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Application Review: Kanji Study

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Abstract

Kanji Study is an Android application which provides a wide range of both paid and free-to-use study methods for learners of Japanese characters (i.e., kanji and kana), including both basic rote learning methods and more efficient methods such as spaced repetition and etymology-based study, providing an accessible and widely customizable alternative to other popular kanji study methods. This review assesses the utility of the features offered by Kanji Study and the viability of these methods on the basis of established research. Comparisons are also made against popular digital learning methods on the basis of their feature set and accessibility.

「Kanji Study」とは、日本語の漢字や仮名を勉強するための、幅広い有料および無料の学習方法を提供するAndroidのアプリである。本アプリは、単純な丸暗記という学習方法に加え、間隔反復や語源学に基づいている、より効率的な学習方法も提供し、他の人気がある漢字の勉強アプリと比べ、より取り組みやすく、カスタマイズ可能なアプリである。本研究は、関連のある研究結果を踏まえ、「Kanji Study」で提供される機能の有用性および学習方法の実現可能性を評価する。一方、特徴セットとアクセシビリティを基に、他の人気のあるデジタル学習方法との比較も行われる。

Introduction

A wide variety of applications and methods to learn kanji (i.e., Chinese characters in Japanese) have been offered to learners over the years, covering a number of approaches (e.g., mnemonics, etymology, spaced repetition, etc.). With the popularization of digital language learning methods, this has expanded to digital, computer-based applications, and learners have been given more options in convenient packages to enhance their study. Though many applications exist from which students can choose, many, such as the popular WaniKani, choose to focus on singular approaches or fixed methods such as spaced repetition.

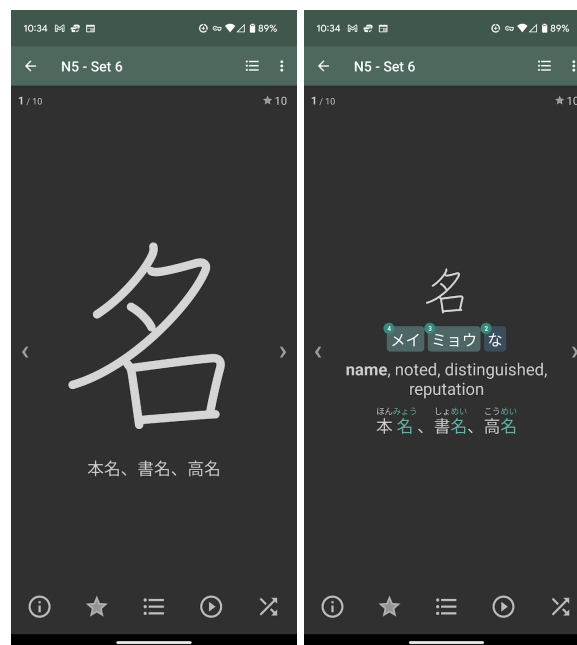
Kanji Study is a feature rich alternative to many other popular apps to study kanji, such as WaniKani and Anki, that offers a wide variety of customizable, targeted study methods, pulling from many popular and traditional kanji learning methods to allow each student to combine the various complex elements of kanji to fit their learning needs. In addition to the free-to-use features, a number of paid add-ons are also offered, which incorporate popular learning methods and systems offered by other apps.

This review seeks to outline the features offered by Kanji Study and assess their usefulness and fit for kanji learners, as well as the support or lack thereof on the basis of established research into kanji study methods and similar methods for related language elements (e.g., vocabulary). A brief comparison will also be made against other popular methods to provide an idea of how the application compares to other digital approaches on offer.

Free Features

Figure 1

Flashcards (Left: Front Side, Right: Reverse Side)



In its base, free-to-use form, Kanji Study offers three core study options for learning kanji: flashcards, multiple choice quizzes, and "writing challenges". The flashcards are the most basic, displaying a character in a handwritten form along with an animation demonstrating the stroke order on one side (as shown to the left in Figure 1) and common examples using other kanji of roughly the same or lower level as the kanji being displayed, with the other side having possible meanings as well as readings (as shown to the right in Figure 1). Each reading can also be tapped to show specific

examples of words that use these readings, providing a Japanese-English dictionary entry for each word and a native speaker's pronunciation where available.

Figure 2

Info -> Kanji Quiz Format



The quizzes allow for more complexity and customization but are made largely from the same essential parts as the flashcards. Four types of quizzes are available: Info -> Kanji, providing meaning and readings as the prompt and 8 kanji as the choices, as shown in Figure 2; Kanji -> Meaning, providing a kanji and 8 possible meanings; Kanji -> Readings, providing the kanji and number of readings and asking the user to select all possible readings from a group; and Example -> Kanji (see Figure 3), providing a usage example with the target kanji removed (the reading in context is provided and an English definition can also be provided if the example is tapped) and providing 8 possible kanji that match. Each of these quizzes can be customized to add or remove information provided, narrow down examples used (e.g., common words only), or provide example sentences or words.

Figure 3
Writing Challenge (Example -> Kanji)



Writing challenges are a relatively unique feature offered by Kanji Study. These challenges present the user with information on the target kanji (readings and definitions) or examples similar to the quiz format and prompt them to write the kanji with the proper stroke order and form. The application offers automatic stroke detection, which tracks the user's input to gauge the accuracy of each of their strokes to the corresponding standard strokes and provides feedback immediately on whether or not the input was correct. Users can also choose to compare their writing output manually against the characters.

The specific kanji that are studied in any mode are also fully customizable and can be ordered in a wide number of popular ordering schemes, such as JLPT levels, the Joyo kanji list, the MEXT graded kanji levels, *Remembering the Kanji* (Heisig, 2011), among others. The app also allows for user-defined orders. Kanji are automatically divided into groups by the app, usually 10-20 depending on the level and number of kanji in each level, but users can freely combine, split, or rearrange groups to their liking. Groups can also be created manually or automatically, either by adding kanji individually, using a text file, copying from clipboard content, or relying on a website scraping feature to gather kanji to be studied. This allows for portability of study lists and can give instructors opportunities to give their students custom kanji sets modified to fit their curriculum.

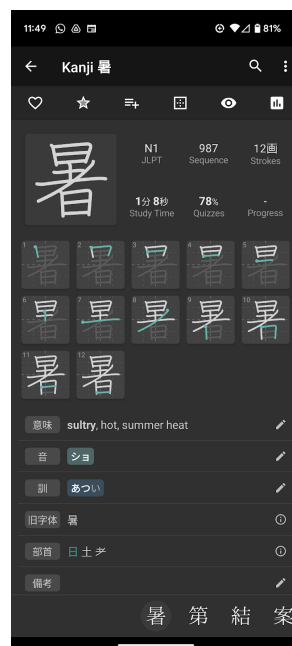
In addition to the kanji themselves, radicals are also introduced separately in a similar format and can be practiced similarly. Kana (i.e., Japanese syllabograms) information and writing practice is also provided. This allows the application to be used even by beginners, making it useful for all levels of Japanese students.

Figure 4
Post-Session Feedback



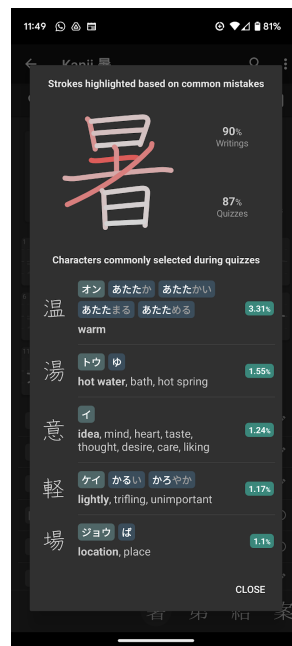
At the end of study sessions, feedback will be provided by the application, showing the rate of correct responses per kanji studied and allowing users to track their progress. As displayed in Figure 4, this feedback gives the overall accuracy rate for that session and individual kanji, as well as the overall change in success/failure rate since the previous session on the specific kanji tested.

Figure 5
Kanji Lookup



In addition to the wide variety of practice and study related features, the application also provides a wealth of information about kanji and related characters, as shown in Figure 5. Each individual kanji has a lookup page which provides information on its level and number of strokes, a stroke order diagram with each step, translations, readings, a decomposition tree showing each component of the kanji, and reading examples (words, sentences, and names).

Figure 6
Individualized Per-Character Feedback

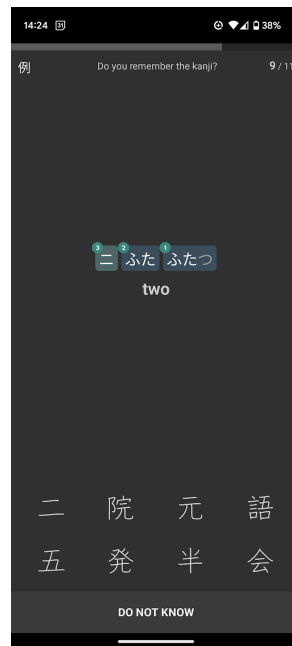


Within this page, individualized feedback for each kanji is also included, as shown in Figure 6, which provides a heatmap indicating strokes on which there were common mistakes and for kanji which the user has incorrectly selected instead of this specific character. This gives learners specific insight into missed strokes as well as for other kanji that may be confounding their ability to memorize this particular character. These tracking features, combined with the custom set features, can also be useful for instructors in tracking student progress.

Paid Features

In addition to the suite of free-to-use features available, the application also offers three paid add-ons. These add-ons provide users with alternative or enhanced learning methods on top of the existing information and features provided in the free app. The three add-ons all incorporate established techniques from popular vocabulary and kanji learning methods. These add-ons are the “Guided Study” add-on, which adds a spaced repetition system (SRS) to the application, “Guided Reading Sets,” which add contextual sentence-based exercises introducing kanji in example sentences, and “The Outlier Kanji Dictionary,” an etymologically-based explanation for each kanji resembling Seeley, Henshall, and Fan's *The Complete Guide to Japanese Kanji* (2016).

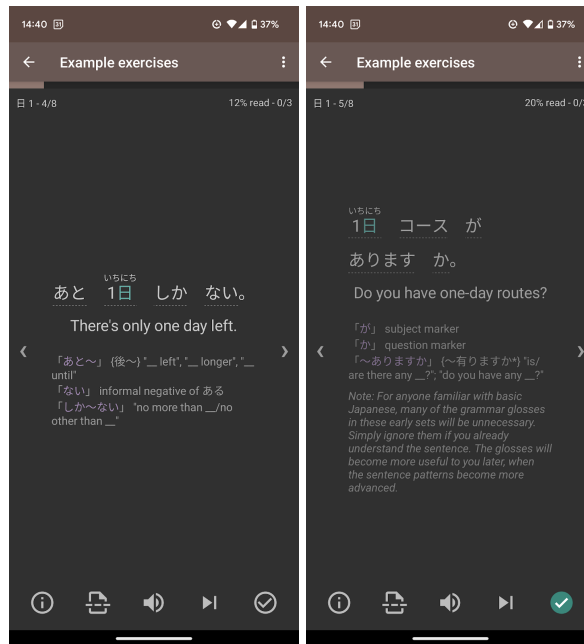
Figure 7
Guided Study



The “Guided Study” add-on adds a spaced repetition system to the application (see Figure 7). This system most closely resembles the quizzes as shown in Figure 7, incorporating readings, meanings, and form in various combinations to test the user on these aspects and associations. Spaced repetition systems (SRS) are an established method that have been studied extensively and implemented in a number of kanji learning and memorization applications. Kanji Study specifically cites the work of Piotr Woźniak as the system after which the algorithm is modeled, who in his paper established the foundations of spaced repetition that would later come to be SuperMemo (Woźniak and Gorzelaczyk, 1994). These methods employ algorithms that space out study content in a way that is thought to maximize memorization.

Various SRS approaches have arisen since then, but the fundamental approach remains much the same. SRS algorithms have shown to be an effective tool for learning, particularly vocabulary. Though the exact nature of the algorithm is not explained in the application, it appears to be built on a core of variable intervals, in this case, likely expanding intervals. Such an approach has shown promise in aiding vocabulary memorization (Nakata, 2015). Incorporating multiple tasks to cover the various aspects of word knowledge (i.e., meaning, form, and use) has been identified as important in second language vocabulary research (Nation, 2001) and systemized as part of Interleaved Spaced Repetition Software (Lafleur, 2020).

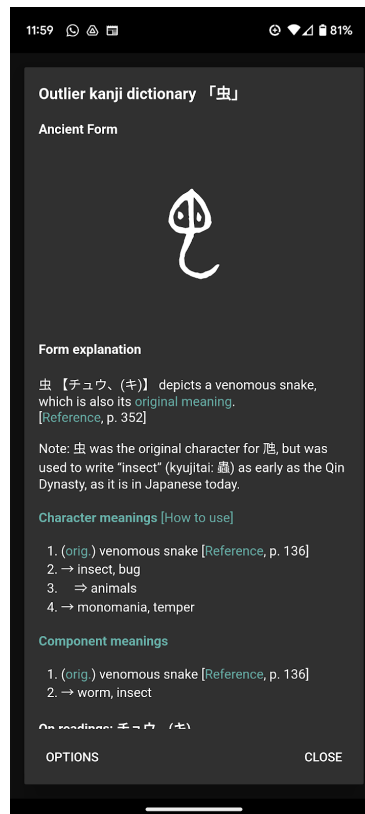
Figure 8
Graded Reading Set Examples



The “Graded Reading Sets” add-on (Conning, 2021) supplements the application with contextualized “kanji-graded readings” based on Conning’s *Kodansha Kanji Learner’s Course* (2014). Learners are initially presented with the sentence alone in Japanese with the addition of spaces not normally seen in Japanese text as shown in Figure 8. Upon tapping the sentence, additional information is provided to add context for the kanji, including readings, translations, and a breakdown of the words in the sentence. These words can also be tapped individually, which shows their meanings for the learner. Notes and glosses of grammar are also provided. These graded readings begin with minimal kanji and gradually add kanji to sentences as more are introduced, growing gradually more complex over time.

Automated graded reading has shown promise as an effective method for vocabulary memorization. An experiment by Huang and Liou (2007) used similarly structured automatic graded readings presented on a web browser alongside an electronic dictionary. The results of the study demonstrated improved word learning and positive impressions from the participants, suggesting that this method may also be efficacious for learning kanji and their associated vocabulary.

Figure 9
Outlier Kanji Dictionary Entry for 虫



The final add-on component, “The Outlier Kanji Dictionary,” is perhaps the most intricate aspect of the app. The Outlier Kanji Dictionary offers detailed entries for kanji, breaking down their components and explaining their associated meanings and phonosemantic evolution. Detailed explanations of the etymology are also provided for some kanji. Ancient oracle bone¹ or other previous paleographic forms are also often given. These forms are displayed to better demonstrate the pictographic forms of kanji in older forms where the depiction of the associated concept or object is clearer. As seen in Figure 9, information on the kanji’s origins and its shape and previous meanings are all provided. As mentioned previously, this approach is similar to Seeley, Henshall, and Fan’s system (2016), however, the Henshall system, as it has come to be known, provides mnemonics alongside the etymology, whereas the Outlier Kanji Dictionary does not.

A purely etymology-based approach may be useful in early stages and, for some kanji, in recognizing their pictographic elements as well as helping to break down components for ease of memorization or recognition. However, some scholars have criticized this approach for its notable limitations. Paxton and Svetanant (2014) note that kanji often undergo semantic shifts, borrowings, or other derivations that cause their etymological origins and modern meanings to become mismatched. This may potentially cause confusion among students, particularly those not immediately familiar with the particulars and complexities of kanji and their history. A case study by Rose (2013) strengthens these assertions. Among the students that participated in the study, one student (“Simon”) used etymology as a learning tool, forgoing other strategies such as mnemonics. During the study, the student using etymology was prone to remembering the origins, but not the meaning of the word itself, particularly in cases

¹ Oracle bone script is an early form of Chinese script that, while not simply pictographic and complexly developed by the time of its inscription (Lu, 2004), does show less abstraction compared to modern script.

where there was significant semantic shift.

Despite this, there is also an argument to be made for incorporation of these kinds of fine-level breakdowns incorporating etymological detail and the meaning of kanji components in order to avoid outcomes where kanji cannot be easily learned. In the same study by Rose (2013), students often used mnemonics not based on components of kanji, instead making freeform stories that help to remember the overall shape but do not necessarily tie it to meaning. In one example, the kanji 感 ‘feeling’ was memorized by a student (“Jacob”) as a “monster on the ceiling who likes to eat nails and then spit them in people’s heads.” This story, while evocative of the shape of the strokes, failed to assist the learner in memorizing the meaning, and fails to reference components that may be helpful in making that association, such as the lower radical 心 ‘heart’, which could be conceivably connected to ‘feeling’. The Outliers Kanji Dictionary’s breakdown of these elements may help avoid these kinds of situations, allowing students to more easily make associations from the elements instead of broad shape-based mnemonics that fail to connect meaning and form.

One advantage of the Outliers Kanji Dictionary is that it provides easily accessible glosses via clickable links of kanji terms and components as well as explanations of kanji components to avoid this kind of unfamiliarity that may lead to a less useful mnemonic device. As such, while this etymologically-based approach may risk not being as effective, increased familiarity with the meaning-form correspondence of kanji may help guard against outcomes such as that of Jacob from Rose’s study (2013).

Though this application is rich in features and offers a wide range of approaches that may benefit learners, there are a number of other popular applications with similar features that may be more widely known. As discussed in the following section and summarized in Table 1 below, it is useful to assess Kanji Study against such competitors, particularly notable and long-used kanji-focused applications such as WaniKani or the SRS-focused general use study application Anki.

Comparisons Against Other Kanji Apps

Table 1
Comparison of Kanji Apps

| <u>Features</u> | <u>Kanji Study</u> | <u>WaniKani</u> | <u>Anki</u> |
|------------------|--|--|-------------------------|
| Platforms | Android | Desktop/Browser (3rd party apps exist) | Android, Apple, Desktop |
| Free Study | Yes | No | Yes |
| Writing Practice | Yes | No | Community Add-on |
| Mnemonics | No | Yes | Community generated |
| SRS | Yes (paid) | Yes (paid) | Yes (freeware) |
| Dictionary | Yes | Yes (limited) | N/A |
| Etymology | Yes (paid) | No | N/A |
| Pricing | \$20.00-\$25.00 (one-time per add-on) | \$299.00 (one-time), \$9.00 (monthly) | Free |

Compared to other popular applications used to study kanji, Kanji Study presents a number of favorable comparisons. WaniKani, a widely used online kanji-learning

program, is likely one of the most direct competitors to Kanji Study. Another popular application for kanji learning (and vocabulary in general) is Anki, an SRS-based flashcard application. Table 1 provides a brief overview of these applications and their features.

Kanji Study has somewhat limited platform availability, as it is only available as an Android app, though WaniKani is similarly limited to a desktop-based browser with no first-party mobile native support, although third-party applications are also available. This contrasts with Anki's wide availability across a number of platforms, including Android, Apple, and desktop applications. Pricing is also an important consideration – Kanji Study's core features are free, with three add-ons varying in pricing between \$20 and \$25, totaling roughly \$100 for all add-ons and the additional expert dictionary which covers kanji outside of the essential list. These add-ons can be purchased for a one-time fee. WaniKani has various plans for subscription, ranging from a \$9.00 monthly fee to a \$299.00 one-time payment for unlimited access but only offers very limited free content. Anki, being open-source and offering community-generated study sets, is entirely free of charge.

In terms of the free version of Kanji Study, it has a few advantages over WaniKani. One basic advantage is its free and customizable study methods (e.g., set customization, various study methods, etc.). WaniKani, due to its fairly rigid system, does not allow for working at one's own pace. In contrast, Kanji Study's basic study modes are fully controllable and customizable by the user to suit their needs. Similarly, Anki is less flexible than Kanji Study in how it can be customized and may require add-ons, user-generated sets, or for the user to make their own sets to study in order to be customized, though it does not put restraints on how much or how frequently one can study.

One unique aspect of Kanji Study that many other applications lack, including WaniKani, is its writing practice mode. This stroke-tracking mode provides users a way of practicing kanji handwriting and structure while being less tedious than traditional rote learning tasks. Kanji Study also allows learners to compare strokes they have input against the kanji itself to provide the user with feedback on stroke accuracy and the correct order. However, this detection system employed to determine correct strokes is far from perfect and strokes are sometimes detected either too loosely, accepting strokes with the wrong shape or orientation, or too strictly, failing to accept strokes that do not perfectly match the orientation of the stroke. With that being said, there are settings that allow for more leeway, as well as self-comparison settings to manually compare the user's drawn strokes against a sample. Strokes rejected by the system that the user believes to be correct can also be overridden manually.

Kanji Study and WaniKani both offer SRS, albeit locked behind paywalls for both. Anki fully integrates SRS, as well as being free to use and download. However, Anki offers no built-in dictionary, while Kanji Study incorporates dictionary lookup into various aspects of the application. WaniKani similarly allows for lookups, though more detailed lookups outside of the items presented in the application as part of their program are not widely available. Kanji Study is also the only of the three to offer etymological resources.

Conclusion

Kanji Study is a convenient application that allows for learners to customize their kanji learning experience in a variety of ways with a number of useful tools and resources. Its incorporation of evidence-based methods and popular approaches from previously established materials also allow for a robust learning experience, albeit locked behind a paywall. The level of customization on offer, particularly with how groups of kanji and study activities can be easily modified for a student or instructor's purposes, make this application a more flexible alternative to some other rigid or prescriptive approaches being offered in other kanji learning apps.

While not likely to fit every student's needs, it will be likely useful to many learners due to its accessibility and wide range of options, as well as being a convenient, one-application solution that provides a variety of methods of study for those willing to pay the add-on fee(s). The feedback and tracking of outcomes for individual characters or studied groups may also be useful for not just learners but also instructors to track overall progress, create convenient groupings of characters for assignments, or reinforce in-class learning with curriculum specific study sets.

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