strategy for the comparison of individual strategies, used by the three different backgrounds; “no-J”, “yes-J” and “yes-K” are examined for learning kanji using the KS.

![Figure 7.1. Average Use of 15 Kanji Learning Strategies by the Three Groups](image)
The mean scores of 15 kanji learning strategies were examined to find any salient patterns of frequent use among the three groups of learners; “no-J”, “yes-J” and “yes-K”, as shown above in Figure 7.1.

A visual inspection indicates that:

- The frequency strategy is used most by all three groups.
- The sound strategy is used least by the “yes-J” and “yes-K” groups.
- The three groups utilised the strategies differently in experience, visualisation, compensation and sound strategies. But, the rest of strategies were used at similar rates by each of them.

The strategies such as frequency, sound, experience, visualisation, and compensation strategies are examined in the following sections.

7.4.1. Frequency strategy

First of all, the frequency strategy was utilised the most by all three groups. This indicates that, no matter what the background of the participants, repetitive practice for recognition of single kanji and/or compound kanji words followed by writing practice is considered to be crucial for memorisation of kanji characters. Also, because the physical involvement in production of kanji characters is an overt strategy (O’Malley et al. 1990), it is observable and easy to report for learners, like using a dictionary. This finding of a high use of the frequency strategy is consistent with other studies of kanji learning as an L2 (Chamot et al. 1996; Okita 1995, 1996; Bourke 1997; Maingard 1999; Kato 2000). Further, learners of kanji in their L1 also practise kanji frequently as the major strategy for learning kanji (Kawase 1988; Yoshimura 1988; Takebe 1989; Bourke
1997). As a consequence, the frequency strategy for learning kanji orthography is considered to be culture-independent (Kess et al. 1999). In effect, it is widely recognised that repeated practice affects memory retrieval so that learners can spend more time focusing on other unknown kanji, as the progress of skill acquisition moves from cognitive, to association, and on to the autonomous stage (Anderson 1995).

The present study group utilised KS to assist more on the recognition level, along with production on their own, inside and outside the CALL sessions. During interaction with the program, the frequency strategy is utilised, at first, for discrimination of kanji information, repeatedly in the program, then for production using a Japanese word processor or handwriting in the participants’ own notebooks and papers. For accuracy and fluency of kanji reading and writing, including meanings, both recognition and production processes frequently interact back and forth from the single kanji level to kanji words in context, as observed in Chapter Six. As a consequence, frequency indicates far more than simple repetitions of kanji writing, although there are only two statements in the SILK survey form.

Further, the frequency strategy leads to accomplishing competence and performance in learning kanji. According to Widdowson (1990), competence denotes the analysability of rule-based knowledge, i.e., there are basic rules for how to utilise homophones and semantic/phonetic radicals in learning kanji, whereas performance indicates the accessibility of kanji for production. Declarative knowledge or “knowledge of language” can become procedural knowledge or “the ability to access that knowledge” by frequent practice in different contexts. In the end, the frequency strategy is essential
for JFL learners to develop their underlying knowledge and actual use of kanji characters. This will be discussed further in section 7.5.2.5 in relation to the preparation strategy.

7.4.2. Sound strategy

The sound strategy is defined as “remembering a kanji by the sound of its English meaning, or by the sound of the Japanese on or kun reading…” (Bourke 1997:371). It was the least used by all groups, but used differently among the L1 backgrounds mainly because of the phonological distance from English as the L1 to Japanese as the L2 for the “no-J” and “yes-J” groups.

Table 7.9. Use of the Sound Strategy by the Three Groups

<table>
<thead>
<tr>
<th></th>
<th>Association of Japanese sound with English meaning of kanji</th>
<th>Association of English sound with Japanese meaning of kanji</th>
<th>Use of rhyme</th>
<th>Association of Japanese sound with alphabet</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-J</td>
<td>67</td>
<td>60</td>
<td>60</td>
<td>37</td>
</tr>
<tr>
<td>Yes-J</td>
<td>50</td>
<td>45</td>
<td>48</td>
<td>43</td>
</tr>
<tr>
<td>Yes-K</td>
<td>33</td>
<td>27</td>
<td>33</td>
<td>40</td>
</tr>
</tbody>
</table>

The “yes-K” group, using sound the least as shown above, did not much utilise any kind of English sound association for learning Japanese kanji (27 per cent) because the use of English sounds demands extra effort for Chinese and Koreans for learning kanji.

However, the “no-J” group used sound association and rhyme around 60 per cent. For example, Akemi in the “no-J” group stated:

Sometimes the word sounded like in English or in one of my other languages. So I’d just put it into remembering like that. Then, I don’t know, I’d use something like “amour” is the kanji like 思う/omo-u/, “to think”. I just try to use it like that. Just stupid things I use. (Akemi, I)
Other than that, they could not associate much sound with an alphabet (37 per cent) due to phonetic differences between English and Japanese. Both “no-J” and “yes-J”, phonemic oriented learners in L1, did not utilise the sound strategy much for learning kanji although L2 learning strategies are usually transferred. Apparently however, the “no-J” used sound association more than the other groups, who presumably found other strategies more useful than sound.

7.4.3. Experience strategy

The experience strategy means “relating the meaning of the kanji to some personal experience which the kanji reminds the learner of” (Bourke 1997: 368). While the experience strategy is a kind of association, it was decided not to incorporate it into the association strategy in order to limit the size of the association strategy (Bourke 1997: 143). As Table 7.1 shows, there are already nine statements in the association strategy. As a result, the experience strategy is removed from the association strategy as an independent strategy. Various types of personal experiences are tied to the meaning of a kanji, and they are widely used to link with other strategies such as association, stories, and radicals as follows:

- Association with the same or opposite meanings of the kanji
- Stories, pure or fabricated, relating to the semantic components of kanji
- Radicals relating to the meanings of kanji

If these strategies relate to “some personal experience”, they can be categorised as experience strategies. In fact, most memory techniques are related, more or less, to personal cases in order to enhance rapid activation of memory processing because familiar information is easier to encode to and retrieve from memory.
As shown below, the "no-J" group associated kanji with their personal experiences more than the other groups, while the "yes-K" used that method less, probably because they had not memorised kanji using personal experience for kanji learning in their L1.

Table 7.10. Use of the Experience Strategy by the Three Groups

<table>
<thead>
<tr>
<th></th>
<th>Association of kanji with personal experience</th>
<th>Need kanji words in the future</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-J</td>
<td>90</td>
<td>63</td>
</tr>
<tr>
<td>Yes-J</td>
<td>65</td>
<td>80</td>
</tr>
<tr>
<td>Yes-K</td>
<td>47</td>
<td>60</td>
</tr>
</tbody>
</table>

Seiko in the "yes-J" group comments:

I remember it, 赤 /aka/, "red" because it's mum's favourite colour. So, I just kind of felt like... that's a person there, she has two children so that the two of them and that's just for decoration. These extra bits I don't know why I came off with that. (Seiko, I)

Orie also said about 兄 /ani/, "elder brother" that "my elder brother talks a lot, so, he has mouth and two legs" (I), using the stories strategy.

The other is also an association of the meaning of kanji with "need(ing) kanji words in the future". For example, "I learn kanji if I'm going to need it in the future". During the CALL observation, Noriko mumbled, "勉強 /benkyō/, ‘study’, oh! This is what I need. (O)" Although there are some other candidate words that they may need such as 運動 /undō/, "to play sports", however, the equivalent loanword スポーツ /supōtsu/, "sports", is used frequently to replace it. There were no other examples during the interview to support association with personal issues.

7.4.4. Visualisation strategy
Visualisation has two categorisations; one is to “...visualise the kanji in [one’s] head and transfer the image to paper” and the other is to “...remember what it looked like on the page where [one] learned it from” (Bourke 1997:369). When learners recall information, strong visual images such as the kanji presented in a specific location in a story or a book can be transferred into their memory. Some of the images are accurate, but some are vague and partial, depending on how pieces of the images are linked together with or without their semantic and phonetic information, as well as on contextual substance.

Similar to the experience strategy, the visualisation strategy was also utilised more by the “no-J” and “yes-J” as shown below, probably because the “yes-K” group already know the images of the kanji graphics required for the course. The former two groups try to utilise any suitable strategy for both encoding to and retrieving from memory while the “yes-K” work mainly for retrieving as they have kanji knowledge in their L1.

Table 7.11. Use of the Visualisation Strategy by the Three Groups

<table>
<thead>
<tr>
<th></th>
<th>Visualise kanji in head and transfer to paper</th>
<th>Remember the image on the page</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>No-J</td>
<td>76.7</td>
<td>76.7</td>
</tr>
<tr>
<td>Yes-J</td>
<td>75</td>
<td>82.5</td>
</tr>
<tr>
<td>Yes-K</td>
<td>53</td>
<td>73.3</td>
</tr>
</tbody>
</table>

Tamie and Orie explained the vague visualisation of a kanji image as an initial clue:

Usually when you go to write it, you can see it in your head, but actually writing it down on page is different. Like, you can’t write it exactly. (Tamie, I)

Just the really detailed ones are hard to remember. So, it’s a matter of visualising them in my head. (Orie, I)
Some of the “yes-J” group use visualisation for retrieval. Yuka has a clear image of “a whole complete picture” of the kanji in her mind, if she knows its stroke order. Further, Michie used visualisation for self-testing to see if she has a clear image in her mind:

When I close my eyes, I can see what it is in my head. And if I don't see it, then I don't remember it. [When I see it] I know the reading and I know the meaning and I know what it looks like. (Michie, I)

The second type of visualisation or, remembering the pages and/or lines of the books from which they learned, was used often when they could not remember kanji precisely during quizzes and exams although they could precisely describe the place where kanji was in a book. One reason is that no semantic information is involved there. Although visual association is surely used to assist in recalling kanji, some had reservations about it because inherently meaningful information is considered more useful due to the limitations of working memory (Anderson 1983). However, others support it because meaningful elaboration may not be easily possible for beginners (Pressley et al. 1987), as in this case.

7.4.5. Compensation strategy

Different from other strategies, the compensation strategy was, notably, the most used by the “yes-K” group. The compensation strategy is defined as the “resorting to other means of finding out when the learner’s own knowledge is insufficient” (Bourke 1997:369-370). As shown below, it was used differently among the three groups, especially in using a dictionary.
The "yes-K" group, remarkably, used a dictionary, not in Japanese but in their L1, probably because the use of English as a common language in this teaching/learning environment may have encouraged them to use a kanji dictionary in their L1. Previous findings (Douglas 1992; Okita 1995) revealed that beginning JFL learners do not use a dictionary frequently, although using a dictionary is necessary for learners at the upper levels in order to manage a large number of unknown kanji characters, words and phrases, among other things. Some in the "yes-J" group self-reported using dictionaries very often, but some mentioned the workbook as a dictionary, while the "no-J" group used dictionaries the least. Eiko and Fusako in the "no-J" group said there is more than enough kanji and vocabulary information (O) in KS, the workbook and the text.

Another sub-category, "asking help from friends and/or teachers", is partially overlapped by the cooperation strategies in the indirect strategies, but the compensation strategies are mainly one way and more directly related to getting help with kanji information such as kanji readings, writings and so on. It is hard to distinguish whether helping is one way or two ways. Sayuri and Mari of the "yes-K" group share their kanji background and exchange their kanji sheets to check each other’s work, paying attention to kanji readings that are easily confused (O), in particular, the combined kanji words. With some degree of prediction, they often semantically analysed and contrasted Chinese kanji vocabulary and Japanese as follows:

<table>
<thead>
<tr>
<th>Learners</th>
<th>Look up in dictionary</th>
<th>Ask someone who knows</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-J</td>
<td>50</td>
<td>73</td>
</tr>
<tr>
<td>Yes-J</td>
<td>75</td>
<td>80</td>
</tr>
<tr>
<td>Yes-K</td>
<td>93</td>
<td>87</td>
</tr>
</tbody>
</table>
Sometimes some Chinese character is different from Japanese... So, I go through every single character and go stroke orders and see it... if I come across something I don’t know, I write it down in separate book or paper. ...and then, sometimes, I ask Mari to check it for me. (Sayuri, I)

Compared to Chinese kanji, Japanese kanji has sometimes different meaning. So, I will check that first in case I get them in Chinese meaning... because the meaning is important. (Mari, I)

Fusako and Noriko in the “no-J” group also studied together sometimes during the CALL session. While working with the kanji quizzes on the computer, they helped each other (O). Tomiko in the “yes-J” group also asked for help from her friends and stated that, “I study better if I’ve got someone there... yeah, Orie and others helped me often” (I).

In addition, another one-way “help” was noticed for this study during interaction with the CALL program. Participants utilised the different types of help functions available on request99, such as the translation of the whole story, kanji and/or vocabulary “balloons” in the ST and sentential translation in “KRQ/KWQ” activities.

For “help” with translations in KRQ/KWQ, Taeko and Orie, commented:

I use it only if I can’t understand the word. (Taeko, I)

That’s like the last resort. You don’t want to go there because you have to learn. (Orie, I)

Since they know that translations are available, perhaps they try not to use them. However, depending on the learners’ kanji abilities and the aims of their interactions with different tasks like the ST, their usage of “help” differs. Some of the “no-J” group checked a “balloon” first and made a kanji vocabulary list for compound kanji, and Eiko said:

99 When users request by clicking a button, the relevant information is available.
I’ve been looking at the highlights, and then I just look at the meaning and then try to read it. (Eiko, I)

Others used translation for confirmation afterwards:

I tried and did my own translation first, and then checked it with the translation. (Fusako, I)

The translation was helpful. I used it if I’ve translated it right or not. (Reiko, I)

I understood what it was saying, but it didn’t make sense [sometimes] with the story. That’s what I was checking for. (Yuka, I)

If I don’t know something, I just keep going, so I can work out a general pattern. Then, I can look at the translation afterwards. (Orie, I)

Thus, the two major reasons for the frequent use of the compensation strategy were the use of a dictionary by the “yes-K”, and the “help” function on the KS program while the participants interacted for learning kanji.

So far in this section, the salient patterns of strategy use were examined among the three groups, the “no-J”, “yes-J” and “yes-K” groups. First of all, the frequency strategy was used by everyone, as often happens in their L1 learning. Frequent practice enhances both recognition and production of unknown kanji, and increases fluency and accuracy for both recognition and production of kanji characters. In effect, repetitive practice is indispensable for developing processing skills for automatisation.

Further, the “no-J” and “yes-J” groups were inclined to utilise experience and visualisation strategies for input probably because these strategies are not demanding, while the “yes-K” group used compensation strategies more, mainly utilising a L1 dictionary. Further, the “no-J” group tend to overly rely on the association of semantic properties of new kanji with personal experience, along with the story and sound.
strategies, mainly because the strategies are familiar to them in their L1, and because their L2 processing skill level is limited compared to that of the other groups.

In the next section, the kanji learning strategies used by this study group are compared with Bourke's (1997) study to find differences and similarities.
7.5  Comparison of kanji learning strategy use: Bourke’s (1997) and the Current study

So far, kanji learning strategies were scrutinised qualitatively among the three different groups. As the current study employed Bourke’s test instruments, the two groups were compared to find any similarities and differences in the use of kanji learning strategies. In this section, the study focuses on the direct strategies which relate directly to kanji learning, mainly because the SILK form is primarily designed for direct strategies dealing with observable behaviours and mental processing as well.

Figure 7.2 Comparison of Direct Strategies Use by Groups in Two Studies (%)
Figure 7.2. shows the frequency of use of direct strategies in kanji learning by Bourke’s group (1997:134) and this study group. The vertical axis denotes the percentage of total strategy use. The major findings at a glance are pointed out below.

- Association and stories strategies were used the most\(^{100}\) by both groups.
- Stroke order and sequence strategies were used the least by both groups.
- Next highly used were compensation and radicals strategies by Bourke’s group while the researcher’s group used physical-emotional response and self-monitoring strategies.
- Bourke’s group used association and stories strategies in almost two thirds of their usage of direct strategies and, the rest of the direct strategies such as experience, self-monitoring, sequence, physical-emotional response, sound and stroke order strategies were used very little. On the other hand, the researcher’s study group used the most strategies relatively evenly without leaning toward any specific strategy except the association strategy.

Before going further, the background for Bourke’s study is summarised. Although both groups of learners were in the beginning JFL level in Australian universities, Bourke’s study was carried out in a different context from this study as follows:

- The main aim was to develop and examine the SILK test instruments.
- Six native English speakers at the tertiary level participated for six weeks.
- The participants had already learned 200 kanji prior to the study.
- Special instruction about radical systems and use of a kanji dictionary was given prior to the study.
- Free recall tests and individual interview methods were used to examine their kanji learning strategies.

\(^{100}\) Strictly speaking, this study group used physical/emotional response more than stories, but they were not significantly different.
On the other hand, this study group, with 17 participants, used the KS program to learn the first 174 kanji at tertiary level for two semesters, including the preparation period. At the end of the study period, the self-rated SILK questionnaire, developed through Bourke's study, was used to examine kanji learning strategies in relation to interactions with the KS program by three types of participants: the "no-J", "yes-J" and "yes-K" groups. Figure 7.2 is further examined without the "yes-K" group due to the inclusion of three learners with kanji backgrounds. As Figure 7.1 demonstrates, some minor differences appear in the compensation strategy (5.4 per cent excluding the "Yes-K" instead of 5.8 per cent by all) and the sound strategy (7.9 per cent excluding the "yes-K" instead of 7.4 per cent by all). In addition, strategy use by the three CALL access groups (see Appendix I) was also included to ascertain the influence of CALL use.

7.5.1 Strategies influenced by CALL methods

This study utilises the KS program as a major learning instrument in the CALL laboratory. The interest in this section on kanji learning strategies is specifically considered to be influenced by the use of the KS program, as this group used a greater variety of strategies than those in Bourke's conventional approach. The major questions through inspecting Figure 7.2 are as follows:

1. Stroke order and sequence strategies were used least by both groups. However, why did the present study group utilise them far more than Bourke's group? Also, the sound strategy was used by this group, far more than by Bourke's group. Does the sound strategy have any relation to other strategies?
2. Does the relatively high use of the self-monitoring strategy by this group relate to the use of KS? Similarly, the physical/emotional response and experience strategies are also used a little more by this group than Bourke’s group. Does this result relate to the CALL method or to other factors like individual differences?

3. Why were the radicals, compensation, and visualisation strategies used less by this study group?

4. Association and stories strategies were used more by Bourke’s group, but they were actively used by both parties, so was the frequency strategy. Are these strategies culture and method independent for learning kanji?

These questions will be investigated below, in order.

<table>
<thead>
<tr>
<th>Question 1:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke order and sequence strategies were used the least by both groups. Why did this study group utilise them far more than did Bourke’s group? Also, the sound strategy was used more by the present group, far more than by Bourke’s group. Does the sound strategy have any relation to the radical strategy?</td>
</tr>
</tbody>
</table>

The initial concern is about sequence and stroke order strategies which are used least by this study group\textsuperscript{101}, but they are still used around 5 per cent more than in Bourke’s study.

The stroke order strategy deals with the graphemic representation of kanji for input and output information. It assists in economically encoding each piece of a kanji graphic accurately, in the right order, at the right location, with a smooth flow in the storing to

\textsuperscript{101} Bourke’s group also used the stroke order strategy the least, but the next least was the experience strategy, as Figure 7.2 displays.
and retrieving from memory for production. Different from alphabetical characters, each kanji character consists of up to 30 strokes, although the average count for the Jōyō kanji is a little over ten strokes. It is still far too many for beginner JFL learners with English backgrounds to manage (see section 2.2.5). In order to overcome this hurdle, the basic rules of stroke order are used for effective and economical drawing, with good balance, in a limited space. In effect, stroke order involves “a rhythm, a pattern, a sequence, by which the kanji has been built up” and “careful and frequent practice of the correct stroke order can act as a strategy for remembering how to write kanji” (Bourke 1997:371).

One of the distinctive features of KS is the presentation of animated stroke orders for each kanji. From the teacher’s viewpoint, it promotes self-paced independent study and saves a tremendous amount of class time (see section 3.4.2). At the same time, this was intended to encourage learners to obtain basic kanji knowledge and develop learning strategies individually in an integrative way. In fact, 82 per cent acknowledged the helpfulness of stroke orders in the program (see Table 6.3). However, in spite of the expectation, the CALL high use group self-reported a moderate use and stated how they used them in the interview:

I can see how they get that. And I usually look at the strokes, and you just copy it like this. (Orie, I)

I'd look through it and just see the stroke order. I just do that for each one, for the whole lot. (Fusako, I)

I use [stroke orders] while I’m writing it...bring a pen, and I’d write it along the screen. And then I follow the stroke orders next time...but when I do my test I don’t. (Taeko, I)

[I count strokes] in my hand... one, two three, four...and go to the next one! I just write them down a lot and, I look at them and write them down and I look at them and write them down...but, I can’t remember. (Noriko, I)
Thus, Taeko is more actively involved in stroke order for kanji production, but the rest use it more for kanji recognition. Yuka in the CALL low use group was the highest user of this strategy and commented:

I think if you do the right stroke order, then you can flow. Then, you’ll also remember in your head, because you’re doing the stroke order, it’ll flow like one, two, three, four. (Yuka, I)

This means that Yuka in the “yes-J” already uses the stroke order strategy as her own regular strategy with or without KS. On the other hand, Mieko in the CALL low use group self-reported using the stroke order strategy frequently and said:

I don’t usually pay that much attention to the stroke counts. Because the stroke order, I thought, kind of starts from the top or goes from left to right. But if you don’t know that there is an order in the Japanese writing, I think it helps. But, I knew that there was an order and there was a way to do it. So you generally get the idea of how it flows if you know. (Mieko, I)

She used a stroke order strategy for the first stroke of a kanji to make it flow smoothly, but she neither paid much attention on the rest of the strokes nor counted the number of strokes. Another comment by Tamie in the “no-J” was that, “I think, I found the stroke order to be a bit slow”(I). This is positive evidence of dramatic growth in the ability to recognise kanji and envision their stroke orders. In fact, the stroke orders of all of the kanji in the KS program for the study period were presented faster than the ones for the preparation period.

Seiko in the “yes-J” group also utilised stroke orders carefully in order not to form incorrect drawing habits. When she noticed her errors, she felt much “easier” after that. From a strategic point of view, she brought two issues here; one is the finding of the correct stroke orders and the other is the noticing of the difference between the pre-
image in her head and the demonstration image on the screen through self-management. Noticing the differences is accelerated by her conscious awareness.

The next strategy is the sequence strategy. It primarily assists graphemic representation, but semantic and phonemic representations can be involved concurrently. Also, importantly, this extends to “learning kanji in context”. In fact, this strategy is used not only at morpho-graphic, sub-lexical and lexicon levels but also at contextual levels.

In this study, the KS program supports learning “kanji in context”. Approximately 12 new weekly kanji are presented in a step by step approach from single kanji in isolation, single and compound kanji words in a short context, to a large context like a story (see Chapter Six). As shown in the Table below, the results reveal few differences among three CALL access groups in placing new kanji in a context, however, the CALL high/mid access groups utilised associating “kanji with other kanji in the sequence I learned” slightly more than the CALL low group.

Table 7.13. Use of the Sequence Strategy by the Three CALL Access Groups

<table>
<thead>
<tr>
<th></th>
<th>CALL high</th>
<th>CALL mid</th>
<th>CALL low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associate kanji with other kanji in the sequence I learned</td>
<td>75</td>
<td>74</td>
<td>53</td>
</tr>
<tr>
<td>Place new kanji in a sentence and remember it in that context</td>
<td>65</td>
<td>51</td>
<td>53</td>
</tr>
</tbody>
</table>

Orie in the CALL high use group used the sequence strategy frequently while using the KRQ/KWQ and the ST in the KS program. Some of her comments about the frequent interactions unveiled the use of this strategy concurrently with other strategies for rapid word recognition, as noted by Cobb et al. (1996:126). Here is an example of her use of
sequence strategies while working with the KWQ:

I used to have trouble with ぎょん /kinō/, “yesterday” all the time. Lately I can remember it. It’s like...I know this bit 냐 and these two have got to line up all the time, so I remember that. (Orie, I)

Seiko, in the CALL mid use group frequently used the ST to learn new and old kanji words in context, rather than focusing on comprehension of the whole story, and said:

I just go along and make sure that I got a general understanding of the story and like there’s any combination of kanji that I haven’t seen for a while, 部屋 /heya/, “room” for an example. If I didn’t remember that, I’ll just go like that and click it. (Seiko, I)

部 /bu/, “part” had already been learned, but was presented in a different reading in a new combination with a new kanji 屋 /ya/, “roof”. Checking the reading and meaning of the kanji in the KI as a single kanji, she put it back into the nearby context briefly and confirmed whether or not it made sense.

On the other hand, Michie in the CALL mid use group, integrated unknown kanji combinations into the ST context and commented:

I checked the kanji combination...but, sometimes, reading the story makes me see the connection between story and other things, like I might remember it being used in one sentence, and what sentence it was used in and that might help me remember the meaning. But, you know, whereas just having one single one outside, I won’t remember it as well. (Michie, I)

It is reasonable to assume that Michie tries to find meanings by inferencing unknown parts while placing “the new kanji in a sentence and remember[ing]it in that context.”

As discussed in the interaction in Chapter Six, Tamie in the “no-J” group commented about the ST very briefly when she used the ST before the KI in the program:

Yes, it was more interesting than [KI]. Because you’ve got a story as well. I think some people just went through and got the Kanji. But I think you have to have the story to help you understand what it means. (Tamie, I)
This is an extremely important step in kanji learning in terms of skill development. Once learners can extend their kanji knowledge to a larger context, they start to infer meanings from any available information not only from internal kanji words but also from the context, although there is a strategic tendency toward over-reliance on local information at the beginner's level (Mori et al. 1999). With the progress of Japanese language proficiency, however, contextual clues are more used than kanji clues (Okita 1995, 1996; Mori et al. 1999). In effect, this transitional step is repeated back and forth until learners can fully utilise both local and contextual clues. Most likely, Tamie challenged the ST and discovered its usefulness because of the availability of the immediate assistance of the balloons in the KS. It is expected that, as the number of compound kanji words, or jukugo, increases, the sequence strategy will be used gradually, integrating the unknown kanji with the existing kanji. At the same time, inference of meanings at the lexical to contextual levels will be used more actively. This is a gradual learning step for expanding to deep processing, and CALL methods can equip the supporting devices overtly and covertly.

Ken in the “yes-K” group used only certain strategies, and the sequence strategy is one of them which he self-reported using very often. As he has knowledge of kanji in his L1, as pointed out in Chapter Six, it is understandable that he used sequence strategies to link new and old and to infer meanings, even if combined kanji words in his L1 were not always the same semantically, as in Japanese. This is true, too, for Sayuri and Mari in the “yes-K” group. They reported having this trouble fairly often, but they mentioned that kanji combinations are more familiar102 than single kanji vocabulary because of the

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102 Due to familiarity with similar phonetic representations, a negative transfer from L1 occurs often and may result in fossilisation.
音読み on-yomi (Sino-Japanese reading), based on Chinese pronunciations (O). Moreover, when one out of a two or more kanji combination was understood, they tried to associate it with the other kanji in the sequence, phonological interferences appear though.

It is worthwhile to encourage developing the sequence strategy from the beginner’s level, even if it is used least now, as this will be extended to contextual learning at the upper level (Douglas 1992; Okita 1995, 1996). Kato (2000) reported the frequent use of contextual learning, especially by JFL beginners with a kanji background in their L1, as they are at the associative stage as far as kanji graphemic and semantic processing are concerned. Even the learners without kanji backgrounds gained significant, positive motivation through contextual learning. Similarly, JFL learners in a Japanese immersion program (de Courcy et al. 1993; Birch et al. 1995) utilised inference through the context. The inferring strategy is discussed later in section 7.5.2.1 in relation to contextual learning.

The third strategy in the first question, the sound strategy, is for helping with the phonemic representation of kanji characters. As there are multiple readings, the sound strategy was expected to be actively used in order to select the appropriate reading, depending on the context. Also, it is a popular strategy for English speakers in their L1, but both groups used it a little: only 1 per cent by Bourke’s group and 7.9 per cent by the “no-J” and “yes-J” groups in the present study possibly because of the phonological distance. Interestingly however, the CALL high access group used it the most among themselves, that is, the average frequencies were 3.13 by the CALL high access group
while being used 2.11 by the CALL mid-access and 2.17 by the CALL low access groups (see more Appendix I). Exposure to the CALL program may affect learners using rhyme.

Another reason that the sound strategy is used less is the limitation of this strategy. "Remembering a kanji by the sound of its English meaning, or by the sound of the Japanese on or kun reading can act as a memory jogger for recalling kanji" (Bourke 1997:371). The second part of this explanation is not fully implemented in either the sound or radical strategies in the SILK. If the radical strategy does not deal with the phonetic radicals in the SILK, the phonetic representation of kanji can be treated in the sound strategy for the time being until reaching an upper level, although it is more logical to include it in the radical strategy. This is discussed further in the third question.

To summarise, the stroke order strategy seems not to be affected much by CALL interaction at this stage, mainly because of the limited use of the strategy. However, the majority of this study group acknowledged the helpfulness of the animated stroke order, as it has the potential to raise the recognisability of stroke orders, together with radicals, through explicit instructions using CALL methods. Also, the inclusion of phonetic radicals in either the radical or sound strategy may change the result, though the former strategy is preferred. The sequence strategy was the least used, but was utilised more by the CALL high access group. As with stroke order, it is difficult to discuss the direct influence of CALL access on these strategies, because it depends primarily on the choice of kanji characters introduced in the curriculum at the JFL beginner's level. So, it is reasonable to note that the sequence strategy also has a much greater potential to provide clues to "kanji in context". At the same time, the importance of noticing should
be taught explicitly to encourage students to pay special attention to any attributes of kanji.

**Question 2:**

*Does the relatively high use of the self-monitoring strategy by this group relate to the use of the KS program? Similarly, the physical/emotional response and experience strategies are also used a little more by this group than Bourke’s group. Does this result relate to the CALL method or some other factors like individual differences?*

The self-monitoring strategy focuses on the practice phase during interaction with KS after the input function was performed, because this strategy directly involves monitoring, compared with the metacognitive strategy (Oxford 1990). As shown below, all three subcategories in the self-monitoring strategy revealed that CALL high access learners reported spending more time than the others for self-testing (95 per cent) and practising problem kanji (95 per cent). However, “write problem kanji in a separate book” was used less (60 per cent) than the other two sub-categories. Probably they did not prepare “a separate book for easy reference” specifically, but they mostly took notes from the program on their own paper while interacting with the program (O).

Table 7.14. Use of Self-Monitoring Strategy by the Three CALL Access Groups

<table>
<thead>
<tr>
<th></th>
<th>Self-test and relearn unknown kanji</th>
<th>Practise problem kanji thoroughly</th>
<th>Write problem kanji in separate book</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALL high</td>
<td>95</td>
<td>95</td>
<td>60</td>
</tr>
<tr>
<td>CALL mid</td>
<td>88.6</td>
<td>85.7</td>
<td>54.3</td>
</tr>
<tr>
<td>CALL low</td>
<td>83</td>
<td>86.7</td>
<td>53.3</td>
</tr>
</tbody>
</table>

For self-testing, Tamie in the mid-access group usually used her own kanji list that she made during the session:
I just write down the characters, and this reading and English meaning. And then, I do the stroke order which I find that helpful to learn as well... Then I usually have them down there, and I quiz myself and just go through it and ask what they mean. (Tamie, I)

Further, self-monitoring is used, more broadly but directly, to monitor their learning especially when they encounter a problem.

If I think I’ll know that tomorrow, then I’ll just leave it... I’ll know that “next time”, and then I usually don’t... but anyway, …I should study more. (Tomiko, I)

As the scores were displayed on the monitor after the activities in the KRQ, KWQ and SQ, some used them to check their progress, and encourage themselves. However, the majority did not pay attention to the scores.

Importantly, KS assists individual learners to self-monitor their learning to become self-regulated, autonomous learners, as Zimmerman (1994) advocates proactive engagement in learning by students, relying on self-motivated, planned or automated methods of learning. Learners have to force themselves, sometimes at first, to get used to doing hard tasks like learning kanji. Eventually however, they are expected to find a suitable method, through interaction with the JFL environment such as friends, books, CALL programs, and so on. It is reasonable to say that the KS program could assist by giving memorable directions during a very critical period for inexperienced beginners. Eiko in the CALL low group commented that the computer “forces you to learn... but I think it’s good to use the computer” (I).

Then, the physical/emotional response and experience strategies come from the individual inspiration of “liking and disliking” toward kanji or “personal experiences” in the past or future. As mentioned earlier, they are less demanding strategies than other
cognitive strategies. Due to these strategies being unobservable, it may be difficult to report on them as two of the kanji learning strategies unless learners are able to notice the feeling consciously and say something aloud in the group. So, some of Bourke’s study group may have linked some kanji with their personal emotions or experiences more than the data indicated, but they did not say so aloud. On the contrary, if a survey asks learners detailed questions by pinpointing something, they may realise what they are using. In fact, self-discovery is also one of the processes of strategy instruction to get attention. As Table 7.15 below illustrates, the CALL high use group indicates slightly higher figures, but not distinctively different. Only one of the four categories, “remembering kanji because I like them” is actively used by the CALL high use group, but other groups also utilised it.

Table 7.15. Use of the Physical/Emotional Response Strategy by the Three CALL Access Groups

<table>
<thead>
<tr>
<th></th>
<th>Remember kanji by the way it feels to write</th>
<th>Remember kanji because I don’t like them</th>
<th>Remember kanji because they are difficult</th>
<th>Remember kanji because I like them</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALL high</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>90</td>
</tr>
<tr>
<td>CALL mid</td>
<td>74</td>
<td>57</td>
<td>74</td>
<td>83</td>
</tr>
<tr>
<td>CALL low</td>
<td>63</td>
<td>67</td>
<td>70</td>
<td>83</td>
</tr>
</tbody>
</table>

Also, the examination by learners’ background L1s and L2s in Figure 7.1 reveals no significant differences among the three groups. As a result, it is safer to say that there is little specific relationship between use of the physical/emotional response strategy and the frequency of interaction with KS and learners’ kanji backgrounds. Rather than the frequency of CALL interactions, it depends more on learners’ individual differences, as in Noriko’s comment:

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It just looks cool, and I like the way it looks. It's interesting, ...but, this one is just boring. (Noriko, I)

Ken also briefly stated his personal reactions toward kanji shapes during production. On the other hand, Seiko said that she liked some complicated kanji as she could enjoy the conquest after overcoming the difficulties.

It's good once you've learned how to do it, as it makes you feel better if you can do more complicated ones. (Seiko, I)

Her adventurous attitude toward difficult kanji strongly supports her learning so that she feels up to further challenges.

The other unobservable strategy is the experience strategy. It is primarily a kind of association with personal experience. The findings of the experience strategy in the previous section (see Table 7.13) were that the use of this strategy is limited among the "no-J" and "yes-J" groups, but not much by the "yes-K" group because the latter already have knowledge of kanji graphics in their L1s and have no need to explore and find other strategies. Further examination of the differences among the three CALL use groups does not show clear differences among them (see Table below).

<table>
<thead>
<tr>
<th>Table 7.16. Use of the Experience Strategy by the Three CALL Access Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>CALL high</td>
</tr>
<tr>
<td>CALL mid</td>
</tr>
<tr>
<td>CALL low</td>
</tr>
</tbody>
</table>

As a result, similar to the physical/emotional response strategy, with the experience strategy it is rather individual differences that determine how they react to their own
experiences. No further comments were available in the interviews.

<table>
<thead>
<tr>
<th>Question 3:</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Why were the radicals, compensation, and visualisation strategies used less by this study group than by Bourke’s group?</em></td>
</tr>
</tbody>
</table>

The radicals strategy was not used actively by either group in spite of being an observable strategy. Moreover, Bourke’s group received a special lecture about radicals, while this group can access kanji radicals/components using the colour-coded presentations in the KI.

The radical strategy is defined as “a way of classifying kanji according to a number of common elements”. Further, the use of radicals as a learning strategy means “knowing the meaning of the radical and relating that meaning to the meaning of the kanji as a whole” (Bourke 1997:368). As mentioned previously, this definition is restricted to semantic radicals, and does not clearly mention phonetic radicals in the SILK as follows:

- I group the kanji with other kanji containing the same radical.
- I remember the radical first and it helps me remember the kanji.

As discussed in Chapter Two, there are phonetic and semantic radicals in kanji characters; the phonetic radicals indicate “readings” while the semantic radicals show “meanings” (see section 2.2.4). Approximately 1200 semantic-phonetic kanji out of 1945 Jōyō kanji indicate their kanji meanings and readings, and about 700 out of these 1200 kanji have a graphemic-phonemic correspondence (Ito 1979). Therefore, some studies (Dwyer 1997; Yamashita et al. 2000) suggested introducing more phonetic information in JFL kanji instruction. However, one of the problems with radicals is in their inconsistency; the location of radicals in a kanji character, and employment of
semantic or phonetic radicals. For example, learners can distinguish the two radicals, 木 /kô/ “work” from 木 /ryoku/, “strength” in 功 / kô / “skill”, but they do not or can not distinguish clearly which is a phonetic radical and which is a semantic radical, especially at the beginner’s level.

In this study, the researcher as a teacher gave a brief explanation of semantic and phonetic radicals during the preparation period. Besides the colour-coded display of radicals in KS to strengthen input at the initial stage (see sections 4.1 and 6.3), seven types of structural patterns for kanji are introduced in a variety activity at an early stage. The findings about their attitudes are that the colour-coded presentation was helpful for up to 82 per cent, and 68 per cent acknowledged the helpfulness of variety activities, although it is not clear if this figure represents the specific radical tasks.

It is assumed that the CALL high access group used colour codes to differentiate kanji elements and to break up a kanji into small chunks for effective memorisation. However, one student confirmed the use of semantic radicals as one of his favourite strategies even though he had few interactions with KS. Perhaps this was influenced by the Chinese language he was studying simultaneously. None of the “yes-K” group commented about radical use during the interview, possibly because of their unconscious use of radicals in their L1s. There are still various opinions dealing with phonetic radicals at an introductory stage in terms of effectiveness of teaching/learning kanji in class103.

103 Based on the Heisig method (1977), Alplin (2002), during on-line discussion (‘SenseiOnline’) on May 1, 2002, proposes an “element-based approach” to introduce radicals at an initial stage.
Overall, no particular group in the present study used the radical strategy extensively, and few comments about phonetic radicals are found at this stage.

Also, the pre-lecture about radicals for Bourke’s group was not rewarded immediately, mainly because not all radicals would have been introduced at this level. One reason could be the definition of radicals. However, as two thirds of this study group, especially the CALL high access group (see Figure 7.2), acknowledged the helpfulness of colour codes, further explicit presentation in conjunction with stroke orders and sequence strategies might enhance the usefulness of the radicals strategy from the beginning JFL level. In particular, the early introduction of the concept of phonetic radicals along with the semantic radicals will assist understanding of the complexity of multiple readings of kanji.

The compensation strategy, such as using a dictionary and asking others, was used more by Bourke’s group than this group. As this is discussed in section 7.4, it is understandable that in the main, the different learning environments affect the use of this strategy. Bourke’s study by six students for six weeks is an ideal condition to encourage the strategy of “asking others” whatever they have any questions about. On the other hand, it is possible for the present study group that the “help” functions such as balloons and translation in the KS program may have replaced the strategies of “asking others” and “dictionary use” while studying kanji.

The third, the visualisation strategy, was different from other strategies in that no significant differences in use were found between the two groups, namely, 6 per cent by the “no-J” and “yes-J” groups as the counterparts while 7.5 per cent by Bourke’s group.
So, it is possible that learners without kanji backgrounds in an L1 may use the visualisation strategy to fill in the gap between strategies used actively and those used less actively, since it is receptive and less demanding in terms of a cognitive processing approach. If the visualisation strategy is used simultaneously with other semantic processing strategies, it shows additional strength in learning kanji. This will be examined in relation to the outcomes in the next chapter.

**Question 4.**

*Association and stories strategies were used more by Bourke’s group, but they were actively used by both parties, as was the frequency strategy. Are these strategies culture and method independent for learning kanji?*

The association strategy was widely used by both parties. In addition, the frequency strategy was also actively utilised, on average, among the 12 direct kanji learning strategies. Can we say that association and frequency strategies are culture and method independent?

The association strategy was frequently utilised by Bourke’s group up to approximately 40 per cent, and also used by the present study group. As discussed previously, association is a familiar strategy used in the L1 of alphabetical languages, along with the key word and mnemonics approaches for vocabulary acquisition. Learners compare and contrast kanji that look similar so as not to confuse them as Sakai (1994) notes. Consequently, accurate recognition of the kanji form in order to differentiate one from another is necessary as Seiko commented.

I looked that one 麟, of having three lines, which is an unusual number, and then just the two things at the top, which a lot of them have just for decorations, and yeah, I just look at the sun “日” with two strokes just connecting them. (Seiko, I)
Two issues should be clarified here, one of which is the language used for the stories. As there is no restriction on the language used for stories, it is reasonable to assume that the L1 or the L2, or a combination of both, can be used to create stories, as long as they facilitate memory of the kanji characters or words. The other is about the associations for the stories strategy. The association strategy is only used to associate new kanji with known or familiar objects and symbols, while the stories strategy (see section 7.3) is used to create stories (or mnemonic devices) by association between old and new information. However, they are used in a mixed manner as in Seiko’s comment:

But, to remember reading and meaning, I was just thinking, “well, if you got a painting, and there’s a dab of yellow”. That’s where your eyes go first. Yellow attracts everybody’s eyes first. So, that’s the key to the painting. Even if that’s not, the first thing you look at is the key for the painting. So, it’s the key, or 黃, /ki/ “yellow”. (Seiko, I)

The KS program contains verbal mnemonics based on kanji etymology. Some in the present group used them as they were, but others, like Seiko, created their own. In fact, the personalised “atypical” stories are better than “typical” ones for recall and recognition performance (Ashcraft 1994) because of the personal involvement in the processing (Kaiser 1999). However, the model mnemonics are also helpful for less imaginative learners as Hultstijn (1997) pointed out because poor learners do not know how to develop their imagination to enhance the memory in a new language.

Below is the summary of the association strategy, utilised by learners with different L1 and L2 backgrounds, and by those with different frequencies of KS access (see section 7.3):
Table 7.17. Use of the Association Strategy by Three Groups of L1/L2 Backgrounds and CALL Access Frequencies

<table>
<thead>
<tr>
<th>L1 &amp; L2 backgrounds</th>
<th>%</th>
<th>CALL access frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-J</td>
<td>58</td>
<td>CALL high</td>
<td>62</td>
</tr>
<tr>
<td>Yes-J</td>
<td>62</td>
<td>CALL mid</td>
<td>58</td>
</tr>
<tr>
<td>Yes-K</td>
<td>53</td>
<td>CALL low</td>
<td>58</td>
</tr>
</tbody>
</table>

The association strategy was actively utilised by all language backgrounds without any significant differences. Considered together with the Bourke’s study, the association strategy is one of the most popular strategies for beginning JFL learners in general, as association represents many areas relating to story, experience, sound and even radical strategies. However, careful observation indicates the different uses of the association strategy depending on the group. The “no-J” group tend to associate kanji with semantic representations while the “yes-K” rely on the graphemic, phonemic and semantic information of existing kanji. The “yes-J” use both, but less than “yes-K” due to their lack of kanji knowledge. In other words, when learners encounter new kanji, the “yes-K” have a wider range of choices than the others, for associating new and existing information.

As regards the CALL interactions, few differences are found among the three access groups. The association strategy was used by all, equally, in this study group while using the CALL program. Further, it was used more actively by Bourke’s group while using a book and workbook. So, the use of the association strategy could be “method-independent”, but further study with a larger number of participants is necessary to form conclusions.
Another popular strategy is the frequency strategy, a favourite among kanji learners, especially in the L1, but even in the L2 (Chamot et al. 1996; Okita 1995, 1996; Takahashi 1993; Maingard 1999). Physical involvement in production of kanji characters is an overt strategy (O'Malley et al. 1990) which is observable in learners.

Both parties show a high use of the frequency strategy, with individuals in Bourke’s group using the frequency strategy 4.64 (out of 5) and this group, 4.76. Further inspection of this group revealed that there are neither big differences among the three groups with different L1 and L2 backgrounds (see Figure 7.1), nor in the CALL access groups. Due to orthographic complexity, some copied a single kanji repetitively, some did it while using other strategies such as naming, readings and stroke order, and some drew one repetitively while associating it with its meanings. The complicated features are considered to be an attribute of kanji which “may facilitate processing by underwriting the uniqueness of a kanji configuration” (Kess et al. 1999:42), who also noted that repetitive writing is popular even among native English readers.

After getting kanji information from the KS program as discussed in the first research question, practice is carried out in a slightly different way depending upon the individual. Some tended to rely on more active and frequent interaction with the program for better activation and processing of the kanji images as follows:

I usually go through as many times as I can before. Just so I can say it. (Orie, I).

Umm, sometimes I did better just by using the computer, but sometimes I didn’t. So, I just use both now anyway. (Fusako, I)

Others concentrated on practising writing for accuracy while checking meanings and readings, sometime they used kanji flash cards as Tamie noted:
Just recognising first, just by sight, and learning what it means and how to read it. After that, umm, I just practise writing. Get a piece of scrap paper like this. [Leaving the computer on], as I’m writing it, I say that and the meaning. Also, I’ve made a little flip card for writing, and myself. You just have to do it over and over. (Tamie, I)

Some in the CALL low access group also practised repetitively so that writing kanji flowed almost automatically.

After I went through the kanji, I just wrote all over it...yeah, just found it really easier to just go over and over again. That’s how I just kind of remember things. And then, I just kind of pick up the ways of what they meant. (Akemi, I)

I’m probably a person who just practises it, like a person that would look at it and cover, and then write it and trying to remember it. I’d usually write it at least ten times or so... until it flows. (Yuka, I)

Learners with kanji backgrounds also reported having used frequency strategies very often (S) but their focus was on the kanji readings at vocabulary level, not kanji graphics due to the direct transportation from their L1s.

Once again, Bourke’s (1997) study and the present study agree that the frequency strategy is culture independent (Kess et al. 1999), and the association strategy could be method independent, although further study is necessary.

7.5.2. Other strategies used by the current study group with the CALL program

Bourke’s study focuses on the production of each kanji character, while this study focuses on the recognition/production of single kanji in isolation and single/compound kanji words (jukugo) in context using the KS tutoring program. In fact, as production is necessary to generate recognition, the participants realised the necessity of repetitive writing practice immediately after interaction with the program and utilised the frequency strategy very often as discussed above. The current focus, however, is on
whether or not this group used any other strategies besides the 12 direct and three indirect strategies included in the SILK form.

The following five additional strategies were found in this study group while interacting with the KS program:

- inferring,
- naming,
- note-taking,
- translating, and
- preparation strategies.

Inferring is to guess unknown kanji and/or kanji words and is often used, together with sequence and translation strategies. Naming is for pronunciation or saying the readings of kanji aloud while reading or writing them. Taking notes is writing down the relevant information about single kanji, compound kanji and any useful information that will help them to learn kanji. The translation strategy is to confirm the meaning of the kanji. The preparation strategy is to prepare kanji lists before/during interaction with the program. These five strategies were utilised while learning kanji using the KS program.

7.5.2.1. Inferring strategy

Inference is generally used to guess the meaning of a word in context; that is, unknown words are carefully examined for comprehension using contextual cues in top-down processing at the global level. It is also used to infer readings and/or meanings of kanji from phonetic and/or semantic radicals.
In regard to kanji learning by JFL learners, previous studies (de Courcy et al. 1993; Okita 1995) found that inferring strategies were used at the upper level, but not often at the beginning level, partially because of the definition referring only to top-down processing using global clues. However, guessing forms, readings and meanings of words in this study mainly refers to bottom-up processing using local clues such as a radical in a kanji form or a single kanji in a compound kanji word as well as the nearest sentences. Another reason why this group frequently used the inferring strategy is possibly because of the use of the CALL program. It is not surprising that different strategies are often employed due to the use of different materials (Chamot et al. 1996), even for the same activities. As explained in Chapter Four, KS offers learners the opportunity to obtain individual orthographic information in isolation to practise kanji vocabulary and to understand kanji in a story context with the assistance of sentential and lexical translations. When the participants encountered unknown words, they tried to guess their meaning by seeking any available information in the immediate vicinity. If a word consists of multiple kanji characters, a learner may look for any familiar phonetic information from a previously learnt kanji or component, or they may guess the graphemic representation through help from the translation or, they may look for a semantic radical in a whole kanji or a component.

While working with a compound kanji word 和食 /washoku/, “Japanese cuisine” in the KRQ, Yuka commented on the feedback or the correct answer:

This is where...for here it is the “wa” but that’s the Japanese reading but that’s what got me confused, because I wasn’t sure what I was supposed to be looking at. I’m guessing.
(Yuka, I)
Yuka knew the word /washoku/ orally, and /shoku/ in written form, but not /wa/ in written form. Another problem comes from the uncertain usage of *on* and *kun* readings of the first kanji. However, as she knew part of the word, her inference, using local clues, was not totally incorrect.

With the same KRQ activity, Taeko knew a different meaning for a word and said:

>This one is /tsuyo-i/ [strong] maybe? I don’t know... “Japanese car keys (?) are strong”...
No! That’s strange...I don’t know that one, but I remember that kanji. I just check the word again and then I just guess but I don’t know...If I don’t get it, I’ll hit again so that [the computer] gives me the answer. (Taeko, I)

Using the neighbouring word /tsuyo-i/ “strong” as a local clue, she translated it into her L1 first in order to infer the meaning of the word, but it did not make sense, so she made no further attempt. Here, the translation was used to confirm the meaning, although it did not lead her to a solution. This next case also shows that inference does not necessarily work. Noriko also attempted to recall a kanji in the same KRQ activity. She did not have a clear idea of what it looked like but did not skip it:

>Sometimes I have an image and sometimes I don’t, and that’s just another way to learn them. If more than one [image] comes up, sometimes the wrong one comes up clearly, you have to look at it and guess whether it fits or not and go. That’s all right, and choose from there. (Noriko, I)

Thus, the inferring strategy was used during trial-and-error practice. In effect, guessing is time-consuming and requires a lot of patience for beginners, but it is “the most important vocabulary learning technique and any time spent practicing it is well justified” (Nation 1990:130). Orie interacted the most with all activities in KS, and tried to guess meanings of unfamiliar words even in the ST activity while Noriko used vocabulary help more often because they were beyond her imagination. In fact, clicking
highlighted words to call up vocabulary balloons in a story allowed learners to follow the text without too much disruption, as it gave a quick reference during reading.

The story is all right. Sometimes I use it because there’s other words that I don’t know. I usually check them, but it doesn’t help that much. (Noriko, I)

I don’t know this word, but I just keep going. So, I can work out a general pattern. Then, I can look at the translation to make sure of it. (Orie, I)

After reading the whole story consisting of four or five paragraphs, Orie moved the mouse back and forth while scrolling through the translation (O). She attempted a more integrative way of using reasonable inference, and tried to confirm the meanings of unknown words as Huckin and Heynes (1993) pointed out that L2 learners often rely on local context clues. Using the same story component, Tamie commented about the differences between interaction with the KI and the ST for learning kanji using the inferring strategy:

Basically it’s the same as the KI, but I think the story helps you to understand what it means, but I have to guess here and there...yeah, it’s interesting, but it took a lot of time. (Tamie, I)

Generally, once learners expand their kanji knowledge, they start to infer meaning from any available information in the context. Even JFL beginner learners start to use the inferring strategy to determine the unknown information of single or compound kanji words (jukugo) in the context although it takes time at first, but is worthwhile training. The more they get involved in the context, the more they infer strategically, so that while they may get more confused, they also start deep processing (Rumelhart 1980).

7.5.2.2. Naming strategy
The second strategy that this study group used was the naming strategy, or reading the kanji aloud. It may be anticipated that the habits from learning L1, based on the phonographic system, transfer to learning of the L2 logographic system. In fact, there are “no purely logographic systems: phonographic signs are found in all traditions” (Mattingly 1992:11) as has often been discussed. Cheng’s study revealed that “reading Chinese characters requires phonological mediation” (Cheng 1992:89), based on character-sound correspondence. Further, Flores d’Arcais (1992) also found phonological information is activated before semantic activation. It is, however, still unclear if naming correlates with memory retention even for L2 learners. Naming is sometimes used to strengthen input, and sometimes for better retrieval because sub-vocal articulation assists recall (Gathercole et al. 1993).

Looking at the kanji list on the Lesson Objectives of the KS, Seiko mumbled all kanji and compound kanji before taking the quizzes:

I just try to mumble to myself every one and try to see how I pronounce them all, and the different combination, yeah...then, I looked at the English list and go, “okay” and say it mumbling to myself. (Seiko, I)

Sometimes, while the learners are using kanji cards, they read them aloud first. Then, they confirm what they said while checking the other side of the card where the correct answer is written (Michie, I).

Also, the naming strategy was often used together with other strategies, eg. naming with frequency strategies, or naming with stroke order strategies. Ken used naming while writing repeatedly, using the same method he used when he learned English as a second language ten years ago:
This case indicates the transfer of naming in L2, however, he said he usually says it aloud, while writing it, for learning something even in L1. Tamie used naming of kanji readings and meanings after watching the animated stroke order:

...get a piece of scrap paper like this. I just practise writing it in the stroke order, or try to, anyway, and umm...as I’m writing it, I say that and the meaning. (Tamie, I)

Orie mumbled mnemonics aloud, whereas Yuka and Noriko used naming strategies while writing kanji repeatedly, but she named “one, two, three, four...” paying special attention to the stroke order. In this case, they are not concentrating on the pronunciation of the number, but the writing order for a more natural flow, enhancing linear code in the verbal/sequential approach (Paivio 1971; Okita 1996). So, it is considered that naming has the power to concentrate attention on and confirm the current task, while using it together with visualisation.

7.5.2.3. Note-taking strategy

Oxford categorised taking-notes as a cognitive strategy and defined it as follows:

Writing down the main idea or specific points. This strategy can involve raw notes, or it can comprise a more systematic form of note-taking such as shopping-list format, the T-formation, the semantic map, or the standard outline form. (Oxford 1990:47).

As the KS program was used as a “tutor” complementing the regular main text and workbook, participants took notes on any relevant information about kanji knowledge as well as kanji learning strategies for enhancing retention and comprehension (Abraham &
The following actions of note-taking were found during observation of the CALL sessions.

- Most took notes about kanji forms, readings and meanings in their own notes. Some wrote everything from the KI while others chose only what they needed or could manage during the week. The former can be considered as “copying” instead of “taking notes” due to a lack of refinement of information. However, they could be “raw notes” (Oxford 1990:47).
- Some prepared their own notes prior to the session and checked them during the session, adding, deleting and correcting as necessary.
- Some added kanji compounds to help familiarise themselves with kanji words in context.
- Some put all of the stroke numbers in order, while others wrote only the first stroke. Some added a memo for irregular strokes to remind themselves.
- Some made key word memos as a memory device, eg., while watching the KI activity, one noticed an image of her own in her mind and she immediately wrote a key word.
- Some took notes about grammatical points where kanji words were included.
- Some took notes about phrases and expressions in Japanese through the English translations.

One thing to be noticed is that copying may not be the same as note-taking. However, the process of physical involvement in copying kanji characters requires cognitive processing. Obviously, this cognitive strategy closely relates to the learning material. The KS program presents various types of kanji information explicitly and implicitly as tutoring material for independent study. Attending the session, the learners take notes about whatever information is considered to be helpful for learning kanji, if they want to use it later, outside of the session. However, the content of the notes should be analysed further, as Abraham et al (1996) had reservations about notes.
Another thing to be noticed is the different focus of kanji learning. Because of the difficulty of learning multiple readings for each kanji, some put their emphasis on the ST to obtain vocabulary information, even the beginner learners. The ST presents real usage of single and compound kanji vocabulary in context. This gives learners further opportunities to take notes.

In addition, due to being an observable strategy, similar to the frequency strategy, the researcher could note the behaviour easily during observation. Amazingly, some learners tend to write a lot because they like “writing”, as Ken said. So, it may relate to individual learning styles.

7.5.2.4. Translation strategy

The translation strategy is mainly used as a common method for linking the L2 with the L1 for information processing. Also, KS itself presents translations in English as a help function both in the QZ and the ST components. Although audio-lingual methods strongly prohibit using the translation strategy, many JFL learners use it overtly in beginning classes, as Maingard (1999) reported. Ken with a kanji background, commented:

Kanji is okay, but I’ll try to translate it back into Korean and try to make sense of it through Korean. (Ken, I)

Thus, translation into his L1 is used for confirmation of his understanding. During their interaction with the QZ, Akemi and Michie commented:

I did it first as much as I could in Japanese and then at the end I’d check the English. (Akemi, I)
I check to see that I know these highlighted words. I don't actually read the sentence. I look more toward words. I know that one, I know that one...but, if I'm not sure of the meaning, then I click the translation. (Michie, I)

Since the quiz is in the context of a short sentence, they tried to solve the problem first using the inferring strategy, and checked their speculation or comprehension using the translation strategy. Similarly, with the ST component, they used the help functions at the vocabulary and whole story levels to confirm their understanding.

There're a lot of the words I didn’t know...I could just check the vocabulary with balloon. That's what I usually do to know how they’re used. (Akemi, I)

I’ve been looking at the highlights, and then I just look at the meaning and try to read it, but it’s too long. (Eiko, I)

Akemi and Eiko, “no-J” learners, explored how kanji words are used in the context of a sentence. Because of their current kanji ability, they almost immediately relied on the vocabulary balloons. However, as Tomiko, Orie and Yuka had previous experience in Japanese, they first challenged the reading comprehension using inferring strategies. As the ST presents opportunities to see and learn how kanji characters and words are used, and even katakana for loanwords and grammatical issues as well, translation takes on multiple roles in assisting participants with different backgrounds to utilise it at their own levels as follows:

The story is good, because it's got more vocab and more grammar. And if I can’t understand it then, it's speculation. If I still can’t understand what it is, I'll go down to the translation. (Tomiko, I)

If I don’t know something, I just keep going, so I can work out a general pattern. Then, I can look at the translation afterwards. (Orie, I)

I like the story, and read the whole thing, and try to get the basic idea of what the story is saying. Obviously if I don’t know the word, then I’m going to click on it [balloon], and just to see and find out what it is. Then, I understood what it was saying, but it didn’t make sense with the story sometimes. Then I check the translation. (Yuka, I)
Thus, the translation strategy is used actively for confirmation before or after processing the correct kanji information. The “no-J” learners tend to use it at an early stage while the “yes-J” learners try to infer the meanings first while delaying the use of the translation. Ken, with a kanji background, translated into his L1, Korean, in order to make sense of it. However, it is not clear if the others with kanji backgrounds re-translated from English to Chinese as there were no comments except that they often used a Chinese dictionary (O).

So far, these four additional strategies, inferring, naming, taking notes and translation, were found through this study. In fact, none of these strategies is new, even the naming strategy, which is somewhat unique, for the acquisition of a different orthographical system. They are registered in Oxford’s SILL, among others (O’Malley et al. 1990; Rubin 1987). This means that the choice of strategies depends on different instructional approaches and materials, and also the level at which the study aims; contextual, lexical or sub-lexical levels.

7.5.2.5. Preparation strategy

In addition, this study group actively prepared kanji lists before and during the CALL sessions to maximise learning both inside and outside the CALL laboratory. For example, Taeko and Tamie prepared their kanji lists while studying with the program because it was easier to start with.

Yeah, makes it a lot easier. I think it’s good. I like it much better than learning it by book. (Taeko, I)

Sometimes I tried to practise this from the workbook. Umm, but it’s just easier to do it off the KI, I feel. It’s set out like mnemonics, stroke orders, etc. (Tamie, I)
On the other hand, Seiko and Sayuri usually prepared their kanji lists on a separate sheet before the session and brought them to the computer lab:

All I do is just write it down beforehand and that's it... when I go in there [lab], I find ways to memorise it. (Seiko, I)

I practise kanji before coming to the class, and prepare to just take the sheet in and memorise it. (Sayuri, I)

Seiko organises the CALL session effectively by the minimal preparation of "just write it down" which helps her to notice the differences from what she prepared at home. Further, an important issue is "noticing" during recognition of the kanji vocabulary in the ST. Noticing does not appear directly as a memory strategy, but certainly activates learning because it leads to genuine understanding. Seiko took a kanji list prepared beforehand, as usual, and noticed the difference:

I’ll check all single kanji, and I’ll just leave a screen like that, and then look at my own list that I’ve made. And then, when I come across the one that I can’t do, I click and see that one and go straight to the stroke order to make sure how it’s done like the other week, when in the story, 市場 /ichiba/, “market” had a different pronunciation and that’s when I noticed that was different. And I was just checking, it was written in the same way as well. (Seiko, I)

Learning needs noticing (Schmidt 1995:22), and it occurs at the surface level, although conscious attention takes place at various levels and phases. More conscious exposure to kanji characters let JFL learners become more sensitive and able to notice irregularities in any element of form, sound and meaning of kanji as in Seiko’s case.

Thus, preparation takes a crucial role in metacognitive and cognitive strategies. It is difficult, however, to decide which category the preparation of a kanji list should belong to because “the distinction between metacognitive and cognitive strategies may be less precise” (O’Malley et al. 1990:145). Another is which category it should be included in,
or whether a new category should be created for it. The possible slots in the SILK are either in self-monitoring in the direct strategies, or in planning your learning or evaluating your learning in the indirect strategies. As the self-monitoring strategy is defined as focusing on “identifying errors” (Bourke 1997) in the SILK, it is probably more appropriate to deal with it in the indirect strategies. Evaluating your learning has only three statements, but it is a more integral aspect of the evaluation of learning outcomes. Consequently, planning your learning would be the most suitable slot, although it already has ten statements. In fact, Bourke hesitated to include the experience strategy in the association strategy because the association strategy already had nine sub-categories and so, an independent sub-category was defined for it. As one solution instead of creating a new category, the replacement of the following item, M9 in the planning your learning strategy with preparation of a kanji list is proposed:

M9. I set myself goals and objectives for what I wish to achieve each week.

The main reason is that “preparation of a kanji list” is more or less equivalent to “setting weekly goals” as the kanji list is for weekly activities, like this study group. Matching the data of a retrospective interview and CALL observation into a SILK category is not straightforward as, “strategy use is highly task dependent” (O’Malley et al. 1990:143).

- 7.5.3. Proposal for five additional strategies

As a result, five strategies are proposed as additions to the five categories in the SILK instrument when the learners use the KS program at the beginning level:

1) inferring strategy in the compensation strategy,
2) naming strategy in the sound strategy,
3) note-taking strategy in the frequency strategy,
4) translation strategy in the self-monitoring strategy, and
5) preparation strategy in the planning your learning strategy

Each of the five statements is as follows:

- **Inferring strategy**
  
  If I'm not sure, I'll try to guess what they are.

- **Naming strategy**
  
  I read kanji aloud while or immediately after writing them.

- **Note-taking strategy**
  
  I often take notes about kanji when I get any relevant information.

- **Translation strategy**
  
  I use translation to confirm the meaning of the word.

- **Preparation strategy**
  
  I prepare a weekly kanji list before and/or during the CALL session.

The last proposal for planning your learning will replace M9 in the same strategy because of considerable duplication.

7.6 **Summary of research question two**

After collecting data using the SILK survey instrument form, the frequency of kanji learning strategy use was examined to find the effect of a CALL program application on a group at a CALL laboratory in an independent study mode. First, the results of total use of strategies indicate that planning your learning strategies were used the most among all strategies as the “manager” of the whole kanji learning business, as other studies also found (Chamot et al. 1996; Bourke 1997). Secondly, association, physical/emotional response and story strategies related to the meanings of kanji were used most among the direct strategies, while sequence and stroke order strategies were the least used of the direct strategies. This is not a surprising result, for learning a new
language, as the former is familiar from L1 learning and transferred from the L1 whereas the latter are new.

Then, the average use of kanji learning strategies was examined by learners’ backgrounds in their L1s and L2s, and frequency of CALL interactions. More than half of this study group actively utilised the kanji learning strategies such as frequency, self-monitoring and visualisation/or compensation strategies, depending on the participants’ different language backgrounds in the L1 and L2 and different interactions with KS. The findings are summarised:

• Most strategies were utilised among the three groups with different L1 and L2 backgrounds. The frequency strategy was used most actively by all groups, while the sound strategy was used least by all, with variations; “yes-K”, “yes-J” and “no-J” respectively in order from the least used. The “no-J” utilised frequency along with visualisation and/or experience strategies, so did the “yes-J”. The mode of visualisation may be weaker in recall than experience, as meaning is not involved in visual processing, while the experience strategy may be stronger due to its association with semantic involvement. However, the simultaneous use of them makes for more effective surface and deep processing. The “yes-K” utilised compensation strategies actively, i.e., using a dictionary.

• Strategy use was also examined in relation to the interaction with CALL access, mainly focusing on the voluntary CALL high access group. This group utilised frequency, visualisation and self-monitoring. The visual impact of KS encourages the direct involvement of the visualisation strategy to “create a whole sensory picture” (Forester 2002:101), and the activities of self-testing on KS lead them to use self-monitoring habitually for effective processing. Subsidiary though, some in the CALL mid-access group utilised frequency and compensation, but the use of compensation is limited among the “yes-K” group in the CALL mid-access group.
Further, a comparison of this study group with Bourke’s group was carried out in the area of the use of direct strategies. The results revealed that both groups of beginning JFL kanji learners used association and story strategies frequently, mainly because of the familiar strategies used in learning English as the L1. The unfamiliar strategies such as stroke order and sequence strategies were used the least. Secondly, Bourke’s group leaned toward the use of association and story strategies in spite of pre-lecturing about stroke orders and radicals in kanji characters. On the contrary, this study group used all strategies rather evenly, because of the use of the KS program in which the use of strategies was indirectly included. In fact, teaching materials should include subject areas with the support of expected learning strategies, explicitly or implicitly, i.e., stroke orders or mnemonics, among others. Those strategies were examined to see whether CALL methods influenced the use of strategies, and they are summarised below.

- The frequency strategy was highly and actively utilised by both Bourke’s and the present study’s groups, disregarding L1 and L2 backgrounds and frequency of CALL access. It is “culture independent” (Kess et al. 1999:42).

- The association strategy, along with the stories strategy, may be “methods-independent” as both parties utilised association actively, but it needs further study with a larger number of learners.

- The self-monitoring and physical/emotional response strategies are more used by this study group than Bourke’s. The latter strategy is individually different and the individual’s emotion may not be influenced much by external factors like CALL use, while the former is individually trainable through CALL methods. In particular, weekly prepared kanji information with self-testing tasks is considered to enhance strategy use through interaction with a CALL program.
• The radical strategy was used moderately mainly by the “yes-K” group. It may be utilised more once kango or Sino-Japanese words are introduced at the intermediate level. Strategically, any potential strategy for kanji learning should be taught during an appropriate preparation period before the necessity occurs, and this beginner’s level is the time for that. In fact, the majority of this study group, especially the CALL high access group, acknowledged the helpfulness of the colour-codes for radicals. More explicit instruction of semantic and phonetic radicals can influence the use of the radical strategy for the next level.

• The sound and sequence strategies were least used, along with stroke order. Although a direct influence can not be found in the strategy use data, CALL has a potential influence on sound along with images since the CALL high access group demonstrated a little higher use than others, as mentioned above. The combination of sounds and visual images on KS can enhance the sensory memory. However, the sensory memory may disappear quickly because it is “effortless, [and] does not require attention” (Forester 2002:102). The sequence, radicals and stroke order strategies also have the potential to develop the use of those strategies concurrently for contextual learning.

Finally, five new strategies using the KS program were found with this study group and are proposed to be included in the SILK test instrument; inferring, naming, taking notes, translation and preparation strategies. They were included in the original SILL inventory by Oxford (1990) from which the SILK was developed for learning kanji. As some studies (Oxford 1996; Chamot et al. 1996) confirm, different strategies are used by different levels of learners, even for the same task, like kanji acquisition in these studies due to different materials or methods.
7.7 Discussion

Findings from the utilisation of kanji learning strategies using KS in comparison with a conventional approach by Bourke (1997), suggest the following three issues should be considered further in relation to the skill learning model:

- The frequency, association and stories strategies in relation to meaningful processing at the surface and deep levels
- The inferring strategy for developing a PRODEC progression
- Importance of the planning your learning and the self-monitoring strategies

7.7.1 Frequency, association and stories strategies in relation to meaningful processing at the surface and deep levels

The results of Bourke’s and the current studies revealed that the frequency strategy is inescapable for developing accurate kanji performance both at the recognition and production levels, simply because people forget so much of what they have learned. As discussed in the first research question, practice by repetitive writing is an efficient procedure for acquiring a complex skill in order to perform it automatically (Anderson 1995; Johnson 1996). A survey of the kanji teaching strategy (Shimizu & Green 2002) reveals the rote learning strategy as the most popular strategy for teaching. This could be interpreted that learning kanji characters is not just a mechanical duplication of orthography, but its repeated behaviour fosters accurate and speedy perception of pieces at the sub-lexical level to larger chunks as patterns at lexical level, utilising the combination of relevant strategies, concurrently, or consecutively, with frequency strategy to achieve automatisation. Practice was often discussed in relation to rote memorisation or mimic-memorisation in the sense of whether or not it was meaningful.
Basically, practice with attention is for better recall in shifting from the cognitive to the associative, to the autonomous stage (Anderson 1983) in skill development. Whereas rote-memory is for recall through mechanical drills, which induce only "shallow processing, leading to relatively poor memory performance later" (Jacoby & Dallas 1981, cited in Ashcraft 1994:354), so the quality and quantity of repetition greatly influences encoding, retention and retrieval from memory\textsuperscript{104}, as Anderson states: "[a]s memory traces become stronger, they can receive more activation and so can be more rapidly retrieved" (Anderson 1995:188).

In comparison with the frequency strategy, the association and stories strategies, highly used by both groups but much more by Bourke's group, are more related to semantic processing in the SILK test instrument. Depending on the depth of the information processing (Craik & Lockhart 1972), the memory system processes information superficially or elaborately. Practice accompanying semantic processing leads to deeper processing "by drawing relationships between already-known information and the item currently being processed" (Ashcraft 1994:215) as in the schema theory. Memory devices like mnemonics and stories using associations with kanji forms, sounds and meanings are for the processes that involve storing and retrieving new linguistic information.

This implies that Bourke's group tended to show a preference for more familiar strategies used in L1 learning such as association and stories strategies predominantly, while this study group tended to use strategies more evenly, involving the three

\textsuperscript{104} Memory is defined as "acquisition, retention and retrieval of information" (Melton 1963).
representations of kanji characters, sound, meaning and shape. The differences between strategies used may be explained by the two instructional methods: a small group of six sharing familiar strategies transferred from their L1 on the one hand, and a mixed approach with learners' familiar strategies in L1 and new strategies presented in the KS program, explicitly and implicitly, on the other. As a consequence, it is understandable that both used the association strategy most for learning kanji in a new language environment. In fact, the present study group used the association and stories strategies approximately half as often as Bourke's group. Instead, other different types of strategies including more language specific ones were used diversely by this study group. As discussed in Chapter Six, despite the low frequency of access with the KS program in general, a wide range of strategies was used. This indicates the influence of the instruction of the KS program, even for some of the CALL low and mid-users. In other words, some strategies are used directly during the interaction, but some are used anywhere, inside and outside of the CALL laboratory, once learners noticed and acknowledged the value of learning devices presented in the KS program. The stories strategy is a good example. During the preparation period, many participants tried to listen to the acoustic mnemonics in KS. However, they gradually discovered how to make their own mnemonics and realised that their mnemonics made it easier to memorise than did those of the program. If they could not make their own, however, they knew that the ready-made mnemonics were available, especially for unskilled learners. As a result, the frequency of access to the mnemonics in the KI decreased dramatically during the study period\textsuperscript{105}, but this does not mean that they stopped using the stories strategy. Instead, they continuously used it, together with other strategies to

\textsuperscript{105} During observation of the CALL sessions, the researcher recommended creating their own mnemonics if the ready-made examples in KS did not match their feelings. So, the sound of the mnemonics gradually disappeared from the CALL lab during the study period.
enhance learning kanji characters. This suggests that the KS program affects the choice of patterns of strategies different from Bourke’s group.

7.7.2 Inferring strategy for developing a PRODEC progression

Oxford assigned inferring to compensation strategies (see section 3.3.1) as it seeks to fill in the gaps by guessing based on information around the unknown character, and found that it is used often together with memory strategies by competent learners (Oxford 1996:xi). As proposed in the previous section, this study group utilised guessing during working with the ST and QZ components, and even the VA in the KI component. According to the interactive model “interactive refers to the interaction between information obtained by means of bottom-up decoding and information provided by means of top-down analysis” (author’s italics, Eskey 1988:90). He emphasises that L2 learners need much help in bottom-up processing due to being less fluent than L1 learners. Although this model refers mainly to reading comprehension, it is easily applied to kanji word acquisition because bottom-up processing includes lexical analysis. Importantly, both top-down and bottom-up processing occurs at all levels simultaneously for contextual learning as Nara (2003) also points out, and the inferring strategy is used whenever gaps for the unknown words must be filled in. In fact, the inferring strategy is essential to selecting and evaluating existing and new information for proceduralisation (Johnson 1996).

As discussed in Chapter Six, the introduction of PRODEC processing replaces the DECPRO series for the “yes-K” and some of the “yes-J” and “no-J” learners. DEClarative knowledge takes time for proceduralisation while interacting with the ST
and QZ components which offer the situation of semi-authentic written communication, as “the learners first internalise language in a procedural form” (Johnson 1996:131). In fact, the declarative dimension can be learned in the procedural aspects of vocabulary knowledge (Robinson 1993), as long as the inferring strategy is used properly to fill in the unknown words. It would be, however, more logical to follow DECPRO processing for the “no-J” and some “yes-J” with no or little experiences to let them obtain a declarative data base first, because “language is hierarchically organised” (Johnson 1996:38-39) although SLA is not necessarily linear. Importantly however, DEC in DECPRO processing can be shortened to lead learners to PRO for meaningful proceduralisation even if they go back to DEC again, because DECPRODEC processing occurs frequently among beginners. Because of this, PRODEC processing is applicable even to the “no-J” group as long as PROCedural processing is immediately compensated for by DEClaorative processing as in PRODEC or DECPRODEC before they collapse or give up. So, the timing is very important in determining whether learners survive by utilising the inferring strategy or learners like the “no-J” group need rescue. The balloons in the ST take a considerable role in assisting them to start deep processing, so does the translation in the QZ and ST components during interaction with KS. The learners can make decisions about whether to click or not before they crash, as it is available anytime.

7.7.3 Importance of the planning your learning and the self monitoring strategies

The final issue from the findings of this study group indicates the importance of the metacognitive strategy in managing kanji learning as supported by other studies (O’Malley et al. 1990; Takahashi 1993; Maingard 1999). The planning your learning
strategy in the short-term and long-term relates to one’s extrinsic motivation to pass the course, especially for full time university students seeking degrees, as with this study group. “[M]otivation itself does not correlate with learning” (Forester 2002:104), but it indirectly assists in attention and effortful processing. For example, the “no-J” group may enrol in Japanese language without knowing very well that kanji learning requires a strong commitment to achieve their goals at the end of one-year of study, as the survey result implies. One of the most important requirements for mastering kanji is repetitive practice over time through regularity, recency and frequency (N.Ellis 1994) to reach automatisation (Anderson 1983; Johnson 1996).

As pointed out in Chapter One, Japanese is grouped in category 4 language, or one of the most difficult languages for native English speakers in the US (Jorden et al. 1991), and it is exactly the same in the Australian environment. Learning massive amounts of a non-cognate writing system like kanji requires sophisticated management skills in setting goals, besides the memory and cognitive strategies. Learners without metacognitive approaches are essentially “learners without direction” (O’Malley et al. 1990:8) for planning, monitoring and reviewing their own progress and achievement. Beginner JFL learners need to practise good management skills to organise and administer the whole process of learning in order to achieve the long-term goal, regardless of their kanji background and/or learning experience in L1 and L2, especially if they aim to master the Jōyō kanji by their graduation. For this purpose, CALL methods could take a sound role in educating beginner JFL learners to become better organisers.
In the first research question, interaction with KS was examined in terms of the quantity and quality of interactions with three different components in the program, designed using the "PPP" or presentation, practice and production, sequential learning model (Johnson 1996). Then, the kanji learning strategies used while interacting with KS were explored in the second research question. The findings are that interactions depend mainly on the learners' L1 and L2 language backgrounds; the "no-J" interacted mainly with the KI, the "yes-J" with the KI and ST more elaborately than the "no-J", and the "yes-K" with the ST due to their different current level. This supports the multiple paths for the PRODEC progression (Johnson 1996). It also implies that the CALL program's memorable form of input encourages interaction for processing information, e.g., the explicit information in the KI and the textual modifications in the ST. Further, in comparison with Bourke's (1997) group using a conventional approach this study group utilised greater varieties of strategies without leaning toward specific strategies. It implies that the CALL program assists not only in the content area but, indirectly, in sustaining strategies for learning kanji in and without context.

In this chapter, the performance outcomes are examined to determine skill development in relation to interaction with KS and the use of kanji learning strategies.

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106 Bourke's strategy study did not focus on interaction with computers.
8.1 Research question three: Outcomes in relation to interactions with KS and kanji learning strategies

In this section, the affective domain of interaction with KS is examined in relation to interaction and strategy use prior to the analysis of the learners' performance outcomes, as it may intensely affect the learners' outcomes and strategy use as well. Then, the performance outcomes for mastering kanji characters at the recognition and production levels is examined in relation to the CALL interactions and individual use of kanji learning strategies under the following research question:

*What are the effects of using the KS program on outcomes in promoting kanji learning?*

8.2 Affective domain of interaction with KS

So far, the physical interactions were mainly examined in relation to previous learning experiences in the L1 and the L2, except for “helpfulness” as one of the affective variables of the interaction. Further, other possible variables affecting the interactions will be investigated in the framework of a judgemental evaluation, focusing more on the affective domain. The purpose is to complement the physical interaction in research question one and the affective strategies, treated little in the SILK Test Instrument in research question two.

8.2.1 Criteria for judgmental evaluation of the affective domain
Three of Chapelle’s criteria (2001:55-56) were selected to evaluate the affective domain of kanji learning using CALL; language learning potential, learner fit, and positive impact, as discussed in Chapter Five.

First, the questionnaire about the participants’ attitudes toward the use of the KS program for learning kanji (Figure 5.3 in Chapter Five) was administered. The participants self-reported their attitudes towards KS and CALL methods using a five Likert scale ranging from “strongly agree” for 5 to “strongly disagree” for 1. The results were summarised into three criteria and six categories, and the figures in the right column in Table 8.1 below show the average scores for each category.

Table 8.1. Affective Domain of Interaction with KS

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Categories</th>
<th>Average (out of 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language learning potential</td>
<td>Helpfulness</td>
<td>3.8</td>
</tr>
<tr>
<td></td>
<td>Confidence</td>
<td>3.2</td>
</tr>
<tr>
<td>Learner fit</td>
<td>Level</td>
<td>4.1</td>
</tr>
<tr>
<td></td>
<td>Anxiety</td>
<td>2.2</td>
</tr>
<tr>
<td>Positive impact</td>
<td>Interest</td>
<td>3.7</td>
</tr>
<tr>
<td></td>
<td>Independence</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td>Preference</td>
<td>3.2</td>
</tr>
</tbody>
</table>

First of all, “helpfulness” was already observed in Chapter Six in relation to the frequency of interaction with the program (see section 6.3.1), and the learners felt that CALL is helpful (3.8 out of 5) as a faster, informative and not difficult aid to learning. However, they are undecided about confidence (3.2) with regard to being able to read a newspaper within three or four years, thinking about the 1,945 Jōyō kanji graphics plus the on- and kun- readings which are the equivalent of over 4,000 readings. In spite of the difficulty with the SQ and KRQ activities, however, they thought the level of the program appropriate for learning kanji, 4.1 out of 5, seemingly by admitting that
learning kanji is difficult. Further, anxieties such as fear and frustration was low (2.2), because of the simple design and usefulness of the program, the friendly atmosphere at the laboratory and, teacher support. However, they felt uncertain about independent study (3.4) through the experience of learning kanji using KS at the laboratory as a self-study mode for almost one year. Possibly they just wanted to obtain basic training before learning independently, due to the nature of kanji and kanji vocabulary. Further, they acknowledged the attributes of CALL in terms of interest (3.7). Also, they expressed a moderate preference (3.2) for using CALL for learning kanji, with the condition of concurrent use of other resources such as a workbook. So, in general, KS is considered as a rather mid-high “smile coefficient” (MacWhinney 1995:322) which means students like it, but not strongly.

Compared with other studies of JFL, Inoue (1998, see also section 3.4.3.5) reports a highly positive attitude toward a CALL kanji program, 3.57 out of 4 scales (equivalent to 4.46 out of 5) by first, second and third year university students during the first semester. This high figure could have been caused by the participants’ kanji levels and the novelty effect. On the contrary, Maingard’s (1999) study using a multimedia program for speaking and listening comprehension tasks for beginner students reports that overall attitudes toward CALL were high (3.95), but diminished to 2.84 by the end of the semester. Up to a point, this tendency was found in this study too, but it can be interpreted that learners know more about how to utilise CALL content and kanji learning strategies for their own learning by the end. On the other hand, beginner

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McCarthy (2001) summarises that the students’ positive perspective comes from “teacher commitment” among other things, not just the design using modern technology.
students of ESL using a multimedia listening comprehension program showed a positive attitude (3.14 for overall and 3.92 for CALL general attitudes, Hsu 1994). Those results show different attitudes depending on the type of tasks and, of course, the content of the program.

8.2.2 Comparison of attitudinal differences by the three groups

Due to an uneven number of items in each of the seven categories (see Appendix D), the average of the attitudes is calculated for the three different groups in Table 8.2 below, instead of the absolute number in each category. The data is easily comparable with other factors horizontally. Further, the negative statements were reverse-coded for the analysis\textsuperscript{108}. As a result, “anxiety” is interpreted as “anxiety free” for an easier comparison.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Language learning potential</th>
<th>Learner fit</th>
<th>Positive impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Helpfulness</td>
<td>Confidence</td>
<td>Level</td>
</tr>
<tr>
<td>No-J</td>
<td>3.5</td>
<td>3</td>
<td>3.5</td>
</tr>
<tr>
<td>Yes-J</td>
<td>4.0</td>
<td>3.4</td>
<td>4.5</td>
</tr>
<tr>
<td>Yes-K</td>
<td>3.4</td>
<td>3.3</td>
<td>4.3</td>
</tr>
<tr>
<td>Overall</td>
<td>3.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The learners’ overall attitude towards KS for learning kanji is 3.6, positive, but not strongly so. None of the learners have ever utilised CALL before for learning JFL,

\textsuperscript{108} As there are mixed conceptions of positive and negative in the same category, negative statements are reverse-coded to be interpreted positively. For example, boring in “interest” is reverse-coded, and anxiety is read “anxiety free” once it is reverse-coded.
especially for kanji characters (I). Two notable points are found; the “no-J” group evaluate the level as not highly suitable although the other groups indicate it is fairly suitable. This means that some in the “no-J” evaluated the level as difficult, but somehow manageable, but occasionally it was difficult as a tool for the “independent” study of kanji characters. At the end, the “no-J” group supported independent, self-paced study the most, probably because of the mixed kanji background class. Secondly, the “yes-J” group expressed positive feelings of “helpfulness” and “interest” about CALL, together with low anxiety. However, the “yes-K” group has a less positive attitude towards this method than the “no-J” group. It is most likely the “yes-K” group has fewer “kanji myths” (Kaiser 1994:63) toward learning kanji which leads them to a comparatively lower evaluation in the affective domain. In fact, the real figures might be lower than this because of cultural differences among Asian learners who hesitate to express their negative attitudes toward a “teacher”, as the researcher also had the role of teacher (see also Ballard 1987; Kato 2000). Further examination was conducted individually among the three groups in the next section.

8.2.2.1 The “No-J” group

Six learners in the “no-J” group reported their attitude towards KS for learning kanji at the introductory level. The results are summarised in Table 8.3 below.

There are two salient differences between the CALL high to mid access groups and the low access group. The upper three have more positive attitudes towards KS and CALL methods, 3.6 to 3.9 on average.
Table 8.3. Attitudes toward KS by the “No-J” group

<table>
<thead>
<tr>
<th>Learners (CALL access*)</th>
<th>Language learning potential</th>
<th>Learner fit</th>
<th>Positive impact</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H**</td>
<td>C**</td>
<td>L**</td>
<td>A**</td>
</tr>
<tr>
<td>Noriko (h)</td>
<td>3.8</td>
<td>4</td>
<td>4</td>
<td>4.5</td>
</tr>
<tr>
<td>Fusako (h)</td>
<td>3.5</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Tamie (m)</td>
<td>4.3</td>
<td>4</td>
<td>4</td>
<td>3.5</td>
</tr>
<tr>
<td>Eiko (1)</td>
<td>3.3</td>
<td>2</td>
<td>4</td>
<td>3.5</td>
</tr>
<tr>
<td>Akemi (1)</td>
<td>3.5</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Miek (l)</td>
<td>2.8</td>
<td>1</td>
<td>3</td>
<td>3.5</td>
</tr>
</tbody>
</table>

* CALL access is marked by (h) for high, (m) for mid and (l) for low access to CALL KS.
** H= helpfulness, C= confidence, L= level, A= anxiety free, Int.= interest, I= independence, and P= preference.

Noriko and Fusako, the voluntary CALL high access group, indicate that KS is helpful and interesting for learning kanji using CALL which is their preferred way because of little fear or frustration. However, the difficulty of the level gives Fusako less confidence about mastering kanji for reading a newspaper within a few years. She felt learning kanji is a cycle of climbing up and down the kanji pile describing it as “just up and down. Up and right down! "(I), although she acknowledged positively the area of self-paced independent study.

Tamie and Noriko have much more confidence because the level of the program is perceived as pleasing (4).

It’s usually an okay-load…about ten kanji every week or so is good. (Tamie, I).

We’ve got to write it down, listen to it, and then look at it and write it down again from the story here. So, it’s like learning it twice; learning it in class and personally on computer. Because you use it in a different context, and that helps you to remember it. And it gives you combinations and tests you. (Noriko, I)

The other three, Akemi, Mieko and Eiko, are not keen about KS and CALL methods because they do not like to use the computer for learning kanji. This is especially true of Akemi (1.7) who has a strong negative attitude.
With regard to “confidence” directly or indirectly, the allocation of 12 weekly kanji per lesson was proposed for this study. However, it was still too demanding for some learners because of the cumulative numbers of kanji, especially when they were moving toward the end of the study period. Their reactions vary:

The number is too many, and it’s not manageable for me. (Mieko, I)

Maybe, yeah, I can…but I have to remember it again. I think kanji is not really difficult because it’s straightforward...like it's very direct. (Akemi, I)

Akemi feels that somehow she can conquer kanji within a few years by repetitive practice. On the other hand, Mieko expresses no confidence. Eiko is slightly different from them; she tried to access the computer more than Akemi and Mieko. In particular, she discovered the merits of CALL for independent study as she missed the regular classes too many times during the study period, as she acknowledged. Possibly her considerable absences affected her attitude toward learning Japanese as a whole, and explains her problem:

I feel that I’ve been left out more and more because I didn’t turn up to class. So, everything is getting hard... I don’t know, but I just try to memorise everything, but I can’t. So, I feel it’s not helpful...But, sometimes, I feel it’s helpful when I didn’t turn up to the class because computer force me to learn. That’s what I think. (Eiko, I)

When learners are mentally behind, like Eiko, they feel that the computer “forces” them using some “power”. This means that Eiko is fighting in her mind by pushing herself in KS to obtain kanji information, because of the value of the helpfulness on one hand, while she tries to escape from laborious study on the other. Generally speaking, if learners feel the program is helpful, independent learning using CALL promotes self-regulated, self-paced learning (Zimmerman 1994). Whereas, if CALL is not perceived as helpful, learners shorten their interaction time to minimise use and their interactions decrease.
Further observation of attitudes was conducted in relation to CALL interaction. Figure 8.1 below shows the relationship between attitudes toward KS and the frequency of interaction with the program by the “no-J” group. Prior to the comparison of these variables, the frequency of CALL access by all learners was converted to scales between 0 and 5. The vertical axis indicates the degree for attitudes and the frequency of access to KS individually.

![Figure 8.1. CALL Attitudes and Interaction by the "No-J" group](image)

A visual inspection indicates that the frequency of interactions among the “no-J” learners spreads from high to low, and that “preference” is the closest curve among the attitudes in relation to interaction, except in Fusako’s case. “Interest” and “helpfulness” roughly follow “preference”.

Noriko and Tamie showed positive attitudes toward CALL and had a good number of interactions. Noriko’s interest revealed an enjoyment of “window shopping” although
she encountered intense frustration due to the difficulty of memorisation, as she complained often saying, “I can’t remember...” (I). On the contrary, Tamie began to show her processing skills in “independent” and flexible study by putting the kanji into context immediately after obtaining the meanings of the unknown kanji vocabulary, which improved her memorisation. In fact, this is a remarkable step for processing, as discussed in Chapter Six.

Fusako’s high frequency of interaction was sustained mainly by “preference”, “interest” and “helpfulness”, as well as “independence” for self-study as she interacted with KS through voluntarily high access. However, she thought the level of the program was difficult, in particular, the QZ and the ST components. Consequently, her high frequency of access is considered to be more related to the availability of self study using CALL methods. Through exposure to L2 scripts at the end of the preparation period, she gained confidence in learning kanji at her own pace (O). However, she did not study for three weeks during the mid-semester break in the study period, and the continuous, weekly unknown kanji increased her fear and frustration. During the cognitive stage, it takes time to develop processing skills and declarative knowledge and, it is easy to regress if learners reduce practising, especially in a self study mode.

“Independent” study by interacting with KS, especially after Eiko missed CALL sessions, were helpful for her to catch up, as she indicated previously. Akemi and Mieko indicated a lack of “preference” for the program, reflected in their low number of interactions, although they were quite positive about “interest”, “helpfulness”, and “independence”. This means that, while they do not like using computers as a main tool, some of the activities were helpful, e.g. stroke order was “definitely” helpful for Akemi,
and coloured components helped Mieko sometimes at the early stage to distinguish radicals, and to link colour and meanings.

8.2.2.2. The “Yes-J” group

The scores of attitudes toward KS by the “yes-J” group are illustrated below.

Table 8.4. Attitudes toward KS by the “Yes-J” group

<table>
<thead>
<tr>
<th>Learners (CALL access*)</th>
<th>Language learning potential</th>
<th>Learner fit</th>
<th>Positive impact</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H**</td>
<td>C**</td>
<td>L**</td>
<td>A**</td>
</tr>
<tr>
<td>Orie (h)</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Tomiko (m)</td>
<td>4.8</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Seiko (m)</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>4.5</td>
</tr>
<tr>
<td>Taeko (h)</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Michie (m)</td>
<td>3.8</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Yuka (l)</td>
<td>4.5</td>
<td>4</td>
<td>5</td>
<td>2.5</td>
</tr>
<tr>
<td>Reiko (l)</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Hajime (l)</td>
<td>2.5</td>
<td>1</td>
<td>4</td>
<td>3.5</td>
</tr>
</tbody>
</table>

* CALL access is marked by (h) for high, (m) for mid and (l) for low access to KS.
**H= helpfulness, C= confidence, L= level, A= anxiety free, Int.= interest, I= independence, and P= preference.

The majority of the “yes-J” group indicate positive attitudes, although Hajime shows a negative attitude (2.4) as he indicated in the interview. Reiko also revealed a non-preference (2.3) for CALL methods and a dislike for independent study (2.5).

Orie, Tomiko, and Taeko among the active CALL users, and even Yuka (low access learner) expressed quite positive attitudes as follows:

I like to study with computer. I don’t think I’d be getting as good marks without it. It’s like having a practical. You need practical lessons to understand it, as well as having the theory... I think it [the level] is good. It’s not easy, no way at all! I did honestly learn a lot, actually that’s really good. (Orie, I)
I just find it helpful to learn them and much more interesting than with "pen and paper". (Taeko, I)

I actually think the computer has been really good. (Yuka, I)

Some activities are good, but some are difficult. But practically I don’t think it’s difficult. (Tomiko, I)

Moreover, using this CALL method is their first experience, but they found it to be their preferred method for learning kanji. Further they comment about “confidence” of mastering kanji:

I plan to make it by the end of the course in my third year. (Orie, I)

I thought we should know 3000 to 5000. But, [in case of 1000] that doesn’t sound like a lot. Actually that sounds all right. (Yuka, I)

If I keep practising at kanji, and if I keep motivated, I’m sure I could...then, maybe, I can make it. I’d like to try. (Taeko, I)

Seiko talked with much stronger confidence in the interview, although she self-rated as “3” due to being a “bit away” from her first goal of the 1,006 Kyôiku Kanji:

Nothing is difficult to do with kanji...It’s good once you’ve found out how to deal with kanji. It makes you feel better if you can do more complicated ones. So, I suppose if you keep at it, you could eventually get there, but it does seem a little bit away. But not impossible!! (Seiko, I)

Further, their positive feelings come from their interest in learning kanji using the program because they feel that the program is helpful and is available for self-paced independent study as follows:

I don’t think I’d’ve learned as much without computer. Like all we’ve got to do without it, it would be very hard. I mean it’s hard enough with it. So, I think without it I couldn’t do it. (Tomiko, I)

I feel that I learned kanji more, definitely. I think it [KS] helps, because they stick a lot better than they used to... This is a fun way of doing kanji. Also, it makes learning a lot easier. So, I like it much better than learning it by book. (Taeko, I)
It’s almost like a bit of a fun time. Also, so much doing it, you are probably not learning just the kanji, but also the vocabulary, sentence structure and things like that. So, it’s pretty good. (Yuka, I)\textsuperscript{109}

It’s really good practice for exam time. Especially when you click on this [balloon], the colour coordinating notes were really good. You just remember it…it’s really helpful. (Orie, I)

This is similar to the report of a Spanish CALL program used at the University of Colorado (Lozano, Dublinski, Halwes, Kite & Ludwig 1985). The more positive are the attitudes toward CALL activities, the more people are exposed to CALL practices. In particular, as other studies also found (Blomeyer 1985; Hussin 1994), some learners as below show more personable attitudes towards CALL programs developed by their own teacher, sharing some sort of positive ownership.

Listening to your voice...that was really easy to remember [kanji]. (Orie, I)

Did you write it yourself, didn’t you? I think it’s excellent program, yeah. It’s very good...so, I should study more. (Tomiko, I)

Seiko, however, expressed some reservations about frequency of the CALL access saying that KS was helpful, but she did not spend too long a time on CALL in order to “have a balance” and to utilise the other available resouces like the textbook and workbook.

On the contrary, Hajime’s negative attitude is clarified partially because of some degree of anxiety, frustration and dislike emanating from various factors caused by a “dehumanising machine” (Hubbard 1996:21), including technical failures such as system crashes and problems with the JWP.

\textsuperscript{109} Yuka in the CALL low access group participated frequently during the latter half of the study period.
Apparently, learners’ affective attitudes toward CALL relate to the interactions. Figure 8.2 below indicates the CALL attitudes and interactions of the “yes-J” group.

Figure 8.2. CALL attitudes and Interaction by the “Yes-J” Group

As with the group of the “no-J” learners, “level” is independent from interaction, but “preference” is somewhat related among the attitudes and the individual’s frequency of interactions. Although it is not entirely conclusive from the various attitudes shown in Figure 8.2, it can be said that the more they liked the program, the more they interacted with KS. Taeko, Orie, Seiko, Tomiko, Michie and Yuka interacted actively, in particular, Taeko, and Orie accessed the program during other times rather than only the scheduled times (see 6.2), believing definitely that the more exposure, the better and faster would be their retention and retrieval in terms of kanji learning. Through repetitive interaction, Tomiko found a better way for herself to expand her kanji vocabulary with the ST.
As mentioned above, possibly because of independent self-study, Seiko demonstrated her analytical ability in processing kanji information at the recognition level:

I’ll just look at all the things of kanji and make sure I recognise all of them. If I don’t, then I’ll just look all over whether it’s complicated or not, and this one’s not on the sides. Because of that, it’s easy to write and get it looking okay, it’s easy to get the balance, since the strokes you can just measure it out and how you put it out. (Seiko, I)

Seiko starts to process the kanji image by cautiously noticing and integrating any available information, being careful not to miss any pieces for accurate memorisation. This process requires that individuals be sensitive to the graphic features of similar or different kanji, simple or complicated, in order to discriminate one from another as noted in Cheng’s (1981) study with L1 Chinese learners. This is what Koda (2002) calls Intraword Awareness (IA, see section 3.1.3).

Further, Michie and Yuka also utilised the program in their own way, focusing on the “meaning” rather than the “form” of the kanji characters and kanji words while working with the ST. This suggests that at least the appropriate resources necessary for advancing processing skills from the lexical and sub-lexical levels to the contextual level should be given from the beginner’s level, as individual processing levels vary. Therefore, a CALL program can incorporate different individual levels despite the varying skill levels of individual learners for independent study.

Hajime and Reiko did not like KS and CALL methods at all, but for different reasons. Reiko indicated positive attitudes except for “preference” which she could not explain. A possible reason is that she has confidence that she will be able to read a Japanese newspaper by graduation, as she already had five years learning experience. Hajime did
not like the program either, but prefers to practise writing, repetitively, by hand. Also, he likes radicals, but disregarded the colour distinctions displayed in the KI. While living in Japan, he found this method was suitable for him together with the kanji cards that he made, mainly because the cards are easy and handy. After testing CALL methods for a while, he became strongly convinced of the value of his own learning style as he could control his learning, instead of feeling controlled by the computer (O). This may relate to his personality.

8.2.2.3. The “Yes-K” group

The results of attitudes toward KS by the “yes-K” group are shown below. The “yes-K” group display attitudes from moderate to negative. Their genuine interest in kanji is totally different from the other groups, particularly the “no-J” group. They already have ample knowledge and processing skills for the task although they need to fill in the gaps between their L1s and L2 in Japanese. Frankly speaking, they consider the CALL method a non-preferred approach, and also not suitable for independent study.

Table 8.5. Attitudes toward KS by the “Yes-K” Group

<table>
<thead>
<tr>
<th>Learners (CALL access*)</th>
<th>Language learning potential</th>
<th>Learner fit</th>
<th>Positive impact</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H**</td>
<td>C**</td>
<td>L**</td>
<td>A**</td>
</tr>
<tr>
<td>Sayuri (m)</td>
<td>3.5</td>
<td>4</td>
<td>5</td>
<td>3.5</td>
</tr>
<tr>
<td>Mari (m)</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Ken (m)</td>
<td>2.8</td>
<td>3</td>
<td>4</td>
<td>3.5</td>
</tr>
</tbody>
</table>

* All three belong CALL mid-access group.
**H= helpfulness, C= confidence, L= level, A= anxiety free, Int.= interest, I= Independence, and P= preference.
All three graded the level of the program as appropriate. During the interview, Ken expressed his views about CALL:

I go through each kanji with the workbook before the computer class. So, it was quite easy for me. I feel it's much easier and more comfortable working with the workbook. (Ken, I)

In fact, Ken mentioned that the “waiting time” for starting the system and even going to the CALL laboratory was time wasted. Instead, he found the familiar “pen and book” method a more suitable one for him. Also, above all, learners are not generally keen to explore other possible approaches if they feel that they know most of what they need for the course. Mari and Sayuri comment differently from Ken although Mari’s attitude is similar to Ken’s.

I learnt kanji before by handwriting. I feel my handwriting is much better than using computer. (Mari, I)

I’ve learned many kanji before, but I can still make sure of it if it’s not clear. So, it was helpful even for me. (Sayuri, I)

Mari self-rated “4” to be helpful, but she commented in the interview, “for me, the computer doesn’t help” (I), as she does not like computers. It sounds as though some of the activities like ST/SQ are not easy but, she comments, “it’s okay, sometimes a bit hard but the other time I can understand” (I). Apparently, her learning style is more suited to a traditional approach, not to CALL methods. The majority of Asian learners are used to learning kanji by traditional hand-writing and rote memory (Ballard 1987), that will be the most comfortable way for them. On the other hand, Sayuri is slightly more adaptable to the new method, but not particularly so (see Table 8.5).
The results of attitudes toward KS and the interactions by the “yes-K” group show (see Figure 8.4 below) that their attitudes associate with interaction, except for the “level” of the program.

![Figure 8.3. CALL attitudes and Interactions by the “Yes-K” Group](image)

Similar to the other groups, “preference” among CALL attitudes relates, mostly, to the frequency of interaction, although the “yes-K” respond in a negative manner. Ken prefers studying with a workbook, as that was how he learned kanji in his L1, and he believes that is better for him. There were some unknown kanji vocabulary with different kanji combinations in the program, but it appears that he did not attempt anything much above his level as he rarely interacted with the SQ after interacting with the ST. It could be said that he is satisfied with his competence as far as kanji learning is concerned. Although he reported the “level” as appropriate, he mentioned during the interview that it was okay for this introductory course, but “easy” for him. He was not
deeply involved in reading comprehension activities, especially moving toward the end of the semester.

Sayuri revealed more positive attitudes while Mari hesitated to self-report saying "uncertain". During the interview, Mari commented hesitantly that she did not like the computer for learning kanji, especially for “Chinese who know kanji”. There were not many interactions with the SQ which are considered to be less difficult for those with kanji backgrounds. However, Mari said that comprehension of the ST and SQ was difficult because of the mixture of unfamiliar structures and kanji vocabulary. Her aim was to obtain kanji vocabulary, and not much more at this stage.

In summary, the affective attitude toward KS was overall “okay” (3.6); the program is at a suitable level (4.1), helpful (3.8) and anxiety free (3.8), however, all users have neither an apparent preference (3.2) for KS nor strong confidence (3.2) to be able to master kanji by graduation at this stage. Clear differences are found among the groups; the “no-J” acknowledge “learner fit” in an anxiety-free learning situation and a positive impact of interest in the program. Further, they support independent study using CALL methods, possibly admitting freedom from pressure from the other groups with kanji learning experience in their L1 or L2. The “yes-J” group indicates the most positive attitudes in most areas, in particular, “language learning potential” and “learner fit” were highly rated. In contrast, the “yes-K” group was least supportive of KS, especially having little confidence in spite of their L1 backgrounds, perhaps a cultural trait to avoid showing off their confidence. In addition, negative attitudes in “positive impact” indicated resistance to using CALL and reversion to traditional face-to-face methods.
8.3 Empirical evaluation of outcomes, interactions and kanji learning strategies

In this section, performance outcomes are examined in the recognition and production tests of kanji the students had been learning for eight months. A total of 174 kanji were introduced in the seven chapters of *Yookoso!, volume 1*, the main text. Each chapter has approximately 25 new kanji characters. The selection of these kanji is based on topics from the oral activities in the text (see section 4.2). The relevant vocabulary for each topic in the lessons is supposed to be utilised in spoken communication activities before the kanji vocabulary is introduced at the CALL session. As a result, the complexity of kanji characters is not the primary issue for the selection of kanji characters and their presentation order in KS (see section 4.2). The kanji characters selected for the recognition and production tests are mixed in terms of density, complexity and familiarity for L2 learners.

Recognition and production represent different stages of processing information. Recognition is for tracing the kanji image while production is more demanding, requiring generating parts of the trace (Anderson 1983; Ke 1996). Thus, recognition always precedes recall for production, but depending on the type of recall test, the trace is not always presented except in context, as in this study. KS focuses directly on developing recognition skills, although the stages of semantic and phonetic assimilation with graphic representations of kanji may vary among JFL learners (Koda 1989, 1996). There is no question that repetitive production practice is expected to immediately follow recognition.
8.3.1 Results of kanji recognition tests

The recognition tests (Appendix E) were held in April, July and October, using the same content in order to obtain individual information about kanji competence at the recognition level as explained in Chapter Five. A total of 129 kanji characters or 100 kanji words are presented in 30 short sentences/phrases to avoid the homophone problem, and also to let learners use the context to infer meanings and make a decision. These were presented in a four option multiple choice test, half of them in a kanji reading test or pronunciation of graphics and the rest in a kanji graphic recognition test or recognisability of the kanji graphics. There were 50 kanji words in each. The results are presented below.

8.3.1.1. Kanji recognition test: Recognition of kanji graphics

Based on the review in sections 2.1 and 2.2, the results of the October tests were examined in terms of difficulty of kanji learning. The kanji reading/ pronunciation and kanji graphic recognition tests, were examined separately in view of the five areas below.

1) kanji density (less or more than seven strokes);
2) readings (single or multiple readings);
3) complexity (single kanji or compound kanji words);
4) kanji composites (phonetic or non-phonetic kanji structures), and
5) familiarity (familiar or unfamiliar words in oral and written activities).

\[10\] Four options for pronunciation of the kanji graphics are presented in hiragana only.
Eight kanji words in Table 8.7, in order, resulted in the most errors among the 17 participants.

Table 8.7. The Most Common Errors in the Kanji Reading Section in the October Test

<table>
<thead>
<tr>
<th>Kanji</th>
<th>Density: more than 7 stroke counts</th>
<th>Readings: multiple</th>
<th>Complexity: compound</th>
<th>Composites: non-phonetic</th>
<th>Familiarity: unfamiliar</th>
</tr>
</thead>
<tbody>
<tr>
<td>今年 /kotoshi/</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>“this year”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>入れて /i-rete/</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“to pour”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>外国語 /gaikokugo/</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“foreign lang”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>強い /tsuyo-i/</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>“strong”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>湯 /yu/</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>“hot water”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>方 /hô/</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>“direction”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>台風 /taifû/</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“typhoon”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>西 /nishi/</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>“west”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Close examination of the results shows that 今年 /kotoshi/, “this year” and 入れて /i-rete/ “to pour” were the most difficult. Although neither is rare, 今年 combines higher stroke counts and multiple, plus irregular readings, while 入れて has only two strokes and is a single kanji word, but, with similar multiple readings which may have increased the difficulty. Also, among the top three compound words; 今年 “this year”、外国語 “foreign language” and 台風 “typhoon”, all satisfy the difficulty conditions, but 台風 “typhoon” is close to the sound of the phonetic loan word, “typhoon”, in English. So, the difficulty rating is slightly lower. As 外国語 “foreign languages” is a three kanji compound word (jukugo), it is assumed to be more difficult than the top two. Perhaps, however, due to being a rather popular word in language learning courses, the degree of
difficulty is decreased, but the problem remains in the multiple readings of each kanji. On the other hand, single kanji words pose another difficulty; an incongruent phonetic radical does not help determine the readings. Even in the case of a congruent radical, the reading applies only to on-readings, not to kun-readings. 入れて “to pour”, 強い “strong”, 湯 “hot water”, and 西 “west” are all kun-readings, so congruency does not apply. However, 方 “direction” is an on-reading for a single kanji, and this is a basic, free standing form which was introduced here for the first time. So, there is certainly no effect from pre-exposure in terms of familiarity.

The top ranked correct kanji readings were; 今日 /kyō/, “today”, 話す/hana-su/, “to speak”, 父 /chichi/, “my father”, 母 /haha/, “my mother” and 好き /su-ki/, “to like”. The results reflect the topic-theme based approach and the frequent use of these words in spoken and the following written tasks. Interestingly, both 今日 /kyō/, “today” and 今年 /kotoshi/ “this year” are the irregular readings, but frequent use compensates for their difficulty rating, from the most difficult to the easiest.

8.3.1.2. Kanji recognition test: Recognition of kanji readings

As with the kanji writing section, the results of the 50 kanji reading tests show the top eight errors with kanji words as in Table 8.8 below. Half of them are compound words or kango (Sino-Japanese words) except 市場 /ichiba/, “market”, and the other half are single kanji words or wago (traditional Japanese words).
Table 8.7. The Most Common Errors in Kanji Recognition Section in the October Test

<table>
<thead>
<tr>
<th>Kanji</th>
<th>Density: more than 7 strokes</th>
<th>Readings: multiple</th>
<th>Complexity: compound</th>
<th>Composites: non-phonetic</th>
<th>Familiarity unfamiliar</th>
</tr>
</thead>
<tbody>
<tr>
<td>市場 /ichiba/</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>“market”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>使う /tsuka-u/</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>“to use”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>言って /i-tte/</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>“to say”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>全部 /zenbu/</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>“all”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>極 /kai/</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>“shellfish”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>洋食 /yōshoku/</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>“western meal”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>食品 /shokuhin/</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>“foodstuffs”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>着る /ki-ru/</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>“to wear”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

First, 市場 /ichiba/ was reported as the most difficult word which satisfied all the items in the difficult conditions list due to similar sound interference and/or unfamiliarity. The sound of /ichiba/ was confused with the popular word /ichiban/ “number one” while taking the test. Or, less likely though for the beginners, they learned another reading for this same compound kanji as /shijō/ instead of /ichiba/, and could not find the appropriate kanji. The second two kanji words may result from the confusion of sounding similar to them. 使う /tsuka-u/, “to use” has the same initial sound as another verb, 作る /tsuku-ru/, “to make” as well as the same semantic radical. Similarly, 言って /i-tte/, “to say” is mixed up with 行って /i-tte/ “to go” due to the same initial sound, and 着ます /ki-masu/, “to wear” with 切ります /ki-rimasu/, “to cut”. Strictly speaking, the same sound is only applied to the kanji part, not to the okurigana. If they would pay a little more attention to the context, one assumes they could overcome this difficulty. Three kango words are categorised by the high stroke numbers, multiple readings and
unfamiliar words. If 全部 /zenbu/, “all” is not very rare, another reason may be confusion with the other kanji word 部屋 /heya/, “room” which was ranked tenth in kanji errors, because of the multiple on-readings of 部 /bu/ or /he/, “part” (see Chapter Two).

Finally, the top ranked correct kanji were; 見る /mi-ru/, “to see”, 右 /migi/, “right”, 前 /mae/, “front”, 時間 /jikan/, “time”, 肉 /niku/, “meat” and 魚 /sakana/, “fish”. As with the results of the kanji reading test, the majority are wago (Japanese words), used frequently in the oral activities during the beginning level. In addition, their graphic complexities are not too high. As a consequence, it can be confirmed that learning kanji is highly influenced by the approach of the main textbook in terms of familiarity with kanji words through oral/aural activities, not just kanji graphic complexities.

Next, the data for performance outcomes were collected to examine individual competence to recognise kanji. In addition, as the learners’ backgrounds in kanji knowledge vary at the initial stage, improvement scores are noticeably reflected in their performance in terms of transformation of the current state into the goal state (Anderson 1995:321). Consequently, individual performance on the recognition test and improvement scores from April through October will be examined together here.

8.3.1.3. Individual results of kanji recognition tests

The recognition tests were held in April, July and October, using the same content in order to obtain data on individual progress in kanji competence at the recognition level.
(see sections 8.3.1.1. and 8.3.1.2). The results of the three kanji recognition tests are shown individually in Figure 8.4 below.

![Kanji Recognition Tests](image)

Figure 8.4. Kanji Recognition Tests in April, July and October

The first six belong to the "no-J" group, the last three are in the "yes-K" group and the rest are the "yes-J". All made progress from April through October\(^{111}\). Some showed greater progress during the preparation period from April through June while others made more progress in the study period from July through October, after obtaining the basic processing skills. The test in April indicates their background knowledge of kanji. Five already knew some of the basic kanji introduced in this first year course. Orie, Taeko and Sayuri already recognised half of the kanji, but the rest knew fewer than a third. On the other hand, ten knew little about kanji in spite of a little learning experience

\(^{111}\) The graph illustrates the individual difference in their progressive improvement from April through October. As there are many unknown kanji in April, it is reasonable that the results in October are higher than ones in April and July.
The result of the July test, however, indicates that everyone made progress during the preparation period. In particular, Ken and Mari, with kanji backgrounds, showed remarkable progress, from seven to 78 for Ken and one to 46 for Mari. This means that those with kanji backgrounds, including Sayuri, already had the graphic knowledge and part of the semantic knowledge of kanji in their L1s, so they could concentrate on learning the phonemic information in Japanese. In fact, the test results in April might have been different if the recognition test employed both kana and Roma-ji (Japanese represented by Roman letters) because their problem might have been with hiragana, not in the readings of kanji since the recognition of kanji lexicon in a script requires hiragana as a part of some words. It was decided early on not to use Roma-ji. Students with a kanji background have highly practical skills for processing kanji graphics in their L1, and cognitive processing does not require full attention. Contrary to the “yes-K” group, the “no-J” group require great attention to detail for detecting graphic, semantic and phonological features. That is, the whole process requires full attention. Without any experience in the Japanese language, Fusako in particular, made an amazing effort to progress from zero to 33 during the preparation period.

The recognition test in October revealed how much the learners achieved over six months in processing kanji words at the recognition level. The majority successfully reached their goals: with the top positions occupied by Ken, Taeko, and Sayuri, followed by Seiko. Among them, Seiko, Tamie, Tomiko, Michie and Hajime made improvements of over 40 points during the study period. However, at the level of kanji recognition,
Noriko was on the border line while Akemi, Mieko and Eiko failed to gain around 50 per cent.

Furthermore, two thirds of the participants improved during the study period after gaining basic knowledge and processing skills. Only those with kanji backgrounds continued to progress in the study period, though at a slower rate than during the preparation period. In spite of some progress during the preparation period, Eiko and Reiko could not maintain their progress during the study period. The question remains why Eiko, in particular, could not make a little more improvement in the second period. Also, why were Seiko and Tamie so successful? In particular, among the “no-J”, why could Tamie make great progress while Akemi, Mieko and Eiko could make only limited progress? In the next section, those issues are targeted for inspection together with the production test in November.

8.3.2 Production test in relation to recognition tests and the improvement

The data from the production test taken by all participants in November were collected for comparison with the recognition test in October, along with improvement scores from April through October (see Table 8.9). The results are listed in order of scores from the production test in November. The improvement scores in the second column indicate the improvement from April through October, although the study period of this research covers only from July through November. It is more logical to display the improvement from April than July since both recognition and production tests also indicate the achievement of the study from April. But, we can refer back to the previous section, if necessary.
Table 8.8. Outcomes of Production and Recognition Tests, and Improvement Scores of Recognition Tests

<table>
<thead>
<tr>
<th>Participants</th>
<th>Production Test (%) Total (kanji graphics/reading)</th>
<th>Recognition Test (%) October</th>
<th>Improvement (points) April – October</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ken</td>
<td>95 (45/50)</td>
<td>98</td>
<td>91</td>
</tr>
<tr>
<td>Sayuri</td>
<td>95 (45/50)</td>
<td>91</td>
<td>38</td>
</tr>
<tr>
<td>Hajime</td>
<td>93 (43/50)</td>
<td>77</td>
<td>56</td>
</tr>
<tr>
<td>Orie</td>
<td>85 (35/50)</td>
<td>79</td>
<td>30</td>
</tr>
<tr>
<td>Mari</td>
<td>83 (35/48)</td>
<td>86</td>
<td>85</td>
</tr>
<tr>
<td>Tamie</td>
<td>81 (38/43)</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>Taeko</td>
<td>80 (30/50)</td>
<td>94</td>
<td>47</td>
</tr>
<tr>
<td>Yuka</td>
<td>80 (35/45)</td>
<td>66</td>
<td>35</td>
</tr>
<tr>
<td>Seiko</td>
<td>65 (20/45)</td>
<td>87</td>
<td>85</td>
</tr>
<tr>
<td>Fusako</td>
<td>65 (25/40)</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Michie</td>
<td>63 (18/45)</td>
<td>86</td>
<td>66</td>
</tr>
<tr>
<td>Reiko</td>
<td>60 (22/38)</td>
<td>69</td>
<td>35</td>
</tr>
<tr>
<td>Noriko</td>
<td>45 (10/35)</td>
<td>46</td>
<td>45</td>
</tr>
<tr>
<td>Tomiko</td>
<td>33 (15/18)</td>
<td>67</td>
<td>64</td>
</tr>
<tr>
<td>Mieko</td>
<td>25 (5/20)</td>
<td>36</td>
<td>35</td>
</tr>
<tr>
<td>Akemi</td>
<td>15 (6/15)</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Eiko</td>
<td>3 (0/3)</td>
<td>22</td>
<td>22</td>
</tr>
</tbody>
</table>

The production test in the left column, held in November, one month after the recognition test indicates the final achievement, production of kanji graphics (the first figures in the parenthesis) and kanji readings (the second figures) presented in context. As the entire final exam covers other linguistic and socio-linguistic areas besides kanji, they are not included in the production test here (see section 5.3).

The result reveals that, as expected, the full recall of kanji graphics for production is more demanding than one of kanji readings since the former requires retrieving the whole image accurately in the right position with the right balance. The latter however, requires finding the distinctive features of kanji visually and matching them with the sound or reading in memory. Also, the context may give enough semantic information to infer the kanji readings and probably the kanji images, too. Recallability is divided into three groups; 80 and over, 45 to 80, and under 45. Both “80 and over” and “45 to 80”
groups are fairly good in phonological retention as words while the production of kanji images is much weaker in the “45 to 80” group. The “under 45” group need to develop the basic skills and knowledge of kanji learning. They can do piece practice, but need to be able to synthesise the whole.

Further, in relation to the recognition test in the middle column and improvement in the right column, another observation suggests three salient patterns in the performance of the production test. First of all, some showed further progress in the production test after the recognition test in October; they were Hajime, Tamie, Yuka and Fusako. In particular, Tamie and Fusako who had no previous learning experience of kanji characters accessed the KS program quite actively. Also, Tamie made a big improvement of 72 per cent while Fusako achieved 50 per cent. On the other hand, both Hajime and Yuka in the “yes-J” also made high scores.

The second finding demonstrates an opposite pattern from the first finding. Some students performed well in the recognition test, but had lower scores in the production test in November. They are Seiko, Michie and Tomiko who are all in the “yes-J” group with mid-range CALL access. As discussed previously, production is more demanding than recognition due to the requirement for accurate construction of whole graphics. Michie and Tomiko improved around 60 points while Seiko made over 80 points in the recognition test. Both Seiko and Michie achieved only a little over 60 per cent, while Tomiko made only 33 per cent in the production test. One possible reason has to do with whether they continuously used the frequency strategy in writing practice, regularly and frequently, until the final exam. Another possible reason is that the production test includes only a limited number of kanji due to the nature of the examination.
The third evident pattern shows that the “yes-K” group made a big improvement and demonstrated high performance in the production test, while some in the “no-J” group showed a small improvement and low performance in the production test. The former are Ken and Mari, and the latter are Mieko, Akemi and Eiko. The large or small improvements by these two groups may prove, up to a point, that the knowledge and skills obtained in a distant L1, like English, are incompatible with that in the L2 during the beginner’s level. Pedagogically, from the learners’ viewpoint, this sort of mixed class arrangement is the worst setting, but independent and self-paced study using CALL methods is expected to be one way to solve the problem without creating serious negative interactions among them, as was examined in the previous section and earlier chapters. Other issues, such as the suitability of the content of the program, must be considered both linguistically and pedagogically.

8.4 Outcomes in relation to interactions and strategy use

In this section, those several salient patterns found in the performance outcomes in the previous section, are investigated further in terms of the three groups, the “no-J”, “yes-J” and “yes-K”, in relation to CALL interactions and strategy use discussed in research questions one and two. The focus points are: 1) how does interaction with CALL relate to their performance outcomes such as recognition and production of kanji? 2) how does the use of specific types of kanji learning strategies relate to the outcomes? The results are categorised into the five stages of skill acquisition: 1) novice learners 2) advanced beginners 3) competent performers 4) proficient performers and 5) experts (Dreyfus et al. 1986; Johnson 1996). They are defined as follows:
The novice learns to recognise various objective facts and features relevant to the skill and acquires rules for determining actions based upon those facts and features [of context-free elements].

Performance improves to a marginally acceptable level only after the novice has considerable experience in coping with real situations...Through practical experience in concrete situations with meaningful elements, the advance beginner starts to recognise those elements when they are present.

With more experience, the number of recognisable context free and situational elements present in a real-world circumstance eventually becomes overwhelming [for the competent performer]. Furthermore, the choice crucially affects behaviour in a way that one particular situational element rarely does...An outcome that is clearly successful is deeply satisfying and leaves a vivid memory of the plan chosen and of the situation as seen from the perspective of the plan.

Usually the proficient performer will be deeply involved in his task and will be experiencing it from some specific perspective because of recent events. Because of the performer's perspective, certain features of the situation will stand out as salient and others will recede into the background and be ignored... The proficient performer, while intuitively organising and understanding his task, will find himself thinking analytically about what to do.

An expert generally knows what to do based on mature and practiced understanding. When deeply involved in coping with his environment, he does not see problems in some detached way and work at solving them, nor does he worry about the future and devise plans... An expert's skill has become so much a part of him that he need be no more aware of it than he is of his own body. (Dreyfus and Dreyfus 1986:20-35, researcher's italics).

8.4.1. The “No-J” group

The outcomes by the “no-J” group are compared in relation to their interactions with KS and use of kanji learning strategies, along with their attitudes toward CALL, to find any specific grounds for learning kanji as beginner JFL learners. Noticeable findings are:
1) Advanced beginner (highly successful): Tamie
   Advanced beginner (very successful): Fusako

2) Novice learner (successful): Noriko

3) Novice learners (unsuccessful): Akemi, Mieko and Eiko

The relevant data from research questions one and two are displayed again in this section, if necessary, as a visual reference for the discussion. The inspection starts from why Tamie and Fusako achieved successful results, especially Tamie who demonstrated the highest achievement among the “no-J” group.

1) Tamie performed well on both the recognition and production tests, particularly making an excellent showing on the production test. Her kanji production is clear, well-balanced and based on understanding the context. For example, 多い /o-i/ “many” is correctly written without confusion with the similar word 大きい /o-ki/ “large” in its sound and meaning. Also, she tried to produce all kanji although two compound words jukugo were missing either the first or the second kanji. This means that the acquisition process is not “all or nothing”, but indicates goal-oriented behaviour to improve skills gradually (Johnson 1996). One of the reasons is the quality of interactions on top of the fairly constant access to KS. Surely, her input frequency is assisting output accuracy (Larsen-Freeman et al. 1991). Fusako had moderate success, but had most access to KS, once or twice a week during the first half of the study period. She seemed to concentrate on the KI for obtaining the basic information of each kanji as accurately as possible at the input stage, thus her interactions with the other sub-components of the program were

112 Recallability on the production test is divided into three, high for “over 80”, mid for “45 to 65” and low “under 33” in this study. (See section 8.4.2).
limited. This is common for Tamie too, as their ratio of frequencies with the components (see Table 6.4) is similar except for interactions with the ST and KWQ. Tamie realises that production requires more accuracy for tracing each piece of a kanji image than recognition, saying that “usually when you go to write it, you can see it in your head, but actually writing it down on the page is different...I find the stroke order really helps me. It gives the order ”(l). As soon as she realises the difficulty of production through the weekly hand-written quizzes, she tries to identify the tools she needs to strengthen her weak areas. Noticing the differences between what she prepared in her notebook and the animated stroke order on the monitor, she utilises the stroke order straight away. Prior to that, she prepared the basic information first, concentrating on recognition by assimilating the graphic, semantic and phonemic representations like others in the “no-J” group. Fusako also interacted with the KI, but more analytically, by paying attention to the different parts of the colour coded kanji components. Those radicals are helpful in creating a mnemonic memory device. During this exposure, she took an active role as long as the computer-provided mnemonics matched her imagination. If the ready-made mnemonics did not match her feelings and her imagination was not up to creating her own story, she used the stroke order for further ideas. This process is time-consuming for JFL beginners, but inescapable because of the involvement in information collection and skill development using various strategies for integration. As the program is not overly sophisticated but static and simple, users can relax and try to maximise the availability without exploring too much. This is the light side of KS, specifically designed to be integrated into the curriculum for this unit.

The differences between Tamie’s and Fusako’s cognitive skills are found in the note-taking activity during interactions with the ST. Both acknowledge that the ST is good
but too time consuming. Fusako is often frustrated while Tamie experienced contextual learning through working with the top-down approach collecting information in her notes, which lead her to deep processing of kanji words. Tamie also could not tolerate often frustrating problems in vocabulary comprehension due to the excessive requirement for inference. However, this is a worthwhile manifestation of the transition from superficial processing to elaboration (Nation 1990; N. Ellis 1994). In addition, this relates to her more positive attitude in “language learning potential” and “learner fit” which motivates learning intrinsically, while Fusako’s attitude is a little passive, especially moving toward the end of the study period.

Further, Tamie compensates metacognitively by utilising a kanji list at home to fill in the gap of missing interactions when she did not access KS for some reason. This is valuable manipulation, strategically as well as cognitively. Her high outcomes can be attributed to regular practice of kanji (De Keyser 1998; N. Ellis 1994) using different types of strategies to develop her recognition skills. Also, self-controlled interactions with the program, instead of computer-control, are important for raising conscious awareness (see also Skehan 1998) and focusing on overcoming insufficiencies while interacting with KS.

2) On the other hand, Noriko puts considerable time into exploring various components, especially the quiz components, KRQ and KWQ (see Table 6.4), in contrast with another high CALL user, Fusako who focused on the KI. Apparently they believe that more exposure to kanji scripts is beneficial in promoting kanji learning, not just the visual discrimination of kanji graphics and semantic and phonetic assimilation. In fact, Noriko’s kanji production test implies that she could have attained somewhat
higher scores if she had been more consciously aware of the differences among kanji pieces. For example, she could produce complicated kanji such as 炎\text{_conversion} /atsu-i/ “hot”, but it was written *ろうい. Clearly, her weakness is caused by her superficial interaction like “window shopping”, and the lack of practice of skill acquisition to activate knowledge from the cognitive to the associative stages, as she commented, “I can never get it right. This [KRQ] is hard because you’ve got to try and remember it. I know the meaning, but I don’t remember the reading”(I). Although her interaction with the ST is twice or three times that of the other two, she felt that the ST “doesn’t help that much” (I).

Noriko and Fusako demonstrated more or less the same progress on the recognition test. At the recognition level, their active interaction with KS is considered to be an influential factor. However, the production test revealed clear differences. Due to her weak recognisability, Noriko can not recall the kanji images accurately enough to trace all parts, while Fusako and Tamie reveal their processing skills by retrieving kanji from memory, due to their cumulative practice in analysing and synthesising while writing kanji. Noriko is still learning kanji in a context-free environment at the initial “little learning” period of the “S-shape” while Tamie and Fusako are at the “rapid learning” period (Anderson 1995:198-199). Tamie is much ahead because of her skill at recalling all parts of kanji words, coping with meaningful situations.

In addition, the quantity and quality of the use of kanji learning strategies are re-
examined to find the strategies used by individuals frequently, more than 3.6 out of 5\textsuperscript{113}, as shown below.

Table 8.9. Strategies Used Frequently by Three Successful Learners in the “No-J” Group

<table>
<thead>
<tr>
<th>Total scores</th>
<th>Strategies used frequently “greater than 3.6”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tamie 47.31</td>
<td>Frequency (5), story (4), experience (4), self-monitoring (3.7)</td>
</tr>
<tr>
<td>Fusako 48.39</td>
<td>Frequency (5), visualisation (4.5), self-monitoring (3.7)</td>
</tr>
<tr>
<td>Noriko 52.27</td>
<td>Frequency (5), physical/emotional response (4.8), experience (4.3), self-monitoring (4.3), and cooperating with others (4.3)</td>
</tr>
</tbody>
</table>

Noriko self-reported that she utilised strategies more (52.27) than the others while Tamie used them the least. All used the frequency strategy very actively due to the nature of kanji learning, as previously discussed. Tamie used the combination of story and experience strategies which are more semantically related strategies, whereas Fusako leaned toward the graphic representation of kanji. Noriko tended to use various types of strategies which are supposed to assist becoming effective learners (Oxford 1990; O’Malley et al. 1990), although the right strategies must be used in the right situations. It is speculated that her weakness might possibly be in this area, namely, her active utilisation of combined strategies, including the “cooperating with others” strategy indicates positive prediction, but the strategies are not used in the right situations (Chamot et al. 1989). For example, given that repeated writing practice precedes her favourite interactions with KRQ/KWQ, the action would assist her more for the self-testing and self-monitoring.

\textsuperscript{113} The five Likert scale is simplified here for an explanation of strategy use by showing three types; 1 – 2.4 for low use, 2.5 – 3.5 for medium use, and 3.6 – 5 for frequent use.
In spite of her high use of strategies, Noriko’s progress is weak in advancing declarative knowledge. This indicates that the effects of practice are different depending on the individual, some do not increase skills directly, but rather assemble them as they develop more efficient procedures. Extended study is necessary to find individual differences in how each develops skills before the case is filed as a “late bloomer” or “failure”.

3) Akemi, Mieko and Eiko failed in both the recognition and production tests. First, Akemi made over 60 per cent for kanji reading and writing in hand-written quizzes during the study period (see Figure 6.2 and Table 6.5). In spite of her continuous progress in working memory during the study period, both her October and November tests of long-term memory were only 40 per cent and 15 per cent respectively. Apparently information was not processed deeply enough to be stored in long-term memory. This is a clear example of how consistent practice is important for better retention and developing processing skills from the cognitive to the associative stage (Anderson 1995). Without practice, the developed skills and knowledge will decrease or fade away. She overlooked the importance of repetitive practice of kanji characters due to a lack of consideration for language being learned (Oxford 1989).

Mieko’s problem is her initial expectation of computers that KS could replace repetitive writing practice, although the colour coded radicals helped to show her how to discriminate kanji parts for accurate encoding. In the end, limited interaction with KS and lack of utilisation of “book and pen” lead not only Mieko but Akemi to poor results in performance. Passive involvement does not result in better memory (Anderson 1995). It appears that both underestimated the time required for practice at this level with a lack
of "intensive attention to the new language and deliberate efforts to make sense of it" (O’Malley et al. 1990:78).

Eiko interacted more with CALL and shows a slightly more positive attitude. Different from Mieko, Eiko is at least motivated to learn, although it is only extrinsic motivation to pass the course (Ely 1986; Oxford & Nyikos 1989). Apparently however, the main reason for her failure was a problem in the regular course from which she was often absent. This increased her anxiety and fear of failing the test, and eventually the course, too (Horwitz & Young 1991), as follows:

When you’re in a quiz, this is a test now, you know, you get so excited and you forget all of it...it’s not like, nervous!, but I feel like, “oh, it’s a test”, and it looks like you’re going to fail again. (Eiko, I)

Thankfully in her case, the CALL session was independent study with the “tutor” in a “comfortable learning environment” (Takahashi 1993:314) without exposure of deficiencies to her peers. Mostly she interacted with KS alone, and avoided asking questions and/or associating with others. Although she interacted with KS most amongst the three, her weak recognition skills, due to lack of practice, could not provide her much assistance to activate processing.

According to the results of the questionnaire on CALL use, their overall strategy use is not overly different from their counterparts in the rest of the “no-J” group, as discussed above:
Table 8.10. Strategies Used Frequently by Three Unsuccessful Learners in the “No-J” Group

<table>
<thead>
<tr>
<th>Learners</th>
<th>Total</th>
<th>Strategies used frequently “greater than 3.6”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akemi</td>
<td>48.93</td>
<td>Frequency (5), experience (4) and self-monitoring (4)</td>
</tr>
<tr>
<td>Mieko</td>
<td>47.74</td>
<td>Physical/emotional response (5), stroke order (5), frequency (4), visualisation (4), radical (4), association (3.8), self-monitoring (3.7)</td>
</tr>
<tr>
<td>Eiko</td>
<td>47.29</td>
<td>Frequency (4), experience (4), self-monitoring (4), radicals (3.6)</td>
</tr>
</tbody>
</table>

Curiously enough, Mieko actively utilised a rich variety of strategies. In fact, the combination of strategies is well-balanced, covering all graphemic, semantic and phonemic (included in association strategy) representations of kanji. The frequent use of stroke order and radical strategies strengthens the ability to draw an accurate kanji image. The other two participants also utilised strategies well, like good learners. It seems likely that their slow progress is directly related to a lack of practice. Because of that, their processing skill level is still at the cognitive stage where new declarative information is piled without being properly handled or simply forgotten. As in Eiko’s case with external problems influencing her behaviour, a major reason for Mieko’s result is her decision to change her degree structure for the following year, with Japanese language no longer required. This sort of external factor has a detrimental impact on JFL beginners in terms of motivating their study (Onwuegbuzie & Daley 1999), and it is difficult to force one’s mind to activate processing skills and knowledge, with or without resources like KS.

8.4.2. The “Yes-J” group
Generally speaking, the “yes-J” group are expected to be able to pass the course due to their previous knowledge and experience of learning Japanese as other studies report that the learners with a learning background use more strategies (Ehrman et al. 1995; Chamot et al 1987; O’Malley et al 1985). However, their previous experiences vary, as explained in the previous chapters, and the noticeable results are reported as follows:

1) Advanced beginners (highly successful): Hajime, Orie, Taeko and Yuka
2) Advanced beginners (very successful): Seiko, Michie and Reiko
3) Novice learner (unsuccessful): Tomiko

1) Advanced beginners (highly successful):
First, Hajime, Orie, Taeko and Yuka achieved successful goals in the production test in November. They could cooperate with real situations with their considerable experience as beginners. All gained over 80 per cent on average in the weekly hand-written tests, demonstrating constant processing skill development. Orie and Taeko showed no problematic signs on the recognition test in October, but Hajime’s and Yuka’s slightly lower scores, 77 per cent and 66 per cent respectively, would make them aware of the necessity of management for their learning before the final examination.

Table 8.11. Strategies Used Frequently by Highly Successful Advanced Beginners in the “Yes-J” Group

<table>
<thead>
<tr>
<th>Learners</th>
<th>Total</th>
<th>Frequently used strategies “greater than 3.6”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hajime</td>
<td>43.91</td>
<td>Frequency (5), radicals (5), compensation (5), experience (5), physical/ emotional response (3.8)</td>
</tr>
<tr>
<td>Orie</td>
<td>65.76</td>
<td>Frequency (5), experience (5), visualisation (5), sequence (5), self-monitoring (4.7), radicals (4.3), story (4.3), physical/emotional response (4.3), association (3.9), evaluation (4.3), cooperating (4.3), planning (4.2)</td>
</tr>
<tr>
<td>Taeko</td>
<td>48.14</td>
<td>Frequency (5), visualisation (4), self-monitoring (4), radicals (3.7), evaluating (3.7)</td>
</tr>
<tr>
<td>Yuka</td>
<td>42.06</td>
<td>Frequency (5), stroke order (5), visualisation (4.5)</td>
</tr>
</tbody>
</table>
Hajime is somewhat unique in this study group. He neither liked CALL nor used it often. His major strategies are frequency, radicals, compensation and experience, as shown above. Hajime's strategy use is semantic oriented, using meanings of radicals and experience strategies. He commented about the mnemonics or stories that he “never uses a story” for memorisation of kanji. This is sustained by the counter argument that mnemonics or the key word technique is only helpful for short term memory (Wang et al. 1992, 1995), although many studies support the idea that mnemonics are good for better memorisation (Stroller et al. 1993; Meara 1980). In spite of repeated, intensive writing practice, Hajime did not make good progress in the recognition test, but amazingly, he attained 93 per cent for the production test. Most likely, his use of the frequency strategy using kanji cards, along with a limited knowledge of semantic radicals, enhanced his rote memorisation for the final examination during the last month after the recognition test in October. In fact, this cram period was good for him as Anderson notes, “retention is better for material learned in high arousal states” (1995:265). Of course, it often causes negative reactions like fear and anxiety for some learners, like Eiko in the “no-J” group, because an exam situation with additional mental pressure interferes with retrieval from long-term memory.

In addition, it should be considered, as an influential factor, that his learning and living environment with a Japanese family motivated him intensely to integrate spoken Japanese with written Japanese. Especially, the high frequency input of spoken vocabulary can be easily transferred to kanji vocabulary without worrying about the on- and kun-readings of kanji. In other words, one can achieve one’s goal with an extrinsic motivation and self-initiation for independent learning (Kojic-sabo & Lightbown 1999),
using any available learning strategies, as long as the strategies include repetitive writing practice. Certain situations also stimulate one to maximise learning due to necessity, but that is beyond the scope of this study.

Orie, Yuka and Taeko also made over 80 per cent on the production test in November. However, the improvement of the first two in ability to recognise kanji was limited to around 30 points due to their previous studies. This implies that they are at the associative stage of the kanji learning skill or "slow learning stage" after passing through the initial learning curves of the "S-shape" (Anderson 1995:198-199). In order to increase accuracy and fluency for production, Yuka utilised a combination of stroke order and frequency strategies along with the visualisation strategy. Orie and Taeko demonstrated a high frequency of interaction with KS to increase their exposures to the L2 script and actively utilised various combinations of most of the kanji learning strategies. Orie’s cooperative learning improved her own achievement as other study reports (Jacob & Mattson 1987). She enjoyed learning kanji using KS the most as well (O), participating voluntarily in the CALL sessions, having prepared her own colour-coded kanji lists and, deliberately practised in interacting with all components, followed by repetitive rehearsal. Above all, the three applied the top-down approach to contextual learning in the ST, along with constant practice. This can be referred to as the power law learning\(^\text{114}\) cognitively. It is apparent that their flexible and appropriate use of those strategies leads them to successful results (Chamot et al. 1988).

2) Advanced beginners (very successful):

\(^{114}\) Power Law learning means that "the observation that performance increases as a power function of the amount of practice" (Anderson 1995:433).
Seiko, Michie, and Reiko attained the “very successful advanced beginners” level. Seiko’s interaction focused on stroke order in the KI and the ST, to check the compound kanji words (*jukugo*), as she indicated, while Michie made rather even interactions with each component (see Table 6.6). Their strategy use is active, as shown below.

Table 8.12. Strategies Used Frequently by Very Successful Advanced Beginners in the “Yes-J” group

<table>
<thead>
<tr>
<th>Learners</th>
<th>Total</th>
<th>Strategies used frequently “greater than 3.6”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seiko</td>
<td>51.9</td>
<td>Frequency (5), stroke order (4.5), compensation (4.5), experience (4), physical/emotional response (4), story (3.8), association (3.7), radicals (3.7), self-monitoring (3.7)</td>
</tr>
<tr>
<td>Michie</td>
<td>47.0</td>
<td>Frequency (5), visualisation (4.5)</td>
</tr>
<tr>
<td>Reiko</td>
<td>53.5</td>
<td>Frequency (5), visualisation (5), self-monitoring (4.3), physical/emotional response (4), story (4), experience (4)</td>
</tr>
</tbody>
</table>

Seiko’s approach to learning kanji was more integrated, using the computer, workbook and oral activities, while maintaining a “balance” among those different resources. Also, her elaborate use of the strategies was well balanced with “stroke order” for concentrating on the kanji form, and the physical/emotional response and experience strategies for covering meanings to link them with form. Her attention focused on the kanji graphics in order to find a pattern during the initial inspection, as she said:

I just kind of looked at it and I thought it must be much more complicated. So, I thought I missed out on something when I was writing it. So, I didn’t finish it, but then, when I looked at it, it wasn’t that complicated. It was pretty plain. It’s just repeating a lot of basic patterns...So, nothing to do with kanji, yeah. (Seiko, I)

Through repeated practice on and off KS during the preparation period, she was aware of the kanji patterns, which allow discrimination among the features of kanji and help categorise them into patterns for “internalisation” (McLaughlin et al. 1996:224).
demonstrated the ability to manage the goal structure by applying this recognition skill to any kanji; simple or complex. Another discovery is that Seiko solved the problem of multiple readings by focusing on the lexical level, disregarding the rest of the readings at this stage. So, the energy she spent on kanji cognition decreased dramatically. As a result, she gained confidence in her kanji processing ability, mainly because of her effective strategy use.

Michie also has a common pattern with Seiko in the recognition and production tests. Both have the same length of previous experience in Japanese. However, their focuses are different when interacting with KS; Michie focuses on contextual understanding with attention to the usage of vocabulary and expressions, while Seiko concentrates on the recognition of single and compound kanji. As Seiko clearly mentioned, her purpose is to get a better score in the hand-written kanji quizzes after the CALL sessions by concentrating on the recognition of kanji graphics while working memory is still activated. On the other hand, Michie’s learning goal is rather modest, like just passing this subject for her graduation at the end of this semester. At the same time, her relaxed feeling may encourage her to explore deep processing during interaction with the ST. However, their results in the production tests were much lower than expected, in spite of their reasonable recognisability and interaction. Their weakness in matching the graphemic and phonemic information implies a little more effort in writing practicing, especially for production. It may also imply the individual differences of production for late bloomers.\footnote{Seiko completed the Advanced Japanese Course four years later. She mentioned that KS helped a smooth transition to an electronic kanji dictionary which increased her positive involvement in challenging kanji hurdle.}
Lastly, commenting about Reiko briefly, the result of the production test only suggests an effort to survive. She did not like KS and used it only once during the study period. So, her strategy use mainly applied to study with a workbook instead of KS. In fact, she lived mostly with her previous knowledge, gained through her previous experience of kanji learning, but her case is referred to as the power law forgetting\(^{116}\) to minimise the loss. This means that she might be classified as a novice learner, one rank lower, if she would not prevent forgetting by practising repeatedly.

3) Novice learner (unsuccessful):

Tomiko has become an unsuccessful learner in spite of her previous experience. She showed a good improvement of 64 points by obtaining 67 per cent on the recognition test in October (see Figure 8.6). She interacted with most of the components of KS at first, but then, gradually focused on the KI and ST during the second half of the study period, because the QZ was just too difficult for her. However, she showed the strongest attitudes of interest in and helpfulness of KS. Possibly those attitudes supported her frequent interactions, but not the quality of interactions which required explicit training. Her retrieval on the production test was unsuccessful due to a lack of practice. Another weakness was in her limited use of kanji learning strategies, especially the lack of frequent writing practice and linking kanji with meanings as shown below.

Table 8.13. Strategies Used Frequently by Unsuccessful Beginners in “Yes-J” Group

<table>
<thead>
<tr>
<th>Learners</th>
<th>Total</th>
<th>Strategies used frequently “greater than 3.6”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tomiko</td>
<td>48.82</td>
<td>Compensation (5), physical/emotional response (3.8), self-monitoring (3.7), and cooperating with others (4)</td>
</tr>
</tbody>
</table>

\(^{116}\) Power Law Forgetting (Wixted & Ebbesen 1991) means that “in the case of the forgetting function more and more delay produces smaller and smaller losses” (Anderson 1995:234).
In spite of her frequent interaction with KS along with her previous learning experience, her practice is still part practice without connecting small pieces with larger segments because she easily forgets old kanji after learning new kanji. Any excess information was forgotten due to the limited capacity of working memory (see Anderson 1995; Gathercole et al. 1993).

Thus, the “yes-J” group ranges widely from the “rapid learning” period in the cognitive stage to the early associative stage of skill development.

8.4.3. The “Yes-K” group

Ken, Sayuri and Mari, with kanji backgrounds, made notable improvements (see Table 8.9), mainly due to the transfer of their kanji graphic recognition and production abilities from their L1 (Koda 1989, 1998). They needed to focus only on kanji readings and meanings. This was a big advantage for them at the JFL beginner level as the majority have to spend much of their time on recognising the kanji graphics, as well as learning other kanji information and processing skills. As far as CALL interaction is concerned, Ken and Sayuri focused on the ST, either for confirming kanji usage in context or story comprehension. On the other hand, Mari still needed to interact with the KI prior to being involved in an “enlarged conception of the world of the skill” (Dreyfus et al. 1986:22), as the results of recognition and production tests show, over 90 per cent for Ken and Sayuri versus over 80 per cent for Mari. At the end, Ken and Sayuri were categorised as competent performers, while Mari was a highly successful advanced beginner.
Table 8.14 Strategies Used Frequently by the “Yes-K” Group

<table>
<thead>
<tr>
<th>Learners</th>
<th>Total</th>
<th>Strategies used frequently “greater than 3.6”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sayuri</td>
<td>55.63</td>
<td>Frequency (5), visualisation (5), self-monitoring (5), compensation (5), stroke order (5), radicals (4.3), sequence (4)</td>
</tr>
<tr>
<td>Ken</td>
<td>37.09</td>
<td>Frequency (4.5), physical/emotional response (4.8), self-monitoring (3.7)</td>
</tr>
<tr>
<td>Mari</td>
<td>50.39</td>
<td>Frequency (5), compensation (5), self-monitoring (3.7), planning (4)</td>
</tr>
</tbody>
</table>

As shown above, their use of kanji learning strategies varied individually, except that all used the frequency strategy as they had done in learning kanji in their L1s. It is fair to say that the specific reasons they accomplish such high levels are the combination of the language transfer from their L1, and frequent writing practice strategies for confirmation, rather than the direct influence of KS.

None of their attitudes toward CALL was positive in spite of the advantages. In particular, Ken and Mari preferred a “pen and book” to the computer, although Mari reported that KS was interesting and helpful for learning kanji. Sayuri showed a slightly more positive attitude, so her interactions were higher with all the components, even with the KI. She tended to check all kanji information in detail, using the self-monitoring strategy. However, Sayuri’s combined use of other strategies such as stroke order, radicals and sequence are considered to have been partially triggered by the CALL program, as well as her previous learning experience in her L1. One of the aims of KS, for the designer, is to develop the contextual learning strategy in order to develop kanji vocabulary among the “yes-K” group. Surprisingly, these participants were less motivated, or simply disliked CALL methods. However, Ken’s limited usage of
strategies, in spite of his high achievement, implies the unconscious use of strategies such that he no longer realises that he is using them.

To summarise, CALL influence on kanji learning was rather limited for the “yes-K” group, although CALL encouraged using various strategies for Sayuri and Mari, but not much for Ken, mainly because they neither like CALL methods nor put value on independent study with a machine tutor. Instead, they were used to learning kanji in their L1s from teachers in a face-to-face environment.

8.5. Summary of research question three

In this section, first a judgmental evaluation of the affective domain using KS for learning kanji was conducted, mainly because physical interaction in Chapter Six does not include the affective dimension except for “helpfulness”. The other six attitudinal variables toward KS and CALL methods were examined using the five Likert scale questionnaire. The result of the overall evaluation was 3.6 which is an “ok” level. The details are that:

- “Language learning potential” represents helpfulness and confidence. Three different groups demonstrate different interaction patterns with KS (see section 6.7). The “yes-J” group feel it is highly helpful (4.0 out of 5). However, most are uncertain if they can master the Jōyō kanji and read a Japanese newspaper by their graduation mainly due to the large number of kanji and the complexity of multiple readings. The “no-J” and “yes-K” groups also show a positive attitude of helpfulness but a little less than the “yes-J” group. The “no-J” has less confidence to master kanji, as expected. In spite of the L1 kanji background, however, the “yes-K” did not express
confidence possibly because of the Asian cultural influence of not showing off individual confidence.

- "Learner fit", indicating level and freedom from anxiety, spreads throughout the group. All felt that interaction with KS was relaxed and anxiety free, although the application of the Japanese word processor in the KRQ and KWQ did not please them as in another study report (Lynch 2000). Although the level of difficulty is different depending on the tasks, all declared the level to be suitable. However, one of the "no-J" learners considered the level to be too high, but another found the ST was more meaningful than the KI since the target kanji remained in her mind as a word, with its meaning, in context; it was "very" time consuming, but this processing is usually more worthwhile (see Nation 1990; Goodfellow 1994; Mori 1998).

- "Positive impact", characterising interest, independence and preference, is different depending on the group. The "no-J" supported independent study using KS the most because of their inferior feelings in the mixed class, especially in front of the "yes-K" group. The "yes-J" expressed the most positive attitude and interest in studying kanji using KS while the "yes-K" evaluated it the lowest on account of the transferability of skills and knowledge from their L1s. Most likely, because they neither have many "kanji myths" (Kaiser 1994:63) nor do they support CALL methods to become independent learners, they prefer the traditional approach by teachers in the classroom. In fact, a third of the participants prefer "book and pen" to CALL methods.

Thus, the "no-J" and "yes-J" perceive that KS provides sound pedagogical practices for individual study up to a point, especially in the current kanji educational environment due to limited instructional time (see Chapters Two and Four), although some modification of the QZ component is required, as users pointed out in section 6.7. The two male participants declared negative attitudes in most variables, however, it is difficult to generalise this result as a gender feature with such a small cohort of male participants.
Further analysis was conducted into the performance outcomes. Two types of outcomes were used; one was the recognition test conducted in April, July and October and the other was the production test in November. Error inspection in the recognition tests reveals that the difficulty of kanji with more than seven strokes and the complexity of multiple readings are common sources of error in both the phonemic and graphemic recognition of kanji. In addition, compound kanji (*jukugo*) and unfamiliar words also increase error rates in graphemic recognition of kanji.

The performances in working memory and long-term memory by the “no-J”, “yes-J” and “yes-K” groups were categorised into the five stages of skill acquisition (Dreyfus et al. 1986: 19-36) in relation to KS interaction and the kanji learning strategies among the three groups:

1. The “no-J” group

There are two advanced beginners (one highly successful and one very successful) and four novice learners (one successful and three unsuccessful) among the six learners in this group. No competent performers are found in this group, mainly due to their lack of experience.

*Advanced beginner (highly successful):*

- She had mid-access with KS, and has positive attitudes in “language learning potential” and “learner fit” which motivate learning intrinsically.
- She noticed the importance and usefulness of the animated stroke order for accurate kanji production through interaction with the KI, after experiencing difficulties with accurate production of kanji graphics on the hand-written quizzes.
• She encountered the contextual learning of kanji words in interaction with the ST using “PRODEC”, but found it to be time consuming.
• She practised regularly inside and outside of the CALL lab using kanji cards along with semantically related strategies at the right time.
• She used kanji actively in the assignments.

**Advanced beginner (very successful):**

• She was a voluntary CALL high access user.
• She concentrated on the KI for taking notes on graphemic, phonemic and semantic information. The processing pattern is dominantly “DECPRO” at this stage.
• She practised kanji writing repetitively.
• She used mnemonics selectively.
• She attained over 30 per cent on the recognition test during the preparation period, but slowed down a little during the study period due to cumulative kanji information.
• She used the frequency strategy in combination with visualisation and self-monitoring.

**Novice learner (successful):**

• She was a voluntary CALL high access user with all components of KI, ST and QZ, but the interaction was a superficial, “window shopping” type.
• She tried to use kanji in the assignment, but was not fully aware of the importance of meaningful practice.
• She had weak recallability due to lack of cumulative practice, on her own, outside of CALL sessions.
• She reported combined strategies quite often, but those strategies might not be used in the right situations (Chamot et al. 1989).
• She had difficulty proceduralising declarative knowledge in spite of considerable use of strategies due to insufficient practice. Her pattern is “DECPRODEC” at this stage.
Novice learners (unsuccessful):

- Three failed. Two accessed KS a few times. Their attitudes toward KS were negative, and they preferred a “book and pen”.
- They overlooked the necessity of repeated and regular practice outside of the CALL sessions due to poor management of learning.
- They did not use special devices such as kanji cards and/or kanji lists.
- One had extrinsic motivation to pass the course, and interacted with KS more positively. However, due to absence from the regular oral classes, familiarity with spoken words decreased, but high anxiety caused fear for learning kanji. Also, a lack of practice caused her weak recognition skills. Further, this participant was the only one to receive no parental encouragement for learning Japanese.
- Although the use of strategies seems to be healthy as it is for good learners, the progress was very slow due to lack of practice.
- Lack of practice fosters a lack of confidence, disregarding learning preferences.
- Low motivation for learning kanji is the inevitable reason for failure.
- Learning pattern is “DEC” at this stage, and one could be DECPRODEC.

2. The “yes-J” group

The “yes-J” group were expected to be able to pass the course partially due to their previous experience. There are three patterns in this group; highly successful advanced beginners, very successful advanced beginners, and unsuccessful novice learner.

Advanced beginners (highly successful):

- Four attained high scores on the production test, mostly because of large improvement utilising their previous learning experience.
- All used the frequency strategy actively.
• Two learners had high access and two low access to KS.
• Two learners have the most positive attitudes toward KS. One of them used various strategies including the inferring strategy very actively with all components on KS. The other is more analytical, using radicals and visualisation, along with evaluation and self-monitoring strategies.
• One male learner showed a different pattern from the others; low access and a negative attitude toward KS, possibly because of his living experience and availability of direct contact with Japanese people in the family.
• One learner with low access but a positive attitude, used minimum strategies focusing on stroke order and visualisation to support the frequency strategy, possibly due to the previous experience she uses unconsciously; she believes that strategies familiar to her are the most suitable.
• The processing pattern is “PRODEC”\(^{117}\), interacting with the ST, complementing the KI.

*Advanced beginners (very successful):*

• Mid-range scores on the production test, but high on the recognition test.
• One uses a wide range of strategies, integrating KS at the laboratory, oral activities in class and the workbook at home. Noticing of irregularities in kanji at the input stage shows her potential to become a successful learner at the next level, possibly if she tries contextual learning with the ST, not just kanji words. Her processing pattern is “DECPRO”, mainly because her aim is to get better scores in the hand-written quizzes.
• The other used fewer strategies, and set a rather modest goal, but was a self-possessed learner trying deep processing while interacting with the ST. Her pattern is “PRODEC”, inferring the meanings, and she also has the potential to become a successful learner.
• The third one accessed KS least, and prefers “no computer”. Her minimal writing practice assists survival with her previous learning experience. Further practice is necessary to develop her skills and knowledge.

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\(^{117}\) The male learner demonstrated a high level of reading comprehension in the final exam, although he did not access the ST component. Certainly though, he did access printed materials in his own study.
Novice learners (unsuccessful):

- One averaged 43-48 per cent on working memory and received 33 per cent on the production test, although she showed good improvement to obtain 67 per cent on the recognition test. It is speculated that the multiple choice of the recognition test might have caused a "lottery" result.
- The biggest problems are a lack of repetitive writing practice after getting input information through interaction with KS and a rather narrow range of strategy use which caused a failure to notice the specific features of kanji.
- Has a positive attitude toward KS due to her interest and its helpfulness, but is a "moody" learner with no direction.
- Her pattern is a "DECPRO", and occasionally "DECPRODEC" as in the "no-J" group due to a lack of knowledge and processing skills.

3. The "yes-K" group

All three, with kanji backgrounds, achieved successful results in both recognition and production tests, mainly due to their transferable knowledge and processing skills from their L1s. Using this major advantage, two made substantial progress during the preparation period in spite of no learning experience of Japanese language. One already had previous experience in Japanese and a kanji background in the L1. Although two are categorised as competent performers, the third one still needs more experience to process information in a real situation, beyond the context-free in order to be included with the rest. Instead, it is considered that the category of highly successful advanced beginner is more appropriate for her.
**Competent performers:**

- Two attained successful results both in recognition and production of kanji.
- They accessed KS, moderately, but have negative attitudes toward KS and CALL methods. They prefer traditional approaches, but hesitate to express it overtly, probably because of Asian cultural constraints (Ballard 1987).
- The major interaction targets were the ST, and, occasionally, the KI for confirmation of their kanji knowledge in their L1 and L2.
- Due to the transferability of L1 knowledge, their skill learning pattern is “PRO” or “PRODEC”.
- The use of strategies is also different; a learner with an L1 typologically related to Japanese uses limited strategies, that is, he does not realise he uses strategies any more because he uses them unconsciously (O’Malley et al. 1990).
- The other used various strategies as the other groups did, however, she primarily exploited the combined use of the language transfer from her L1 with confirmation using KS.
- In spite of their superior kanji knowledge, interaction with the SQ was limited because CALL methods are not a preferred approach for them.

**Advanced beginner (highly successful)**

- She attained successful results both in recognition and production tests.
- She needs a little more experience to become a competent performer.
- She started “DECPRO”, but gradually moved to “PRODEC”.
- She actively used the strategies transferred from L1 learning, i.e., dictionary use, planning your study, self-monitoring.
- She had negative attitudes toward KS and CALL methods.
- Her interaction was with VA, KI, and ST, but not with SQ.

In conclusion, it is considered that the use of the CALL program for learning kanji characters affects beginner JFL learners with different backgrounds in L1 and L2 in terms of interaction and strategy use, as well as outcomes. The “yes-J” group reveal
themselves to be the most beneficial recipients, while the “yes-K” group receive the least benefit due to the transferability of previous knowledge and skills in information processing gained from their L1 learning experience. Since the level of some activities in the KS program is relevant for the “yes-K” group, or at least not easy, the possible reason is the incompatibility of the application of CALL methods for learning kanji with their learning style. On the other hand, the performance outcomes by the “no-J” group indicate four different patterns; highly successful advanced beginner, very successful advanced beginner, successful novice learner and unsuccessful novice learner, mainly because of the quantity and quality of practice and using the appropriate strategy at the proper time. Another factor for these varied outcomes depends on individual differences in the affective attitudes toward CALL methods, such as preference. It may also be different motivations, learning styles, and personalities, but those are beyond the scope of this study.

8.6. Discussion

In this chapter, the third research question about performance outcomes was investigated in relation to interactions with KS and the use of strategies from the perspective of skill learning. Also, from the viewpoint of SLA, the effects of using the KS program as an instruction tool were found in the use patterns of the kanji learning strategies and an interlanguage utilising new and existing knowledge by transferring it from the L1 to the L2. Further, the following three major issues will be discussed in terms of the three major different stages of skill development, competent performers, advanced beginners and novice learners among the 17 participants:
- Different outcomes from working memory and long-term memory in the production phase among the three performance groups
- Significance of strategy use for learning kanji among the three performance groups
- Further examination of contextual learning in relation to outcomes, KS interaction and strategy use.

8.6.1 Different outcomes from working memory and long-term memory in the production phase among the three performance groups

Working memory and long-term memory perform at the production phase of the PPP sequential model in this study. The former is shown by the weekly hand-written quizzes right after CALL interaction, and the latter is represented by the recognition test in October and the production test in November. The average of the ten weekly quizzes during the study period is higher than the average of the delayed recognition and production tests, because information in the working memory is retrieved more easily and without much interference as it has just been encoded and put into storage. Then, the retention function delays forgetting slowly through practice, referring to the power law of practice. However, the memory loses retention over a long period due to the forgetting function, although a number of rehearsals with deep processing can improve recall by delaying memory losses. It is important to note that working memory, heavily based on shallow processing, is not enough to guarantee good long-term memory, as shown in the results of recognition and production tests. However, limited storage capacity can be compensated by deep processing with semantic involvement (Craik et al. 1972; Rumelhart 1980) and dual processing of visual and acoustic codes which are much more reliable for retention in and retrieval from memory (Gathercole et al. 1990, 1993)
Two significant patterns were found; one increased the scores in long term memory while the other decreased them. In the former pattern, two successful learners revealed elaborate processing practice in a highly stimulating manner during the last study period before the final examination, as study and test environments enhance recall if they match learners’ moods (Godden & Baddeley 1975, cited in Anderson 1995:287-289). One is in the “no-J” group. Her access to the program was mid-high, digesting the KS information presented explicitly in a bottom-up approach at first, but later trying to apply a top-down approach for processing with meaning. Until two thirds of the study period was over, her working memory quizzes were 50 to 60 per cent each time. After that, her first and highest achievement of 95 per cent on the last quiz gave her solid confidence for a 72 per cent in the recognition test of all the accumulated kanji. It implies that kanji information was accumulated in working memory and further activated to be encoded into long-term memory. Concurrently, noticing a small gap between her knowledge and the information on the screen advanced her discriminability. Her cognitive behaviour accelerated her ability to attain 81 per cent in the production test as she maintained repetitive writing practice accompanied by dual processing, mumbling the readings of kanji words, as one in the “yes-K” group did.

The other is in the “yes-J” group, with little access to KS due to his negative attitude toward CALL methods. Instead, he used a more individualistic learning style, based on his high motivation through direct contact with his Japanese family and his living experience in Japan. He attained approximately 84 per cent for the quizzes of working memory, and 77 per cent in the recognition and 93 per cent in the production tests for long-term memory. These high performance results take place through repetitive writing practice, which advances restructuring in the learning process.
One integrated KS in her own way by note-taking and using her own kanji cards whenever available, while another relied more on his own learning environment and extrinsic motivation. The common point is that both utilised cognitive and metacognitive strategies effectively, maximising their individual learning styles (Oxford 1996). On top of their self-generated practice, their better performance in the formal examination is probably due to the highly stimulating test mood engendering better recall.

In the latter pattern, however, four of the unsuccessful novice learners revealed opposite effects mainly due to lack of practice as shown below, together with a successful novice learner as a reference. This is consistent with studies reported by others (Takahashi 1993; Maingard 1999; Kato 2000).

Table 8.15. Outcomes of the Five Novice Learners

<table>
<thead>
<tr>
<th>Novice learners</th>
<th>Working memory</th>
<th>Long term memory</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weekly quizzes*</td>
<td>Recognition test</td>
</tr>
<tr>
<td>unsuccessful</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No-J: i</td>
<td>28-40</td>
<td>22</td>
</tr>
<tr>
<td>No-J: ii</td>
<td>48-49</td>
<td>36</td>
</tr>
<tr>
<td>No-J: iii</td>
<td>65-72</td>
<td>40</td>
</tr>
<tr>
<td>Yes-J: iv</td>
<td>43-49</td>
<td>67</td>
</tr>
<tr>
<td>successful</td>
<td></td>
<td>46</td>
</tr>
<tr>
<td>No-J: v</td>
<td>62-66</td>
<td></td>
</tr>
</tbody>
</table>

*The first figures of weekly quizzes indicate the scores for kanji form and reading, as both of the tests in long term memory include only kanji form and reading while the second scores include the scores for meaning.

Moving toward the end of the study period, the first in the table had increased fears of failure but maintained her motivation extrinsically to pass the course with assistance of interaction with KS while the second lost her motivation for learning kanji after changing her degree structure. Neither could utilise the learning strategies appropriately.
The third attained up to 72 per cent in working memory quizzes whereas the long-term memory test was only 40 per cent for the recognition test and 15 per cent for the production test. The fourth\textsuperscript{118} reached less than half in working memory and production tests, but gained 67 per cent in the recognition test. In contrast, a novice learner at the bottom achieved 66 per cent in the working memory, and no significant differences are found among them, but the latter achieved 45 per cent in the production test. The notable differences among them were that the last one was a voluntary CALL high access user with positive attitude toward KS while the third one was a CALL low access with negative attitude toward CALL methods, and relied on a “book and pen”. The fourth was a mid-access user to CALL but a “moody” learner without a clear direction for kanji learning except that she had a little background in learning Japanese. This implies that frequent exposure to L2 scripts in any form can assist, at least, recognition of kanji (Segalowitz et al. 1993), as active participation in skill development gives an opportunity to encounter and solve the problem of how to store and retrieve information in the production stage. Apparently, however, these unsuccessful learners could encode information in working memory but overlooked practice for retention in and retrieval of kanji from long-term memory due to a reluctance to self-practice, as Takahashi also reports about poor JFL beginners (Takahashi 1993:343).

It is certain that memory degenerates if forgetting is not slowed or prevented by practice. Importantly, working memory should be further activated by sufficient and meaningful practice involving deep processing, not just repetition, in order to lead them to skilled performances in a long-term memory.

\textsuperscript{118} Tomiko could be included as a successful novice learner since the average of production and recognition tests reached 50 per cent. The production test score is, however, too low to save her.
8.6.2. Significance in strategy use for learning kanji among the three performance groups

First, all of the learners in this study group utilised the frequency strategy or acknowledged the importance of it. Regardless, in learning an L2, using CALL or not, learners need to write repetitively to master kanji characters in a new environment. The frequent writing practice is considered to be “culture-independent” (Kess et al. 1999:42). It could be the reflection of teachers’ strategies in teaching kanji as reported by Shimizu and Green (2002). The insufficiency of repetitive practice leads to beginner JFL learners failing to learn kanji characters as evidenced by some novice learners.

The next issue is the high use rate of the self-monitoring strategy; 3.9 by the whole group. In particular, as discussed in section 7.5.1, two of the three subcategories in the self-monitoring strategy\textsuperscript{119} were highly used (4.4) as follows:

G1: Self-testing and relearn the kanji I don’t know. \hspace{1cm} (4.412)
G3: Thoroughly practice kanji that are easily confused. \hspace{1cm} (4.411)

Further examination of this strategy also indicates active use for learning kanji by all three performance groups, as shown below.

Table 8.16. Frequencies of Two Categories (G1 & G3) in the Self-Monitoring Strategy

<table>
<thead>
<tr>
<th>Competent performers</th>
<th>Advanced beginners</th>
<th>Novice learners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Highly successful</td>
<td>Very successful</td>
</tr>
<tr>
<td>5</td>
<td>4.3</td>
<td>4.6</td>
</tr>
</tbody>
</table>

\textsuperscript{119} The other subcategory of the self-monitoring strategy, "I write the kanji I have trouble with in a separate book for easy reference" was not used much (2.8) by this group, simply because they did not prepare a separate book.
Competent performers used both self-testing and practice "very often" (or 5 out of 5) in spite of their advanced skills and knowledge of kanji transferred from their L1s due to their familiarity with kanji learning strategies. Similarly, the rest including unsuccessful novice learners also utilised them actively, partly because G3 is a kind of frequency strategy, as mentioned above, except it is a monitoring function. The SILK differentiates the self-monitoring strategy from the metacognitive strategy, and categorises it to monitor learning cognitively as a "bridging strategy" between direct and indirect strategies.

Compared with the use scores (3.14 out of 5) by Bourke’s group, these figures in Table 8.16 are remarkably high, and imply considerable influence from the KS program for the JFL beginners regardless of how frequently learners accessed the program. Once they acknowledge the value of self-testing through interaction with KS, they test, find their weakness and practise by themselves in various ways, with or without KS.

Then, different patterns of unfamiliar strategy use were found among the learners. Competent performers utilised radical (3.5) and sequence (3.5) strategies, as other studies (Douglas 1992; Okita 1996) report that they are more popular at the upper level due to the requirement of more flexibility in skill development. Advanced beginners and novice learners used the visualisation strategy actively, since it is less demanding. However, unfamiliar strategies such as radicals, stroke orders, sequence and sound strategies were also used "quite often" to "sometimes", in combination with the visualisation strategy. In addition, some of them used sound strategy as a complementary strategy to facilitate memory visually and verbally (Gathercole et al. 1993). Although the use of the sound strategy is still limited (2.8) at this stage, the very
successful advanced beginners have the potential to develop their cognitive skills to become highly successful learners in the next step, especially as those visual and sound strategies are neither too demanding nor unfamiliar to them.

Another interesting point is the use of stroke order (3.6) along with visualisation (3.5) strategy by unsuccessful novice learners. The animated stroke order on the computer monitor in KS assists the use of visualisation strategy with its memorable visual impact. This also means that strategy use is considerably influenced by the method of presentation of the subject matters, even if a strategy is not familiar to or demanding for learners, as Bourke states, “students can be taught this skill at an earlier stage in their learning” (Bourke 1997:149).

Finally, strategy use by the unsuccessful novice learners was, in fact, well-balanced, covering the three representations of kanji. Most likely however, they did not use strategies at the right time in the right combinations. They also self-reported the repeated use of the frequency and self-monitoring strategies, as mentioned above. Consequently, it is considered that the quality of the practice was “stereo-typed” without involving “evaluation”, “selection” and “combinational skills” (Johnson 1996:40-44). It is most likely that the proper usage of multiple readings and homophones of kanji characters, or the simple discrimination of kanji graphics, were neglected during practice, especially at the input stage.

8.6.3 Further examination of contextual learning in relation to outcomes, KS interaction and strategy use
Contextual learning to promote phonemic representation from the beginning level was discussed in Chapters Three and Seven. One of the strategies that Okita (1995,1996) finds in kanji learning among first, second and third year college students, is contextual learning\(^{120}\). Contextual learning, such as “repeated reading of Japanese scripts” is used more by third year students. If first year students were to get more training in utilising contextual learning, such as interaction with the ST, what level could they reach in three years time in terms of application of the phonetic radical strategy to the phonemic representations of kanji in *kango* or Sino-Japanese words? Or should they wait for the phonetic radical strategy until the upper level?

The value in pursuing contextual learning from the early stage is not only in the deep processing, cognitively, but also in its inductive approach toward phonetic radicals of semantic-phonetic kanji characters linguistically. As discussed in Chapter Two, the number of kanji to be learned by graduation is the 1,945 Jōyō kanji which include a total of 4,087 readings; 2,187 *on-readings* and 1,900 *kun-readings*. Approximately 1,200 Jōyō kanji are semantic-phonetic, and 740 of them match the phonetic radical with the whole character reading. It is no doubt worth choosing the most cost-effective approach under these circumstances. One study (Saito et al. 1998) reports that L1 readers of Japanese performed well in naming the kanji with the same phonetic radicals, and other studies (Alprine 2002; Dwyer 1997) suggest an early but systematic introduction of the phonetic radicals as radical awareness increases recognisability. However, there are pros and cons with regard to introducing phonetic radicals from the beginning level, mainly because phonetic radicals affect only *on-readings* which are used only for *kango* or Sino-

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\(^{120}\) After applying factor analysis for 30 kanji learning strategies, she categorises them into rote learning and mnemonics learning besides contextual learning (Okita 1995,1996).
Japanese words, not for the *wago* or traditional Japanese words used more during the beginning level.

As regards the radicals, the SILK deals with the semantic radicals in the radical strategy from the beginning level as many practitioners do, but the phonetic radicals are not clearly mentioned in it. According to the recommended guidance for the different stages of kanji learning (Bourke 1997:224), “stage 2” (81-240 kanji) introduces some of the semantic radicals while the whole radical system is introduced at “stage 3” (241-440 kanji). However, it is not clear whether “stage 2” and/or “stage 3” includes phonetic radicals. For example, 昨 and 作, 遠 and 関 are often introduced by stage 2, and each pair shares phonetic radicals /saku/ and /en/ respectively. Some kanji with phonetic radicals are included in “stage 1”, sometimes as compound kanji\(^{121}\), although the number is limited. As a consequence, if the SILK includes phonetic radicals in the radical strategy, learners may gradually notice the relationship between phonetic radicals and the *on*-readings of kanji words. At the same time more explicit instruction, along with supporting exercises would be helpful.

Koda notes that the development of L2 character processing competence begins with “an unanalytical, holistic processing mode”, but that it gradually becomes an “analytical, word-learning approach” (Koda 2002:241). At the same time, processing skills gradually develop discriminability with Intraword Awareness (IA). This top-down approach relates to the linguistic processing system during interlanguage development: the rule-based system or the exemplar-based system (Skehan 1998:62). This is applicable to

\(^{121}\) The radical 木/moku/tree is introduced in a compound word of 木曜/mokuyō/ Thursday.
kanji learning. The former is a demanding approach for processing kanji information, for example, learners must apply the rules of on/kun usage after obtaining the basic information of on- and kun-readings for each kanji. On the other hand, as the latter is quicker to use for communication, learners can gain reading information of a kanji word from the ST as an example and use it as it is because the phonemic representation is fixed at the word level. It is operative immediately, but its weakness is in the vast amount of memory required for encoding and retention of each combination at a lexical level.

A halfway methodology, proposed by N. Ellis, seems suitable for kanji learning. It is attained “explicitly through selective learning (the learner searching for information and building, then testing, hypotheses)”, (N. Ellis 1994:214). So, it is suggested for future study that this halfway methodology could fill the gaps in Koda’s “holistic” to “analytical” approach for contextual learning, especially linking on-readings in conjunction with the phonetic radicals. At the beginner’s level, in particular, it is important that the main purpose is to learn on-readings at the lexical level, and the phonetic radicals supplementarily at the sub-lexical level, in order to gradually sensitise learners to identical or similar readings of kanji characters and the phonetic radicals of the kanji. In other words, when learners encounter new kanji characters, mostly in the multiple kanji words or jukugo in the ST, for example, they can find an appropriate reading in the context and, hopefully, link it with the phonetic radical information of the kanji segment, presented in a help function such as a balloon. After that, learners return to the ST and continue to comprehend it in the context.
Thus, contextual learning can encourage the gradual use of the radical strategy, along with the sound, sequential and the inferring strategies discussed in the previous section, in the framework of skill development in the DECPRO to PRODEC progression. Also, radicals are linked with the stroke orders in piece and whole practice. Certainly, this approach is trainable using CALL methods from the beginning level, given that appropriate assistance, like the balloon function in the ST, is available, and contextual learning can be developed gradually to sensitise learners to the phonetic radicals by the halfway methodology and, to some extent, explicitly, in a suitable context.
CHAPTER NINE:
CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the conclusions and discusses the implications of the study. It outlines the strengths and limitations and makes recommendations for further study on kanji learning strategies for beginner JFL learners.

9.1 Conclusions

This study investigated the various approaches used by beginner JFL learners with different backgrounds in L1 and L2 to learning kanji using the CALL kanji program KanjiSensee (KS). There are three groups, the “no-J” without any previous learning experience of Japanese, the “yes-J” with learning experience of Japanese as an L2 including a little kanji, and the “yes-K” with kanji backgrounds in their L1. Participants’ usage of the information resources in the CALL program and their strategy use for learning kanji were examined, cognitively and strategically, to determine how they interacted with the program to attain their goals. These learning processes were then related to students’ performance outcomes. The conclusions of this study relating to interaction with the CALL program, kanji learning strategies and learning outcomes are presented below.

9.1.1. Interaction with the KS program

The three components in KS represent three learning stages based on the “PPP” skill learning model (Johnson 1996); the Kanji Introduction component (KI) as presentation,
the Story component (ST) and Quiz component (QZ) as practice\textsuperscript{122} and the weekly handwritten quizzes right after the CALL sessions as production. This study showed that the roles of each component vary depending on the learner’s current level of language learning. While the explicit information in the KI was utilised by all to develop and/or confirm mental databases of basic kanji information, interaction with the ST component varied among the students. Some students interacted with the ST at a shallow level while others carried out deep processing, utilising the non-linear resources. In contrast to the use of the KI and ST components, the majority in the “no-J” and “yes-K” groups did not actively interact with the QZ component, because the use of the Japanese word processor (JWP) for learning kanji was not favourably received. Lynch (2000) made a similar observation with JFL beginners in a study of electronic mail correspondence. Insufficient practice of kanji prior to self-testing with the QZ component caused difficulties which accelerated unfavourable attitudes for most in the “no-J” group, while the “yes-K” group preferred handwriting for self-testing, a more familiar method from their L1 character learning background. Students in the “yes-K” group acknowledged the “helpfulness” of the JWP up to a point (3.3 out of 5), but this figure may indicate their Asian cultural constraints to respect their teachers’ efforts (Ballard 1987) as another study also reports (Kato 2000). The “yes-J” group gained more benefit from the KS program due to their kanji knowledge, processing skills and curiosity to take up the challenge posed by kanji in a non-threatening CALL environment. However, some preferred to continue using their own learning styles rather than interacting with the KS program.

\textsuperscript{122} The QZ component may be either practice or production while interacting with KS.
The varied patterns of interactions can be explained by Anderson’s skill learning model (section 3.1.2.3), showing how learners proceduralise knowledge for automatisation, and by Johnson’s (1996) modification of it to take account of the fact that all learners do not necessarily take the same route due to different backgrounds. The patterns of progression by the learners in this study are summarised as follows:

Table 9.1. Patterns of Progression by the Three Groups

<table>
<thead>
<tr>
<th>Learners’ Groups &amp; numbers</th>
<th>Patterns of progression</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-J (6)</td>
<td>2 DECLarative and 4 DECLarative-PROcedural</td>
</tr>
<tr>
<td>Yes-J (8)</td>
<td>5 PROcedural-DECLarative, 1DECLarative-PROcedural (and 2 uncertain due to low interactions)</td>
</tr>
<tr>
<td>Yes-K (3)</td>
<td>2 PROcedural-DECLarative and 1 PROcedural</td>
</tr>
</tbody>
</table>

Figures indicate the number of participants.

The majority in the “no-J” group progressed from declarative knowledge to procedural knowledge, including DECPRODEC simply caused by forgetting (Lightbown 1985). Some were gradually able to generalise their production by choosing the proper rules of kanji representation, but some were still DEC at the cognitive stage because they overlooked the necessity of repetitive practice to achieve the hierarchically directed goals of language (Johnson 1996). In addition, insufficient motivation may also restrict students’ progress. One student, however, did demonstrate PRODEC, briefly, toward the end of the study period by trying a more naturalistic approach through initial exposure to semi-authentic stories in the ST. The majority of the “yes-J” demonstrated the PRODEC pattern towards the end of the study period, mainly because they could increase their “combinational skills” (Johnson 1996:41-42) by applying the three
representations of a kanji for its lexical and limited contextual levels. But, one learner remained DECPRO due to her “moody” attitude toward practice which affects the learning behaviours of skill development for “building up a set of well-learned, automatic procedures” (McLaughlin et al. 1996:216). On the other hand, the “yes-K” demonstrated PRO or PRODEC at the end of the study. Because of the transferability of processing experience and some kanji knowledge from their L1s, they did not start to learn kanji declaratively.

Without sufficient and meaningful practice, one cannot attain the goal where “ra=0” (“required attention becomes zero”, Johnson 1996) in learning kanji. Practice comprises part practice and whole practice. The “no-J” group used part practice, one kanji at a time, looking for declarative knowledge such as basic information about a kanji without context. They perceived a kanji as the whole-character in the KI, rather than perceiving its segmental information such as radicals and stroke order. In other words, due to a lack of analytical skills, they were unable to link the whole character properly with the radicals or stroke orders. On the other hand, some of the “yes-J” and “yes-K” groups used whole practice, often mixed with part practice, by interacting with a semi-authentic story using the ST. Their more advanced processing skills in “evaluation of data”, “selection” and “combinational skills” (Johnson 1996:35-36) allowed them to operate at a more complex level than the “no-J” group.

The results of handwritten quizzes indicate the current level of production from working memory; the “no-J” reached 62 per cent, the “yes-J” 81 per cent and the “yes-K” 98 per cent on average. All of the groups shared higher scores for the semantic
representation of kanji than they did for the graphemic and phonemic representations. Not surprisingly, the “yes-K” group obtained the highest scores of all, and the “yes-J” group also showed good outcomes with fairly even progress in the three representative areas. At the same time, the “no-J” group was still progressing, although having difficulty with kanji reading. Their scores from kanji meaning were much better than from reading and form, in comparison with their counterparts in the “yes-J” and “yes-K” groups. This result seems to be contradictory to the psycholinguistic studies of word recognition, as Shimizu states that “a phonological coding system seems to be a dominant feature of the short-term memory (STM) encoding process regardless of a student’s linguistic background” (H. Shimizu 1997:53). As far as a decoding process is concerned, however, this is consistent with the findings of many studies in SLA (Ishida 1989; Y. Shimizu 1993), that the phonemic representation of kanji characters is the most difficult to learn.

The study also showed that it is valuable for L2 learners to become sensitised to the existence of “newness” such as “homographs, near-homographs, and other potential sources of graphemic confusion” (Huckin & Bloch 1993:174) from the beginning stage. It is certain that noticing bits and pieces in the KI as input information influences output from working memory (Skehan 1998; Schmidt 1994,1995). The large presentation of each kanji graphic with its phonemic and semantic representations on the same screen, followed by the stroke order to facilitate the initial visual perception was well received by many learners, especially the “no-J” learners. This is an example of CALL’s “memorable form of input” (Pennington 1996:8). Partly due to lack of explanations, however, the colour-coded presentation of radicals was not adequately utilised to link
stroke orders and to reunify kanji as chunks comprised of several strokes to save into storage for encoding semantic and/or phonemic information. During the study period, acoustic mnemonics were not as frequently used by all as they were during the preparation period. However, some of the “no-J” and “yes-J” groups noticed that mnemonics work well with pictograph and simple ideographic kanji, but not very well with the more abstract kanji.

9.1.2. Kanji learning strategies while using the KS program

The results of the Strategy Inventory for Learning Kanji (SILK developed by Bourke 1997) test instruments as used in this study indicate that the planning your learning strategy was the most used, followed by association, physical/emotional response and story strategies, while sequence and stroke orders strategies were used least. This study group realised the necessity for total management of learning to overcome a difficult language, Japanese. This finding is consistent with other studies (Chamot et al. 1996; Maingard 1999). In particular, the learners did make much use of the planning your learning strategy for setting short-term goals along with the self-monitoring strategy for pursuing them directly. Clearly, it is more difficult to prepare a long-term plan when starting to learn a new language.

A comparison of the current study with Bourke’s (1997) study reveals that CALL methods influenced the choice of strategy use; this group, working with the KS program used all strategies rather evenly, while Bourke’s group leaned towards the use of the association and story strategies. The familiar strategies from the L1 such as association
and story strategies were transferred, but it is difficult for students to establish unfamiliar strategies like sequence and stroke orders when new contents and strategies appear concurrently. This means that strategy transfer depends on the distance between the L1 and L2, much like language transfer (Koda 2002). However, beginners rely more on familiar strategies from their L1 than advanced learners do, despite the distance from the L1. In addition, five more strategies, inferring, naming, taking notes, translation and preparation strategies, which were originally included in the Strategies Inventory for Language Learning (SILL developed by Oxford 1990), were rediscovered in this study. This indicates that materials used in a CALL program explicitly and implicitly affect both learning of the content and the accompanying strategies. Furthermore, based on the average use of each strategy, the frequency strategy was used actively and concurrently with other strategies by both Bourke’s and the present study groups. As discussed in the first research question, sufficient and meaningful practice is essential to perceive, store and automatically retrieve new language information from memory. Repetitive writing practice for learning orthography in the L1 and the L2 is culture-independent (Kess et al. 1999). Lack of practice affects the development of orthographic processing skills for recognition and production, even using CALL methods.

Finally, for the rest of the strategies used by the present three groups, the “no-J” and “yes-J” groups used more sound, experience and visualisation which corroborate readings, meanings and forms of kanji respectively, but fewer compensation strategies such as dictionary use. On the other hand, the “yes-K” used fewer of the former three strategies, but more compensation strategies. The choice of strategy use relates directly to learners’ experiences in learning their L1s and the three representations of kanji in the L2 as subject matter.
9.1.3 Effects of the KS program on learning processes and outcomes

Outcomes are the final products of input, as shown in Figure 3.1 in Chapter Three. L2 information is processed, through different types of exposures to the L2 using a CALL program, to an interlanguage system (Selinker 1972) under the influence of the L1 and individual learner factors such as learning strategies used in the L1 and L2 (R. Ellis 1994a).

The summary below of the performance outcomes by the three groups shows kanji learning using the KS program during the preparation and study periods for two semesters. As outlined in Chapter Eight, the categorisation is based on the “five stages of skill acquisition” (Dreyfus et al. 1986:19-36), novice learners, advanced beginners, competent performers, proficient and expert learners. No one could attain the top two stages among this JFL beginner group. The learners were categorised into three stages in which advanced beginners and novice learners were further divided into two additional levels, as shown below.

Table 9.2. Outcomes of the Three Study Groups

<table>
<thead>
<tr>
<th>Learners' group</th>
<th>Competent performers</th>
<th>Advanced beginners</th>
<th>Novice learners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Highly successful</td>
<td>Very successful</td>
</tr>
<tr>
<td>No-J</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Yes-J</td>
<td>0</td>
<td>4 (1)</td>
<td>3 (1)</td>
</tr>
<tr>
<td>Yes-K</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Numbers in the parenthesis indicate CALL low access learners.
This reveals that competent performers consist of 12 per cent, only from the “yes-K” group, advanced beginners\textsuperscript{123} 59 per cent, from a mixture of the three groups, and novice learners 29 per cent from the “yes-J” and “no-J” groups. In addition, the result of a judgemental evaluation of the affective domain of CALL methods revealed a satisfactory level as a whole. More precisely, half of the “no-J” and “yes-J” groups perceived that KS provides sound pedagogical practice for individual study, most likely due to “kanji myths” (Kaiser 1994:63) and the “newness” (Oxford 1990:136) of learning kanji using CALL, but the other half of the learners preferred a “book and pen”. Due to the small number of participants, one should be cautious in generalising from the results. Apparently however, while frequent interaction with KS may activate accurate production supported by self-testing and thorough practice of kanji, it may not always be associated with high performance. Learners’ negative attitudes toward CALL methods may be associated with low outcomes from the viewpoint of strategy use, because the use of the KS program affects learners both cognitively and metacognitively, as noted in section 9.1.2. Their failure comes from their inappropriate use of strategies as “tools for active, self-directed involvement” (Oxford 1990:1), while the successes among the “yes-J” group rely on frequent interaction with KS, integrating shallow and deep processing with frequent practice. Two in the “yes-K” group are competent performers who can solve problems by seeing “a situation as a set of facts” (Dreyfus et al. 1986:24), mainly because of the transferability of kanji knowledge and processing skills from their L1s (Koda 1997), as anticipated. In fact, one of them using “PRO” and/or “PRODEC” could be categorised as a proficient performer, because he dealt with kanji intuitively using “holistic similarity recognition” (Dreyfus et al.

\textsuperscript{123} One of the advanced beginners conquered the kanji hurdle and completed the Advanced Japanese Course four years later.
However, his involvement was not analytical enough to allow him to organise the tasks while dealing with the ST. Similarly, one advanced beginner (highly successful) could be a competent performer, but her interactions require more experience. Probably however, they could demonstrate better performance using a traditional approach, since all three of the “yes-K” group preferred the familiar face-to-face instruction by teachers, and indicated somewhat negative attitudes toward CALL methods.

From there, comparison of working memory on weekly handwritten quizzes and long term memory on the recognition and production tests as outcomes indicates significant differences among the “no-J” and “yes-J” groups. The first case is about two highly successful advanced beginners. One in the “no-J” group demonstrated a great effort to become an advanced beginner (highly successful), cognitively, by noticing a small gap between her current knowledge and new information at the input stage. At the same time, strategically, she practised kanji sufficiently inside and outside of the CALL laboratory, utilising kanji cards and her kanji notes prepared during the CALL sessions. Another, from the “yes-J” group, also achieved good results through his frequent practice and, surrounded by his Japanese family, his extrinsic motivation to master kanji in a humanistic way encouraged him to build a “construct of usefulness of kanji” (Shimizu & Green 2002:239). This particular situation substituted for his negative attitudes toward KS and “machine controlled” interactions. The common point between them was processing massive amounts of kanji information according to the principle of practice in skill learning - frequency, recency and regularity. This finding is consistent with other studies (Okita 1996; Kato 2000, Maingard 1999). In contrast, unsuccessful
novice learners overlooked the importance of the frequency strategy, and did not practise enough meaningfully, memorising and using kanji repeatedly either in perception or in production. In particular, one showed motivation extrinsically to pass the course by interacting with KS because she felt that the computer forced her to learn. At the same time, she wanted to know how to memorise the material without having to practise, as she had severe anxiety about failing the course. At least, however, CALL assists those poor learners to save face before their peers because it allows them to study independently. Usually though, unsuccessful novice learners are not motivated enough to go to the computer laboratory, and simply avoid the CALL sessions without compensating with self-study using a “book and pen”. Another study (McKay et al. 1997) reports a similar finding. Self-study using CALL methods needs to find a way to encourage unmotivated, poor learners to engage in effective use of the metacognitive strategy, “coordinat[ing] their own learning” (Oxford 1990:136).

Finally, the progression from DECPRO to PRODEC and contextual learning used among competent performers and advanced beginners were examined. Contextual learning is the learning of kanji in context, instead of in isolation. The learners’ performance in the DECPRO phase indicated a gradual movement from “one by one” learning of declarative knowledge to procedural knowledge. During the PRODEC phase, the learners managed contextual learning by incorporating the schema concept for processing meanings. Utilising inference, they integrate unknown information with existing knowledge (Rumelhart 1980) while interacting with the ST, mainly because an immediate “help” function is available to obtain the semantic and phonemic information of a kanji at the lexical level. Similar cases were observed in L2 reading in
German (Chun & Plass 1996) and in French (Lomicka 1998) in which multimedia annotation had a positive impact on L2 vocabulary learning. Also, sentence level translations could diminish the risk of incorrect inference from an L2 context (Grace 1998). Character-based languages, however, require further help for distant L2 learners to infer unknown L2 kanji words at the beginner's level. For example, in the interaction with the QZ component, a short, sentence-level translation was supplied, but some learners were still far from inferring the meanings of kanji words. Hence, it is reasonable to consider that text modification using CALL methods is invaluable for beginner JFL learners to enhance processing and retention of kanji. The learners need to: 1) assure readings and meanings of kanji words at the lexical level\footnote{It is preferred that learners also connect readings and meanings of kanji to their radicals.}; 2) infer meanings and usages of kanji words at the sentence level; 3) verify kanji words at the lexical level again to reconstruct the schemata and; 4) continue comprehension of the content.

9.2 Positive outcomes of the study

The strengths of this study are listed below from pedagogical, theoretical and methodological viewpoints.

9.2.1. In relation to CALL methods

- The quality of CALL materials, e.g., the animated stroke order, is associated with learners' noticing during the input stage (Pennington 1996; Schmidt 1995) which may encourage better output (Skehan 1998).
• The CALL methods encouraged participants to integrate the various pieces of information, such as kanji graphemic, semantic and phonemic representations in the KI, and implicitly promoted internalisation by providing immediate feedback/help in the ST.

• The salient impact of the KS program triggered learners’ attention for input modification to discriminate the complexities of kanji characters.

• Technological attributes of KS motivated the CALL mid to high access participants to practise a single kanji and/or kanji word in context through frequent exposure to the program.

• Learners’ affective domain toward CALL methods and the KS program could affect their interactions, which influence kanji retention in the end. So, it is important for practitioners to consider that all learners are not necessarily inclined to CALL methods, and learners’ valid attitudes must be considered for the employment of CALL methods in classroom instruction.

9.2.2. In relation to strategy use

• The transfers of strategy and language from the L1 to the L2 were confirmed among the beginner JFL learners for learning kanji characters, as another study (O’Malley et al. 1990) claimed that beginner learners rely more on transfer from the L1 than skilled learners.

• Strategy use depends on learning methods. For example, Bourke’s (1997) group by the conventional approach\textsuperscript{125} relied more on the use of familiar L1 strategies while the present study group using CALL methods utilised strategies rather evenly, mixing old with new strategies for kanji learning. Further, five additional strategies were found to be used among members of the present study group.

\textsuperscript{125} Bourke (1997) used CALL programs, but not as a major intervention method as in the current study.
• The planning your learning strategy is essential to manage the whole of kanji learning as an indirect strategy on one hand, while the frequency strategy is indispensable as a direct strategy to increase proficiency in the language on the other hand. Practice in a new language is essential to increase proficiency. However, practice should be meaningful, not just mimic-memorisation as learning is “non-stereotyped” (Johnson 1996:43). The labour-intensive exercise of practice is culture-independent (Kess et al. 1999). It is probably also method-independent.

• The different patterns of strategy use indicate the distance from the L1 and learning experience in the L2. For example, the compensation and radical strategies were used by the “yes-K” group while the sound, experience and visualisation strategies were used by the “no-J” and “yes-J” more than the counterpart.

• Strategy use can be attributed to the CALL learning environment as Pennington states that CALL provides “more focused, explicit, and specific uses of language” (Pennington 1996:2).

• Strategy education for learning kanji could be promoted by CALL methods.

9.2.3. In relation to the research methodology

• This study provides empirical data over one academic year, or two semesters, at the tertiary level, supporting “trustworthiness” (see Lincoln et al. 1985) among participants in the study. Too short an experiment may cause difficulty in verifying the learning process due to the Hawthorne effect (see section 5.2), often caused by the introduction of technology.

• Multiple sources of evidence support the triangulation of data in order to increase credibility in the qualitative analysis of this study.
As the three groups with different backgrounds in their L1s and the L2, “no-J”, “yes-J” and “yes-K” represent a normal distribution for beginner JFL classes in Australia, the results of this study can be easily applied to teaching kanji in regular classes of JFL in similar learning environments.

The participants were selected as naturally as possible, following the “naturalistic inquiry” (Lincoln et al. 1985) to increase the validity of the learning processes and outcomes of regular beginner JFL learners. For example, one of the highly successful advanced beginners, integrating the frequency strategy with his helpful learning environment, while another, an unsuccessful novice learner with little practice, fearing failure in spite of her strong extrinsic motivation.

Some studies warned about drawing immediate conclusions from laboratory experiments due to the artificiality of the learning situation (Hehelheimer et al. 2000; Hulstijn 1997). However, kanji learning seems suitable due to its nature as a written language rather than a spoken language.

9.3 The limitations of the current study

The limitations of this research include:

- The results of this study will indicate the effects of this particular CALL kanji program, not CALL programs in general, at the beginning level of JFL.

- Due to the limited number of participants with different backgrounds in L1 and L2, caution must be taken in generalising the findings. In addition, with only two male participants, gender differences can not be examined deeply.

- Data on interactions with the KI and the ST indicate the total frequency of interaction with these components, not for each activity within the components. So,
the data do not reveal how the frequency of interaction with each activity relates to specific strategy use in the SILK survey, e.g., sound in the KI, audio narration in ST and the “sound” strategy.

- The self-rated surveys used in this study may encourage participants to mark “strongly agree” or “5 out of 5” simply because participants tend to want to be treated as positive students, especially by their researcher teacher.

- One of the aims of the KS program is to develop self-regulated kanji learners. However, it is unclear whether the decreased exposure to the program at the end of the study can be interpreted as the result of students having become autonomous learners.

9.4 Recommendations and implications for future study

1. The findings of this study reveal that, through interaction with the activities in the KS program, five new strategies were used by the present study group: inferring strategy, naming strategy, taking notes strategy, translation strategy, and preparation strategy. It is recommended that these be included in the SILK test instrument (Bourke 1997), as different teaching methods support wider ranges of strategies. In addition, the SILK could possibly include phonetic aspects of the radical strategy since the semantic property is already included. Although there are pros and cons regarding early introduction of phonetic radicals, the attributes of CALL methods can implicitly assist some learners from the early stage, especially with the mixture of learners with individual differences in terms of noticing. Otherwise, many practitioners and students will continue to associate only the semantic linkage with a character and its semantic radical (Yamashita et al. 2000; Toyoda 2000), and the difficulty of kanji reading will persist until later learning stages.
2. Contextual learning for increasing the procedural aspects of kanji knowledge was applied to expand kanji vocabulary and text processing skills (see also Robinson 1993). It was also used for developing kanji processing skills, involving the small but gradual use of stroke order, radical, sound and sequence strategies, together with the inferring strategy, in skill development from the DEC PRO to PRO DEC progression. It is not clear, however, whether or not the learners in the present study group perceived and linked the special features of the phonological property of kanji at the lexical and sub-lexical levels, or even at contextual level.

Further study is recommended to examine contextual learning, dealing with the introduction of phonetic radicals from the beginning level. Designing a “help” function like the balloons, or a non-textual but semi-authentic context in Variety (VA), may include information such as the same or similar sounds of a phonetic radical and the phonemic representation of a kanji character. Also, in contrast to the advanced level, a single kanji as a radical should not be overlooked for inclusion in phonetic radicals at the introductory stage. For example, an independent single kanji 木/moku/ takes the role of phonetic radical within other kanji, e.g., 木/moku/. The interactions with VA were limited in this study, but the majority of those who interacted with the ST appreciated the help function for providing basic information in the context. It is still not clear, however, which learners accessed them, and how often and at what level this function was used for processing kanji.

Methodologically speaking, the exemplar-based approach in lexical learning is immediately useable for beginners at the lexical level while the rule-based approach
deals with phonetic and semantic radicals at the sub-lexical level (see also section 8.7.3 and Skehan 1998:53-55). So, learners have to first analyse quantities of piecemeal information, and then synthesise them using proper rules in the rule-based approach. As particular combinations of radicals occur frequently and regularly, learners expect to learn gradually so that they can process them faster and more accurately later. Given that the pronunciation of a whole character and its phonetic radical are available explicitly in the ST or VA, learners would gradually notice the feature of same or similar sounds between them from the JFL beginning stage, as the systematic presentation of phonetic radicals facilitates character reading (Dwyer 1997). However, an approach relying too much on the phonetic radicals before reaching a critical level (Lewis 1993; Coady et al. 1985; Mori & Nagy 1999), may require restructuring of the curriculum because it is more demanding and time-consuming (Alpine 2002). As in the evaluation by Komori et al. (2001) of internet kanji programs for advanced JFL learners, it is important to present appropriate information to accommodate beginner JFL learners. Beginners move from holistic to analytical kanji learning approaches (Koda 2002). So, gradual development in contextual learning seems more feasible for the current “topic-theme based approach” (as defined in Tohsaku 1994, see section 4.2.2.2) used in spoken and written communication. In particular, a halfway methodology integrating top-down and bottom-up approaches, proposed by N. Ellis (1994), will be attainable in the setting of classroom instruction. Pedagogically, we can no longer accept the high attrition rates.

A longitudinal study, using a large number of participants with a better gender mix, should be conducted to determine the influence of salient resources using CALL
methods on the strategy development of phonetic radicals among cross-linguistic learners and to ascertain whether there are gender dependent differences.

3. Surprisingly enough, the predominant JFL teaching strategy of kanji characters is the rote learning strategy, according to a survey of over 250 teachers of the Japanese language in Japan and the United States (Shimizu et al. 2002). The importance of memorisation cannot be denied. Under this sort of circumstance however, the integration of technology requires a great deal of attitudinal change for teachers. At the same time, it should contribute to developing strategy education as one of CALL’s attributes for all participants, including teachers and JFL beginners (see section 9.2).

It is essential for good learners to deal with massive amounts of information in a new language environment. The Oxford (1990) definition of the metacognitive strategy includes more than these planning and self-monitoring strategies (also see section 3.3.1), and many other studies report the necessity of active use of the metacognitive strategy for second language acquisition, including JFL learning (Takahashi 1993; Van Aacken 1999). However, some of the unsuccessful novice learners were unable to get enough benefit from self-paced, individualised learning through CALL methods, while the “yes-K” also demonstrated negative attitudes toward CALL methods, due to the lack of human contact.

Hence, it is suggested that human assistance such as a teaching assistant (TA) in the CALL laboratory, at least for a while, could fill the gap between the CALL tutor and the learners, and encourage the JFL beginners to manage kanji learning in the first instance despite unfamiliar methods.
CALL is not a method to save money by putting many students in a laboratory for self-study. On the contrary, CALL is an expensive method unless an effective approach can be found to maintain computers beyond their normal lifespan. Further study, assisted by a TA, will be necessary to examine how the use of the planning your learning and evaluating your learning strategies, along with self-monitoring strategies, affects learning processes and outcomes. Individual differences such as learning styles and motivation should also be included to examine how learners become autonomous learners in the CALL environment.

4. Finally, it is important for a teacher and researcher to regularly review and evaluate the genuine value of the program, theoretically and pedagogically (Schwartz 1995), so that the impact of obsolescence can be ascertained for further teaching and learning. Computer technology has and will continue to directly influence CALL methods in foreign language learning classes. So, two further studies should be carried out; one to find an effective method of using a Japanese Word Processor for beginner JFL learners in learning kanji characters, the other to evaluate KS for internet use for distance education\textsuperscript{127}. The KanjiSensee program is a home-made multimedia program, based on the curriculum. It was developed by one teacher for her students, as one of the teaching and learning materials for the course, as recommended by Hussin (1994). In spite of a tremendous amount of time for development, it is now becoming "obsolete" (see also McCarthy 2001), although it is still assisting students' learning. Of course, the program designer should consider learners' individual differences when introducing advanced technology.

\textsuperscript{127} The Australian, January 21 2003 (page 20), reports the failure of online courses in US.
9.5 Concluding remarks

Kanji learning is fundamental for learning written communication in Japanese from the beginning level. Without knowing kanji, JFL learners cannot process any information written for adults. Learning kanji requires both low and high levels of knowledge and skills for processing kanji’s basic representations and their elements, as well as kanji vocabulary and text comprehension. It is demanding, complicated and very time-consuming. So, cost effectiveness is vital for beginner JFL learners. The results of this study of learning kanji using CALL methods has shed light on: 1) the different paths for processing kanji information among the three groups, 2) the different patterns of strategy use due to strategy transfer from the L1, and 3) the importance of the planning one’s study strategy for individual study of kanji with a CALL tutor. In fact, regardless of whether CALL is used, “self-direction is essential to the active development of ability in a new language” (Oxford 1990:10). The proper use of the metacognitive strategy, in general, should lead learners to become autonomous JFL learners, and CALL methods should enable one to become more independent as long as the content supports learning that is based on pedagogical objectives.
BIBLIOGRAPHY


Chikamatsu, N. (1999). Japanese E-mail and its effect on communication skill development. CALICO Conference, Miami University, U.S.A.


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APPENDIX A. Consent form

The University of New England
THE HUMAN RESEARCH ETHICS COMMITTEE

PLAIN LANGUAGE STATEMENT / CONSENT FORM

Research project: Analysis of interaction and strategies in kanji learning using Computer Assisted Language Learning (CALL)

Person responsible: Satoko Van Aacken, School of Languages, Cultures & Linguistics, University of New England, Armidale, NSW 2351
ph: 02-6773-3028(wk) or 02-6771-5140(hm) fax: 02-6773-3505(wk)

Purpose: This study is to investigate beginning Japanese language learners’ strategies in Kanji character learning using computers. The goals are to determine the appropriateness of CALL methods for Kanji reading, writing, and retention in internal and external learning environments at the UNE.

Participation requested: The study will be held for six months, and employ interviews, diary writing and surveys. The final interview will be photographed by video while participants use the computer program. You are under no pressure to participate in an interview and would not be penalised for refusing to participate.

Possible risks: none

Should you have any complaints concerning the manner in which this research is conducted, please contact the Human Research Ethics Committee at the following address:

The Secretary
Human Research Ethics Committee
Research Services
University of New England
Armidale, NSW 2351
Telephone: 02 6773 2352 Facsimile: 02 6773 3543

You are free to withdraw your consent and to discontinue participation in the activity at any time. Your identity will be kept confidential by using a code name. The result will only be used for research purposes and for improving computer lab materials.

Thank you for your participation.

I (the participant) have read the information above and any questions I have asked have been answered to my satisfaction. I agree to participate in this study, realising that I may withdraw at any time.

Signature: ___________________________ Date: ______________
Name: _______________________________
APPENDIX B. Demographic data survey form

SURVEY

This survey is part of my research in learning Japanese writing systems. The purpose of the research is to improve our understanding about the problems and successes in learning kanji characters in Japanese language among students of Japanese as a foreign language. Your name will not be used in any research reports. If you have any questions, please contact me any time. Thank you for your cooperation.

Sato Van Aacken, (phone: 6773 3028)

1. Name: ___________________________ sex: male □ female □

2. Degree: In what degree are you studying Japanese language?
   BA □ BLanguages □ BAsian Studies □ BTeaching □
   others: (please specify) ________________________________

3. What is/are your Main Subject/s? (Tick them.)
   Japanese □ Asian Studies □
   Indonesian □ European studies □ Economics/Accountancy □
   Chinese □ Sociology □ Math/Statistics □
   French □ History/Archaeology □ Business/Marketing □
   German □ Psychology □ Philosophy □
   Italian □ Politics □ Computing/Engineering □
   Greek □ Geography □ Other Science □
   Linguistics □ Art/Media/Communication □

4. Which year of study are you now in (at uni)? 1 □ 2 □ 3 □ 4 □

5. Nationality:
   Australian □ Others □ (please specify) __________

6. Which language other than English do you use at home? (Tick only one)
   French □ German □ Spanish □ Italian □ Indonesian □ Thai □
   Mandarin Chinese □ Cantonese □ Korean □ Malay □ Japanese □
   English ONLY □ Other (please specify) □

7. Does your partner or do your parents actively encourage you to learn a foreign language (other than English)?
   YES □ NO □

8. How many years have you been studying Japanese?
   less than 1 □ 1 □ 1.5 □ 2 □ 2.5 □ 3 □ 4 □ 5 □ 6 □ more than 6 □

9. If you studied Japanese before you came to university, where did you study?
   □ I did not study Japanese before university □ At high school
   □ At weekend school □ At TAFE
   □ Adult education classes □ Other (Please specify)

10. Have you ever been to Japan?
    □ Yes, once □ Yes, more than once □ No

    If Yes, how long were your stays altogether?
    □ less than a week □ 1 week to 1 month
    □ 1 month to 1 year □ more than 1 year

End of survey
APPENDIX C. SILK Survey form

Strategy Inventory for Learning Kanji (SILK): Version 3
Test instrument for identifying strategies in use for learning Kanji (Bourke 1997)

The strategy Inventory for Learning Kanji (SILK) is designed to gather information about how you, as a student of Japanese as a foreign language, go about learning kanji. On the following pages, you will find statements describing possible approaches to the kanji learning task. Please read each statement and mark the response that describes how often you use that particular approach.


Please note that there are no right or wrong answers and no 'best' average scores for the different parts. Each individual will approach the task in his/her own unique way. This instrument is designed to give you a profile which summarises the way you are approaching the task of learning kanji.

Group 1: Direct strategies (strategies dealing directly with the task)

A. Association

A1. I create associations between the new kanji and other kanji I already know.
A2. I create associations between the new kanji and katakana.
A3. I create associations between the new kanji and other known symbols.
A4. I create associations between new kanji and letters of the alphabet.
A5. I associate kanji with other kanji from the same meaning group.
A6. I associate kanji with kanji that mean the opposite.
A7. I associate kanji with other kanji that look different but have the same reading.
A8. I associate kanji with other kanji that look same but have a different reading.
A9. I compare and contrast kanji that look similar so as not to confuse them.

B. Stories

B1. I make up my own stories according to what the kanji looks like to me.
B2. I make up my own stories according to the component elements of the kanji.
B3. I use stories told to me by my teacher.
B4. I use stories I find in reference books on how to remember kanji.

C. Radicals

C1. I group the kanji with other kanji containing the same radical.
C2. I remember the radical first and it helps me remember the kanji.
C3. I associate the kanji with the meaning of the radical.

D. Frequency

D1. I remember kanji by writing them out numerous times until I know them.
D2. I remember the kanji which I use often.

E. Experience

E1. I associate kanji with some personal experience the kanji reminds me of.
E2. I learn a kanji if I'm going to need it in the future.

F. Visualisation

F1. I visualise the kanji in my head and transfer the image to paper.
F2. I remember what it looked like on the page where I learned it from.
G. **Self-Monitoring**

G1. I test myself and relearn the kanji I didn't know.
G2. I write the kanji I have trouble with in a separate book for easy reference.
G3. I practise more thoroughly kanji that are easily confused.

H. **Compensation**

H1. If I don't know a kanji, I look it up in a dictionary.
H2. If I'm not exactly sure of a kanji, I ask someone who knows.

I. **Sequence**

I1. I associate the kanji with other kanji in the sequence I first learned it in.
I2. I place the new kanji in a sentence and remember it in that context.

J. **Physical/emotional response**

J1. I remember the kanji by the way it feels to write it.
J2. I remember some kanji because I don't like them for some reason.
J3. I remember some kanji because they are especially difficult.
J4. I remember some kanji because I like them for some reason.

K. **Sound**

K1. I associate the Japanese sound with the meaning of an English word.
K2. I associate the English sound with the Japanese meaning of the kanji.
K3. I use rhyme to remember kanji.
K4. I associate the Japanese sound with a letter of the alphabet.

L. **Stroke order**

L1. I remember kanji because I have committed the stroke order to memory.
L2. If I remember the first stroke, the rest comes naturally.

**GROUP II: Indirect Strategies (strategies for managing your learning)**

M. **Planning your learning**

M1. I have a set time each day/week which I spend learning kanji.
M2. I use flashcards to repeatedly practise kanji.
M3. I use a computer program to practise kanji.
M4. I use kanji as often as I can. (eg. in class notes, homework assignments, etc)
M5. I use a highlighter to organise the information in my kanji learning book.
M6. I try to find better ways of learning kanji from books or by talking to others.
M7. I buy kanji learning resources additional to those required in my course.
M8. I borrow kanji learning resources from the library/friends.
M9. I set myself goals and objectives for what I wish to achieve each week.
M10. I set myself a long-term goal on how many kanji I want to learn.

N. **Evaluating your learning**

N1. I test myself regularly to check whether I know the kanji I have studied.
N2. I keep a list of the number of kanji I know.
N3. I write a language learning diary where I record my progress and my feelings.

O. **Co-operating with others**

O1. I work with others on kanji learning, practising together.
O2. I discuss my feelings about the kanji learning task with others.
O3. I ask another person to test me on my kanji.

*That's all. Thank you for your cooperation.*  

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In this questionnaire, I would like some information about your feelings about the CALL “KanjiSensee” and the computer. There are no “right” or “wrong” answers. Your name will not be used in any research reports. Please answer the questions freely and honestly. Thank you for your cooperation.

Sato Van Aacken
Room #181 ph: 6773-3028

Please circle the response that best describes how you feel about each of the following statements.

<table>
<thead>
<tr>
<th>1=strongly disagree</th>
<th>2=disagree</th>
<th>3=neutral/unknown</th>
<th>4=agree</th>
<th>5=strongly agree</th>
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<tr>
<td>1. The level of KanjiSensee is appropriate for me.</td>
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<td>2. I would say that I'm usually very interested in KanjiSensee.</td>
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<td>3. I feel that I learned vocabulary, as well as kanji, from KanjiSensee.</td>
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<td>4. I feel that KanjiSensee helped me learn Kanji faster.</td>
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<td>5. Computers are usually very frustrating to work with.</td>
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<td>6. I find KanjiSensee to be very boring.</td>
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<td>7. KanjiSensee makes learning Japanese more interesting.</td>
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<td>8. Computers make study more enjoyable.</td>
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<td>9. I prefer a “book and pen” to using a computer for kanji learning.</td>
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<td>10. KanjiSensee gave me many hints on how to learn Kanji.</td>
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<td>11. I felt somewhat embarrassed to ask for assistance when I had computer problems.</td>
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<td>12. I can learn kanji more independently when I use a computer.</td>
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<td>13. Using KanjiSensee increased my interest in learning Japanese.</td>
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<td>14. I feel that I will be able to read Japanese newspapers by graduation from university.</td>
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<td>15. I feel that kanji is not difficult to learn when I use KanjiSensee.</td>
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<td>16. Using a computer gives me more control over my Japanese learning.</td>
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<td>17. I enjoy the challenge of using a computer.</td>
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<td>18. I'd like to continue using a computer for kanji learning next year.</td>
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<td>19. I prefer studying with KanjiSensee to using the workbook.</td>
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</tbody>
</table>
CALL KanjiSensee:

Variety:
20. Warming up (variety) activities were helpful. 1 2 3 4 5

Kanji Intro:
21. The Kanji “cluster” presentation with different colours is helpful for focusing on the pieces of each Kanji. 1 2 3 4 5
22. ON-KUN readings and meanings were useful. 1 2 3 4 5
23. The presentation of the stroke order was helpful. 1 2 3 4 5
24. I feel that I can distinguish the parts of the kanji now even if the kanji are complicated. 1 2 3 4 5
25. “Mnemonics” contributed to my remembering Kanji. 1 2 3 4 5

Story:
26. The story was difficult, but challenging. 1 2 3 4 5
27. It is easier to understand the stories on the computer than those in the text. 1 2 3 4 5
28. The reading comprehension quiz was helpful to check my understanding. 1 2 3 4 5
29. When reading unknown kanji words in KanjiSensee, the “vocabulary balloons” aided my kanji learning. 1 2 3 4 5
30. While reading the stories, I often used the “translation” at the bottom. 1 2 3 4 5

Kanji Quiz:
31. The Kanji Reading Quiz was helpful. 1 2 3 4 5
32. The Kanji Writing Quiz was helpful. 1 2 3 4 5
33. English translation for quizzes (Eigo) were helpful. 1 2 3 4 5
34. Typing the letters using “Kotoeri” was difficult. 1 2 3 4 5
35. From time to time, I evaluated my kanji learning by checking the scores. 1 2 3 4 5

End of Survey

Thank you for your cooperation.
APPENDIX E: Kanji Recognition Test

KANJI SURVEY

This survey is part of the research to develop the Kanji program. The result does not affect your course grade at all and your answers will be kept confidential. Thank you for your participation.

Sato Van Aacken (room #181, ex 3028)

Name: ________________________________

Please choose the correct readings or Kanji underneath and circle them.

1.今年は雪が多いですね。
   a. きょうねん  a. ゆき  a. おおき
   b. ことし  b. あめ  b. すくない
   c. さくねん  c. くも  c. おおい
   d. らいねん  d. くもり  d. つよい

2.クラスでは日本語で話して下さい。
   a. にほご  a. かして  a. ください
   b. にほんご  b. たして  b. したかい
   c. はんご  c. はなして  c. さげさい
   d. にほんご  d. よまして  d. ください

3.キャンベラはシドニーの西ですか、南ですか、北ですか。
   a. ひがし  a. みなみ  a. にし
   b. きた  b. にし  b. きた
   c. みなみ  c. きた  c. ひがし
   d. にし  d. ひがし  d. みなみ

4.朝は空が青くて、とてもきれいです。
   a. よる  a. ぐう  a. あかく
   b. ひる  b. いえ  b. しろく
   c. あさ  c. うち  c. あおく
   d. はん  d. そら  d. くろく

5.日本の酒はとても高いですね。
   a. さか  a. おいしい
   b. しゅ  b. あまい
   c. さけ  c. やすい
   d. ざけ  d. たかい

6.アーミデールは春も秋もいい天気です。
   a. はる  a. なつ  a. げんき
   b. あき  b. ふゆ  b. てんき
   c. なつ  c. はる  c. でんぎ
   d. ふゆ  d. あき  d. てんぎ

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7 コーヒーにお湯を入れてください。
   a ちゃ a はいって
   b ゆ b とれて
   c みず c くれて
   d しお d いれて

8 兄は毎週外国語の勉強をしています。
   a いつもと a まいしゅう a かいごくご a びんきょう
   b あに b まいにち b かいごくご b べんきょう
   c あね c まいねん c かいごくご c べんきょう
   d おとうと d まいげつ d かいごくご d べんきょう

9 夏より寒い冬の方が好きです。
   a なつ a あつい a なつ a きた
   b あき b さむい b あき b かた
   c ふゆ c つめたい c ふゆ c ほう
   d はる d すずしい d はる d ひと

10 家族は父と母と姉と弟です。
    a かそく a はは a はは a いもうと a あね
    b がそく b ちち b ちち b あね b いもうと
    c いえそく c ぱぱ c まま c あに c おとうと
    d かそく d そぼ d そぼ d おとうと d あに

11 あの白いシャツをきた人は中国語が上手です。
    a あかい a じゅうごくご a じょう
    b しろい b ちゅうごくご b じょうず
    c あおい c ちゅうごくご c しょうず
    d くろい d じゅうごくご d うえで

12 台風が来ましたから、昨日はかぜが強かったです。
    a だいふう a く a あした a つよかった
    b だいかぜ b き b きょう b よかった
    c たいふう c こ c きのう c よかかった
    d だいぶう d ら d きょうねん d たかかった

13 妹は音楽を聞くのが好きです。
    a あね a おんがく a いく a すき
    b いもうと b おがく b かく b しゅき
    c おとうと c おとがく c ひく c さき
    d あに d おんかく d きく d つき

14 今日は暑いですね。何度ぐらいですか。
    a あした a さむい a なんど
    b きょう b つめたい b なんかい
    c きのう c あつい c なんねん
    d きょうねん d すずしい d なんにん
15 お母さんは料理を作るのは下手です。
   a おとうさん b りょうり c する d じょうず
   b おかあさん b りょうり b やる b じょうず
   c おにいさん c しゃくろう c つくる c したて
   d おねえさん d しゅくどう d すくる d へた

16 ほしいものがないときは、てんいんにきいてください。
   a 物 a 持 a 店員
   b 国 b 時 b 员
   c 動 c 待 c 市
   d 運 d 間 d 店員

17 しょくじのまえにじかんぐらいうんどうをします。
   a 仕事 a 前 a 時間 a 通勤
   b 食事 b 後 b 時分 b 運動
   c 飲事 c 風 c 時間 c 週勤
   d 物事 d 花 d 時間 d 運転

18 はなやの みぎにきものをうっている みせがあります。
   a 市屋 a 左 a 切物 a 場
   b 花屋 b 右 b 洋服 b 買い b 味
   c 花屋 c 外 c 和物 c 同 c 店
   d 花屋 d 有 d 着物 d 主 d 茶

19 わしょくのほうが ようしょくよりいいです。
   a 日食 a 海食
   b 私食 b 朝食
   c 和食 c 昼食
   d 秋食 d 洋食

20 あかい かいをみたことがありますか。
   a 青い a 風 a 目に
   b 白い b 回 b 見た
   c 赤い c 買い c 買た
   d 黒い d 貝 d 会た

21 きょうびは九時にはじまって、ごご二時におわります。
   a 木曜日 a 始まって a 午前 a 起きます
   b 水曜日 b 合まって b 午後 b 終わります
   c 火曜日 c 開まって c 午後 c 立わります
   d 土曜日 d 閉まって d 午前 d 始わります

22 インスタントしょくひんはちょっとあじがかわるいです。
   a 物品 a 味 a 色い
   b 物理 b 回 b 暗い
   c 食品 c 貝 c 良い
   d 食料 d 名 d 悪い

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23 ぜんぶで ななひゃくえんです。

a 千円  b あんぶん  c えん  d せんぶ

24 にくと やさしい さかなで どれが いちばんいいですか。

a 魚  b 料理  c 肉  d 鳥

25 いちばで こめと やすい とりにくを かいました。

a 一番  b 市場  c 市  d 一晩

26 かみが なが広いので、みじかく きりました。

a 多い  b 赤い  c 長い  d 強い

27 きいろの ふくを きている人は アンさんの ごしゅじんです。

a 理色  b 黄色  c 青色  d 悪色

28 このくろい ペンは つかかった オフィスへ かえしてください。

a 黒い  b 長い  c 墨い  d 高い

29 へやが すこし くらいので、でんきを つけてください。

a 電館  b 電屋  c 電子  d 電気

30 すみません。もう いちど いってください。

a 一部  b 市度  c 一度  d 今度

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APPENDIX F.
Weekly Handwritten Kanji Quiz (week2) sample

#2 1998年  月  日  名前（）

<table>
<thead>
<tr>
<th>読みかた / reading</th>
<th>漢字 / Kanji</th>
<th>いみ / meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>昨日</td>
<td></td>
<td></td>
</tr>
<tr>
<td>そら</td>
<td></td>
<td>strong</td>
</tr>
<tr>
<td>すこし</td>
<td>高い</td>
<td>hot</td>
</tr>
<tr>
<td>ひがし</td>
<td>多い</td>
<td></td>
</tr>
<tr>
<td>さむい</td>
<td></td>
<td>north</td>
</tr>
</tbody>
</table>
Dear JAPN 101 students,

RE: Diary writing

As a PhD researcher, I am writing to request your participation in studying approximately 180 Kanji in various contexts. I would like to ask you to write a diary in which you make positive or negative comments about how you used the study materials and learned during your study. I am specifically interested in researching the learning Kanji in a foreign language environment. My main concerns are:

1. how you learn Kanji using the computer program: it may not be the same each time i.e., preview, review or computer with opening the workbook. Also, the order in which you use the program; e.g. you just follow the program, the other way round, or random order.

2. whether you use computer tools for each Kanji, i.e. Vocabulary, Translation, Radicals, Stroke orders. Or you use a workbook/textbook or dictionary as a reference.

3. during the practice, you thought that you really needed something to solve your problem, but you could not get it. Consequently, you compensate in some other way, and how?

4. how do you feel each time during lesson and/or drill, i.e. satisfied, frustrated, something different, etc.

5. which types of activities do you find useful for your Kanji learning

6. any technical and language problems you had and how you solved or got around them

7. any comments as to why you did/did not use the program at the expected day/time, etc. i.e. -afraid of serial technical problems
   -forgot the previous Kanji
   -writing on paper instead of using computer
   -busy with other things

Your name will not be used in any research reports. Please write your comments freely and honestly.

NOTE:

When you start to use a computer at Mac lab, please “log-on”. Then, you'll see a “name” and “password” window. Type “kanjisensee” for the name, and “research” for the password. When you finish, please don't forget to “log-off”. If you have any technical problem, please contact the following:

Technical assistant: Greg Siettmann, ph: 3932 (extension)

I will contact you sometime in September/October to discuss and collect your diary of Kanji learning. Please return the diary to me by mid-October.

Thank you again for your cooperation.

Sincerely,

Sato Van Aacken
School of Languages, Cultures & Linguistics, UNE
ph: 02 6773-3028, fax: 02 6773-3505 email: svanaac@metz.une.edu.au
APPENDIX H. Tracking Data - sample

TEST DATA FILE

Name: xxxxx
Student #:98xxxxxx
Date: 060898  Time Modified: 4:31 PM
History:

<table>
<thead>
<tr>
<th>Screen Time(seconds)</th>
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<tbody>
<tr>
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</tr>
<tr>
<td>Objectives4B 110</td>
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<tr>
<td>PreReading 82</td>
</tr>
<tr>
<td>Activities 3</td>
</tr>
<tr>
<td>TaskMenu 1386</td>
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<tr>
<td>TaskMenu 1558</td>
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<tr>
<td>Activities 2</td>
</tr>
<tr>
<td>KanjiRQuiz 78</td>
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<tr>
<td>Activities 2</td>
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<td>KanjiRQuiz 181</td>
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<td>Reading 87</td>
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<td>ReadingCompQuiz 299</td>
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<td>KanjiRQuiz 111</td>
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</tr>
<tr>
<td>TaskMenu 377</td>
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<tr>
<td>Activities 1</td>
</tr>
</tbody>
</table>

Lessons:

Lesson Number: 4B
Reading Quiz score: 5
Reading Quiz attempted: 6
Kanji Reading Quiz score: 11
Kanji Reading Quiz attempted: 11
Kanji Writing Quiz score: 10
Kanji Writing Quiz attempted: 10

*******************************************************************************
APPENDIX I:

Average Use of Strategies by the Three CALL Access Groups

<table>
<thead>
<tr>
<th>Strategies</th>
<th>CALL-high</th>
<th>CALL-mid*</th>
<th>CALL-low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Association</td>
<td>3.08</td>
<td>2.92</td>
<td>2.91</td>
</tr>
<tr>
<td>Stories</td>
<td>3.13</td>
<td>2.93</td>
<td>2.79</td>
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<tr>
<td>Radicals</td>
<td>3.33</td>
<td>3.10</td>
<td>3.00</td>
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<tr>
<td>Frequency</td>
<td>5.00</td>
<td>4.71</td>
<td>4.67</td>
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<tr>
<td>Experience</td>
<td>3.75</td>
<td>3.21</td>
<td>3.75</td>
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<tr>
<td>Visualisation</td>
<td>4.63</td>
<td>3.29</td>
<td>3.75</td>
</tr>
<tr>
<td>Self-Monitoring</td>
<td>4.17</td>
<td>3.81</td>
<td>3.72</td>
</tr>
<tr>
<td>Compensation</td>
<td>3.25</td>
<td>4.21</td>
<td>3.42</td>
</tr>
<tr>
<td>Sequence</td>
<td>3.59</td>
<td>3.14</td>
<td>2.92</td>
</tr>
<tr>
<td>Physical/Emotional Response</td>
<td>3.94</td>
<td>3.61</td>
<td>3.54</td>
</tr>
<tr>
<td>Sound</td>
<td>3.13</td>
<td>2.11</td>
<td>2.17</td>
</tr>
<tr>
<td>Stroke Orders</td>
<td>2.75</td>
<td>3.43</td>
<td>3.42</td>
</tr>
<tr>
<td>Planning Your Learning</td>
<td>3.33</td>
<td>2.77</td>
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</tr>
<tr>
<td>Evaluating Your Learning</td>
<td>3.08</td>
<td>2.48</td>
<td>2.44</td>
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<tr>
<td>Co-operating with Others</td>
<td>3.58</td>
<td>2.57</td>
<td>2.17</td>
</tr>
</tbody>
</table>

Average         | 3.58      | 3.22      | 3.15     |

* CALL mid-access group includes three learners in the “yes-K” group.