

Multimedia assisted learning of Japanese *kanji* characters

Sara Librenjak, Kristina Vučković and Zdravko Dovedan

Department of Information and Communication Sciences

Faculty of Social Sciences and Humanities

Ivana Lučića 3, Zagreb 10 000, Croatia

Phone: (01) 6120 318 E-mail: sara.librenjak@gmail.com, kvuckovi@ffzg.hr, zdovedan@hotmail.com

Abstract - This research presents guidelines for usage of multimedia in learning Japanese writing system for international learners. The writing system in question, the Sino-Japanese script called *kanji*, consists of at least 2000 commonly used ideograms. Such system presents a great obstacle in acquiring Japanese language for a great number of international learners. The research consists of three parts. Firstly, we provide an overview of existing multimedia tools for learning and teaching the Sino-Japanese script. Secondly, we present the results of survey among 47 international students. They have been surveyed about their methods of learning *kanji* in classroom and self-study, as well as their perceived difficulties and problems. Lastly, we talk about the experiment about using multimedia in teaching and learning *kanji*. The group of 6 students spent one semester learning *kanji* using modern multimedia method, such as websites, videos and smartphones. The group was successful in acquiring a large number (300-400) of characters with greater retention and reported enjoyment in the process, which had been the biggest issues in the acquisition process.

I. INTRODUCTION

This article presents the research about methods for acquisition of Japanese writing script *kanji* in learners of Japanese as foreign language. Japanese language uses three separate scripts: two syllabic, phonographic scripts called *hiragana* and *katakana*, each containing 48 different characters, and *kanji*, a more complicated logographic script borrowed from China around 1st century A.D. Since *hiragana* and *katakana* are relatively simple to learn and represent no problem for most learners, they are not being dealt with in this research. On the other hand, *kanji* contains 2136¹ logographic characters with varying shape and more than a single reading, and most of the international learners of Japanese encounter problems while acquiring the script,

¹ These 2136 characters, called *jouyou kanji* (*kanji* for general use), are prescribed by Japanese government to be taught in schools as a part of compulsory education. Approximately a thousand of additional characters are used informally in personal writing, novels etc., while newspaper and other formal documents use only the *jouyou kanji*.

not only in Croatia, but in all countries that do not use or teach a variant of Sino-Japanese characters, like China or Korea. There is a considerable difference in overall language acquisition between *kanji*-using country nationals and other international (non-logographic) students [1]. It should be noted that one needs knowledge of at least 1000 characters in order to understand Japanese newspaper texts [2]. These facts lead us to believe that *kanji* literacy should be promoted in the learners of Japanese as a second language.

The fact that the students achieve poor results in learning *kanji* while learning Japanese was noted, but in order to precisely define the problems and possible solutions additional research was required. The hypothesis in question is that using multimedia helps, in order to simulate environment which naturally includes *kanji*, and to facilitate memorization process of complicated and often similar shapes of *kanji*. Firstly, the overview of learning and teaching tools for various platforms is given. Secondly, 47 international students of Japanese were surveyed about individual and classroom problems of acquisition of *kanji*, and their thoughts role of multimedia in the learning or teaching process. With the data collected from these two steps, a group of six students was chosen to take an experimental course in *kanji*. The course tried to show students an alternative method, both the classroom methods and self-study strategies using stories, etymology and multimedia learning and reviewing tools. The article will report the findings of this experimental course.

II. OVERVIEW OF LEARNING TOOLS

Multimedia assisted language learning is a field which emerged in the past few decades. The term refers to a learning process using various media, like text, picture, sound, video etc. In the case of language learning, computer is most often used equipment for presentation of multimedia. In the last few years, as Internet became widely available, fast and increasingly filled with multimedia content, multimedia assisted language learning and Internet usage became closely connected. Except for computers, other important platforms used in this overview are smartphones, which became, due to their convenient size and shape, a perfect supplement in foreign language acquisition. As we shall see, this is especially true in the case of *kanji* learning process.

The tools for the learning of *kanji* are divided by the method of usage in two groups: tools for specialized and explicit *kanji* learning, and tools which concentrate on other language skills, enjoyment or reference, enabling *kanji* acquisition in a more implicit manner. In both groups we will include tools for PC and two smartphone platforms, iOS and Android. All tools mentioned will be either in English or Japanese. Additional information about any of the tools is easily available online. Homepages of the tools mentioned are listed in the appendix at the end of this paper.

A. *Kanji learning tools*

Most notable offline tools specialized for *kanji* learning are various flashcard programs, especially SRS (spaced repetition system) flashcards. Flashcard software is based on the idea of physical flashcards: paper cards with new data on one side, and known one on the other. Since *kanji* are numerous and should be practiced often, this software is useful, and especially convenient on smartphones. User needs only few minutes a day to review and regular use is advised. Most popular software is *Anki*, a flashcards program available on almost any platform (PC, Linux, Android, iOS). Other similar programs include *King Kanji*, *jMemorize* and *Mnemosyne*.

While SRS flashcards are extremely useful, the number of online *kanji* learning tools is by far larger and more diverse. Online tool similar to flashcards, but using more advanced quizzing methods is *Memrise*. Like flashcards software, it can be used to learn anything. Some of the popular other choices include *Renshuu* and *Kanji Roushi*. Still, most of these tools provide only the visual information, and do not provide anything more than reviewing the data. An alternative choice is based on an original approach by Heisig [3], where *kanji* is divided in logical units and memorized by story about the units interacting. Site called *Reviewing the Kanji*, or an iOS based application *Remembering the Kanji* serve as perfect tools to accompany this approach. Similar, but less structured are *Kids Web Japan: Quick Kanji* and *Kanji Wiki* and *Kanji Pictographix* for iOS.

Other tools based on smartphone platforms are *Kanji*, *JA Sensei*, *JLPT Study*, *Kanji LS Touch*, *Kanji Flip*, *Kanji Sensei* and *My Japanese Coach*, which is similar in design to a videogame. Some other smartphone applications are games with *kanji* learning as a theme, for example *Kanji Dream*, *Kanji Word Search*, *Kanji Pop* and *Kanji Maze*.

While most of the tools mentioned are useful in *kanji* learning, a user should have some guidelines about effective usage in order to get the most out of them. Also, many of the international learners are unaware of the existence of these tools, even though they are easily accessible and mostly free.

B. *General Japanese learning/ reference tools*

Japanese language reference tools, such as online dictionaries, are very useful in language acquisition as well. Many of the students use stand-alone electronic dictionaries, but they are developed mainly for Japanese

students of English and unavailable in many countries. An alternative could be aforementioned online dictionaries. Best choices include *Jisho*, *Goo* and *JimBreen's WWW J-Dic*. Most are based on the same dictionary data, including specialized name, technical dictionaries or sentence databank, but they differ primarily in the interface design. Notable reference tool is a website called *Chinese Etymology*, which provides data for historical development of a character. Dictionaries for smartphones include *Kotoba* and *Japanese* for iOS, and *JED – Japanese Dictionary* and *Jishop* for Android.

Except for the dictionaries, extremely useful tool is a browser extension *Rikai*. *Rikai* provides the reading and meaning of a word in a browser or text when hovered with mouse. There is also a tool for adding reading above *kanji* called *Furigizer*, but it should be noted that some text processors such as MS Word provide the same functions.

Lastly, one of the most overlooked usages of multimedia is so-called raw materials, such as Japanese movies, TV shows, songs, subtitles and videogames. Since Japanese television has a fair amount of text used in various TV shows, watching can be beneficial for learning the writing system as well, and it's generally considered beneficial to watch foreign television in the language acquisition process [4]. What should be watched depends on the viewers themselves, but some of the tools for watching from countries other than Japan are *KeyholeTV* for PC, and *iKeyholeTV* for iOS. It is also advised for learner to immerse oneself in Japanese environment as much as possible with adding Japanese subtitles to any show [5] or even using songs through karaoke programs. Although it is not a tool by itself, another recommended method is reading Japanese comics, *manga*, using a computer or a smartphone.

III. INTERNATIONAL LEARNERS SURVEY

In order to better understand what difficulties *kanji* learners have, and how they cope with them, a sample of 47 students of Japanese from various countries were chosen to be surveyed. The subjects had various levels of Japanese, ranging from beginner to advanced level. We have conducted the survey in two language centers in Japan, in Japan Foundation Center in Osaka and Japanese Language Center in Hakodate. Languages of the survey were English or Japanese, according to the Japanese level of the subject.

It should be noted that there is no similar research made in Croatia at the moment. There is a general consent that there is no relevant difference in *kanji* acquisition between international learners who do not use logographic script in their first language [2], so results of our survey can be used as a reference point for Croatian, as well as other international students.

A. *Survey content and methodology*

The main purpose of the survey was to find out what problems with *kanji* learning do international learners have, what learning strategies they use, and to

what extent do they use multimedia. The introductory part of the survey gathers data about the subject's Japanese learning history and self-approximated number of *kanji* known. Next, subjects were asked about the way they were taught *kanji* and whether they are satisfied with that method. In the second part we gather detailed information about difficulties in studying, most effective method of learning, and preference about *kanji* learning in general. Lastly, the subjects were asked if they would like to know about alternative methods of teaching and self-study of *kanji*.

The subjects were chosen based on the following criteria:

- he/she has learned Japanese as a second language (native speakers excluded)
- he/she has started learning *kanji* already (complete beginners excluded)
- he/she hasn't learn Japanese script as a part of compulsory education (Chinese and most Korean native speakers excluded).

The average age of the subject was 23 years, ranging from 21 to 41. Most of the subjects were native speakers of English (48%), while the others' native languages were Polish, Indonesian/Malaysian, Spanish, Burmese, Vietnamese, Arabic, Bulgarian, German, Mongolian, Dutch, Swedish and Ukrainian. According to the Japanese level, there were 22 beginner-intermediate level 10 intermediate and 15 advanced level students. The average subjects spend 3 years and 2 months learning Japanese in classroom, and had an additional year of independent study. It is interesting to note that there is no big difference in the average learning length between upper-beginner or intermediate level, and more advanced learners. This is due to the sample itself, because the students on advanced levels mostly come from Asian countries which have a longer tradition of Japanese language education and more exposure to Japanese language and culture. A research on a larger scale could prove this hypothesis.

B. Results

The number of characters that a subject knows how to recognize, pronounce and write served as a measure of success in *kanji* acquisition. We can compare number of known characters to general Japanese level, 1 being the lower beginner, and 5 being the advanced. Five levels are chosen to correspond to five levels of Japanese language proficiency test.

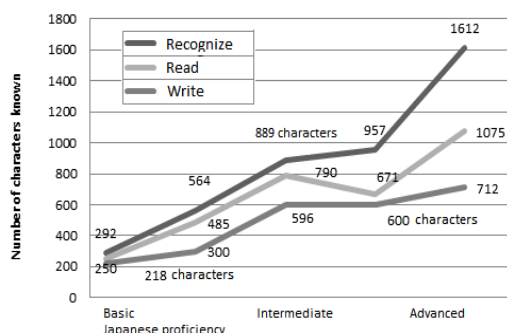


Figure 1. Level of Japanese and *kanji* knowledge

As we can see, there is a big difference between recognizing character shape of pronunciation and writing a character. The difference is growing bigger with the student's level. We also notice how the numbers of *kanji* known stagnates in the intermediate level, which is a common problem in Japanese acquisition. When a number of characters known grows to around 500, the progress suddenly slows down. The subjects have listed most common problems in the learning process, which is presented in Table I. In the experimental part of this research, we tried to tackle the issues that subjects stated as difficulties in learning. Figures in Table I denote percentage of participants reporting the problem.

TABLE I. MOST COMMON PROBLEMS IN KANJI LEARNING

Rank	Problem	%
1	Forgetting <i>kanji</i> fast	70.2
2	Confusing similar <i>kanji</i> shapes	63.8
3	No connection between shape and meaning of <i>kanji</i>	36.2
4	Difficult to memorize pronunciation	29.8
5	Order of learning is illogical or confusing	25.5

Other important point of the survey was the question about strategies subjects use while learning *kanji*. Table II summarizes most often mentioned methods of learning according to the student's level. Figures in Table II denote percentage of participants using the mentioned strategy.

TABLE II. MOST COMMON KANJI LEARNING STRATEGIES

Method	% overall	% (1)	% (2)	% (3)	% (4)	% (5)
Writing the character until remembered	87.23	80	86	87.5	100	87.5
Using paper flashcards	53.19	60	42.8	60	57.14	37.5
Using a computer or a smartphone	29.79	20	42.8	60	28.5	0
Using other methods or media	31.91	20	0	50	28.5	62.5

The data about the learning strategies help us understand two points. Firstly, they explain the stagnation of progress between lower and higher levels of proficiency. In this particular set of data from our subjects, levels 3 and 4 of general proficiency in Japanese reported knowing almost the same number of *kanji*, as we can see in Figure 1. While these data cannot speak for all international students of Japanese, it shows the influence of different study methods to *kanji* acquisition. Subjects belonging to level 3 of Japanese proficiency group had shorter period of Japanese learning and lower overall proficiency, but roughly the same number of characters known. This means that their learning strategies are most likely more effective, and this group noted using multimedia among 60% of subjects.

Still, simply using the computer or smartphone does not mean that its usage yields results, which is seen

when beginner and advanced groups are compared. Figure 2 shows the influence of multimedia on acquisition of Japanese script in more detail. The methods stated in the survey were divided in traditional ones (using pen and paper) and modern one (using multimedia). According to the method used, the numbers of *kanji* known were compared. As we can see, when the data is compared according to the type of the method, there is a significant difference in the success rates of students. It should be noted that the students who used multimedia successfully often stated that they use a systematic approach to *kanji* learning in order to tackle common problems, such as forgetting *kanji* or confusing similar shapes and sounds.

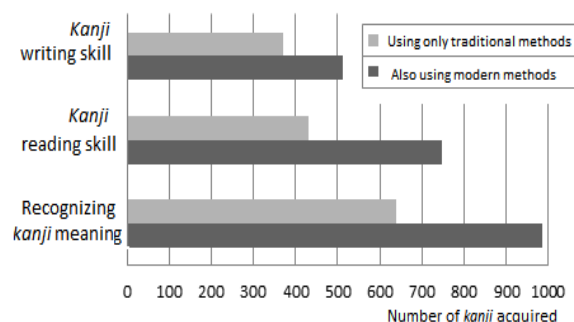


Figure 2. Influence of using modern methods in *kanji* acquisition

Even though the difference between *kanji* skills (reading, recognition and writing) is still present, the difference between two groups is large enough to convince us that the multimedia does matter in the learning process.

From all the data in the survey, we can conclude that the following characteristics of a learner are significant for a successful acquisition and longer retention of a large number of characters:

- length of learning process,
- emersion in Japanese language environment as much as possible,
- personal affinity and interest towards *kanji* learning (upper half of subjects showed a higher satisfaction with classes and stated an average 4 out of 5 affinity toward *kanji* learning),
- willingness to work on own methods (92% more successful half of subjects stated they still want to improve their methods, instead of 68% in the lower half),
- usage of multimedia,
- systematization of *kanji* (50% in upper half, 13% in lower half).

Almost all of the subjects used repeated writing method, which seems useful method when supplemented with other strategies. On the other hand, usage of paper flashcards did not seem to make a big difference in results. According to this survey, the experimental class will have student use SRS flashcard method and systematization as main methods of learning.

IV. THE EXPERIMENT

A. Methodology and setting

Six beginner students of Japanese from Croatia were chosen to participate in the experimental *kanji* acquisition course. Three had previous basic knowledge of Japanese (A1.1 level, both syllabic scripts and very basic *kanji* education), and three had just begun their studies. Ages of subjects ranged from 16 to 29, and both sexes were equally represented. Two of the participants were high school students, and four were attending university. Participants were asked to actively participate in and after classes. Classes lasted one semester, one session a week with total of 30 class hours.

The main idea of this experimental course was to help students acquire *kanji* at much higher speed and retention rate compared to the traditional approach. Traditional approach in *kanji* education normally consists of listing characters (approximately 6 a week on beginner level and 12 a week on intermediate level) and assigning students to memorize them as homework in any way they see fit. Approach used in this research was to present 30-40 characters each week (although some sessions were review-only), but to present students with more interesting way to systematize, memorize and review characters. The primary goal was to help students acquire between 300 and 400 characters in one semester, compared to 50-100 taught in faster traditional courses. Secondary goals were to enhance participant's understanding of *kanji* structure in general, to introduce more interesting, multimedia-oriented methods of learning, and to make students more interested in studying *kanji*.

Before lessons, characters were organized to be presented in a more systematic order and relevant to students. Since order of learning was listed as one of the issues in acquisition, some changes to traditional learning order were introduced. *Kanji* are usually presented in order similar to the one used in Japanese elementary schools, using the criteria of shape simplicity and usage frequency, without regard to similar shapes which can easily be confused. The learning order presented in this research takes in account similarities between shapes of characters which are easily confused, as advised by Pye [6], and the rule that all elements of a complicated character should be understood before its acquisition. That means that sometimes the less common characters with simple shapes will be presented before more common ones with complex structure, but we consider this helpful approach in understanding the structure of *kanji*. Understanding all elements in a character enables one to use creative techniques to memorize it, like stories and visual representations.

That takes us to another important point used in the experimental course. Similar to systems used by authors such as Henshall [7] and Heisig [3], participants were asked to devise stories using parts of the character, to connect the meaning of its parts to the whole. It should be noted that this approach rarely represents the historical development of *kanji*'s meaning, but its help in memorization and retention is invaluable, as shown by the survey in this research. Usually, such systems are

suggested for use in independent study, but this time we tried to incorporate it in classroom. In this way students could share ideas and make learning more interactive and fun.

Third point of this research was use of multimedia in learning process. Students used two main methods every week and few additional methods occasionally. After every class, participants were asked to write their own stories about the characters in order to help them memorize it. Stories were shared online in a collaborative document, similar to *Reviewing the Kanji* website, but on a smaller scale and with a limited number of characters. Collaboration between participants and in authoring the material is thought of as an important part of *kanji* learning process [8]. Secondly, students were encouraged to use free SRS program Anki either on computer or a smartphone. They were asked to review as often as possible, with updates ready every week. Additional methods occasionally used were videos about *kanji* development and history (e.g. Japanese show called *Kanji daisuki*) or pictorial representation of *kanji* (e.g. *Kanji Pictografix* smartphone application). Lastly, participants were asked to use and see Japanese as much as possible in Japanese comics, video games or TV shows.

Every few weeks participants took various quizzes in order to both review learned characters and practice recognition of known components in larger characters. In the end of 30 hours' course participants were asked to provide their feedback.

B. Results

Generally, the group was successful in acquiring around 320 characters, but the success rate varied among the participants. All of them reported they liked this type of course and that they would like to continue (3 participants strongly agreed, while 3 agreed). Participants generally liked to notice their progress and the ability to understand a much larger portion of written Japanese. Motivation is considered to be extremely important in the study of *kanji* [9]. Participants not currently taking classes in Japanese wished they experienced more integration of character's reading in real Japanese context. It should be noted that this course served only to introduce shape and meaning of characters, and taking it without real context of Japanese language environment might result in lower motivation for studying.

Difference in success among participants can be explained with the difference in methods individual participants employed. Although they were all provided with the same guidelines, some of the participants followed them over the whole course, while some of them rarely used mentioned guidelines for individual learning, participating only in the classes. It is interesting to note that two of the participants that actively used Anki and wrote stories themselves achieved near 100% acquisition of characters thought and even devised their own methods of integrating learned *kanji* in Japanese context themselves. Another two participants who occasionally followed guidelines achieved between 60-80% acquisition, finishing the course with knowledge of

150-200 characters. They reported irregular reviews with Anki, but used multimedia in order to surround oneself with *kanji*. That helped to remember certain characters, but without systematic approach, a number of the characters not appearing in a given videogame or show was not acquired. Last two participants reported less than 60% success with acquisition, but still were able to recognize a larger number of *kanji* in comparison to the state before the course. It should be noted that they almost never used proposed methods for acquisition, due to their reported free time restrictions. Even the less successful participants favored this integrative and systematic method to simple listing of *kanji* without order and context. It is important to mention that modern methods used in this experimental course would not have been successful without proper implementation. Anki flashcards should be used with mental concentration and care, and occasionally a traditional pen and paper exercise is also advised.

If we compare these results with those collected through the survey, we find that the participants showed better and faster acquisition than the average learner in the survey. Specifically, if an average learner acquires no more than 300 characters after a year of a college level study, a participant in the experiment was twice faster, learning up to 300 characters within 30 hours of the classes. Learning at this rate could enable learners of Japanese to acquire all of 2136 general-use characters in three years university program of Japanese language.

This experiment with only six participants provided us with enough data to start using the multimedia and story-producing approach in class with a higher number of participants, and for a longer period of instruction. Data from such more comprehensive experiments shall be reported in subsequent research.

V. CONCLUSION

In this paper we presented research about modern methods which could enhance *kanji* acquisition for international students of Japanese as a second language. In the first part, we gave the overview of some tools and software for either explicit or implicit learning of *kanji* on various platforms. In the second part, we presented the results of the survey conducted among 47 international students which stated most common problems in learning *kanji* and most often used methods for studying. Problems that students encounter include low retention rates, confusing similar shapes and pronunciations and illogical study order. Most common study strategies include repeated writing, paper or digital flashcards, various multimedia and systematization methods such as Heisig system. Surveyed students were divided into groups who used modern methods such as multimedia together with traditional approach such as repeated writing, and it was noticed that besides diligent and motivated study, usage of multimedia in *kanji* learning significantly helps in acquisition. Secondly, systematization of *kanji* also makes a significant difference in the acquisition rates.

Therefore, we organized an experimental course for 6 students in which the guidelines acquired through the survey were employed. Participants were expected to

memorize between 300 and 400 characters in one semester of study through 30 hours of classes and independent study at home, using Anki SRS digital flashcards and systematic division of *kanji* components. *Kanji* was presented in an order different from traditional, with the emphasis on similarity between shapes, but also frequency of usage as *kanji* itself or as a *kanji* component. Every week participants devised stories to help them memorize shapes and meaning of *kanji* in question, and to share stories in an online environment. Other multimedia was also offered occasionally. General results of the experimental course were successful. Most of the participants reported satisfactory acquisition of the characters and preference for this method over the traditional one. All of the participants plan to continue to learn Japanese language and *kanji*. It can be approximated that at this rate, all of 2136 *kanji* for general use could be successfully acquired within 3 years university bachelor course of Japanese studies.

We can therefore conclude that modern multimedia language learning methods such as digital flashcards, immersion in Japanese language through Internet environment or online collaboration can improve acquisition of *kanji*, and the affinity towards learning, which is an important part of the lengthy *kanji* learning process.

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APPENDIX

Following is a list of all kanji acquisition tools mention in this paper.

Name	Platform	Home page
Anki	PC, iOS, Android	http://ankisrs.net/
Chinese Etymology	PC, iOS, Android	http://www.chineseetymology.org
Furiganizer	PC	http://www.furiganizer.com/
Goo	PC	http://dictionary.goo.ne.jp
JA Sensei	Android	https://market.android.com/details?id=com.japanactivator.android.jasensei
Japanese	iOS	http://itunes.apple.com/us/app/japanese/id290664053?mt=8
JED – Japanese Dictionary	Android	https://market.android.com/details?id=com.umibouzu.jed
Jisho	PC, mobile phone	http://www.jisho.org
Jishop	Android	https://market.android.com/details?id=com.jishop_software.jishop&feature=search_result
JLPT Study	iOS	http://itunes.apple.com/us/app/jlpt-study-1-5-level-kanji/id330922255?mt=8
jMemorize	Java enabled device	http://sourceforge.net/projects/jmemorize/
Kanji	Android	http://www.appbrain.com/app/kanji/mx.com.covenant.kanji.full
Kanji Dream	iOS	http://www.appstorehq.com/kanji-dream-iphone-84499/app
Kanji Flip	iOS	http://itunes.apple.com/us/app/kanji-flip/id287049212?mt=8
Kanji LS Touch	iOS	http://itunes.apple.com/us/app/kanji-ls-touch-writing-learning/id304848819?mt=8
Kanji Maze	PC	http://members.jcom.home.ne.jp/2822728701/kodomo%20site/naritati-1/nari0101/nari0101.htm
Kanji Networks	PC	http://www.kanjinetworks.com/
Kanji Pop	iOS	http://itunes.apple.com/us/app/kanji-pop-kanji-practice-in/id295235915?mt=8
Kanji Roushi	PC, iOS	http://www.kanjiroushi.net/
Kanji Sensei	iOS	http://itunes.apple.com/us/app/kanji-sensei/id307174033?mt=8
Kanji Wiki	PC	http://tell.fll.purdue.edu/KanjiWiki/
Kanji Word Search	iOS	http://itunes.apple.com/us/app/kanji-wordsearch/id412691744?mt=8
KeyHoleTV, iKeyHoleTV	PC or iOS	http://www.v2p.jp/video/english/index.html
Kids Web Japan: Quick Kanji	PC	http://web-japan.org/kidsweb/language/quicckkanji/index.html
King Kanji	PC, some PDAs	http://www.gakusoft.com/kingkanji.htm
Kotoba	iOS	http://itunes.apple.com/us/app/kotoba-japanese-dictionary/id288499125?mt=8
My Japanese Coach	iOS, Nintendo DS	http://www.ubi.com/US/Games/info.aspx?Id=7042
Remembering the Kanji	iOS	http://itunes.apple.com/us/app/remembering-the-kanji/id424471278?mt=8
Renshuu	PC	http://www.renshuu.org
Reviewing the Kanji	PC	http://kanji.koohii.com
Rikai, Rikai-chan, Rikai-kun	PC	http://www.rikai.com
WWWJDIC	PC	http://www.csse.monash.edu.au/~jwb/cgi-bin/wwwjdic.cgi?IC