Evaluating e-resources for Japanese language learning

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Abstract

The aim of this paper is to evaluate and compare electronic resources for the Japanese language in terms of their usability for Japanese language learners. The paper focuses on a computer assisted language learning (CALL) system developed to support learners in reading Japanese language texts, the Japanese Language Reading Tutorial System "Reading Tutor", and the e-dictionary server "WWWDJDIC" with its extended functions. Each system was introduced and used in the classroom for various teacher-planned reading and comprehension tasks. The paper outlines the advantages and disadvantages of the systems that were identified during classroom usage by university students enrolled on a Japanese language course, and discusses the results of a survey conducted in order to explore student opinion, preferences and usage habits regarding the resources. In addition, the paper also notes and briefly addresses some other e-dictionaries, e-resources and tools covered in the survey, such as the pop-up support dictionary tools "Rikai-chan", "Perapera-kun", and "Popjisyo", the Japanese Reading System for Multi-Lingual Environments "Asunaro", and the Writing Support System "Natsume", as well as the corpus query system "Sketch Engine" with "Word Sketches", which automatically extracts collocational information for the Japanese language.

Keywords: e-resources; CALL systems; Japanese language learning; evaluation; reading and comprehension tasks; student survey

1. Introduction

The Japanese language is peculiar for its writing system as it uses three sets of characters: two syllabic, *hiragana* and *katakana*, which are relatively easy to master, and a few thousand Chinese characters, *kanji*, which require a long learning process. The Japanese Ministry of Education prescribes 2,136 characters as being the most essential for common use and everyday communication.¹

Chinese characters in Japanese writing are used either independently, or in combination with *kana* letters, or in various combinations with other Chinese characters, and typically they have two or more readings. It is a frequent situation for learners to not know how to read an unknown Japanese word and, thus, must first consult a Chinese character dictionary, where characters are arranged according to form, radicals, and the number of strokes, prior to looking-up the meaning in a dictionary arranged according to either an alphabetical or *kana* order. This is a time-consuming process and an obstacle to Japanese language students when trying to read Japanese texts, which is especially the case with using traditional paper dictionaries.

Along with the advances in computer and internet technologies, various computer assisted language learning (CALL) systems, online tools, and dictionary servers have been created to support the reading of electronic Japanese texts. They provide significant support to Japanese language learners through various functions: ranging from simple or complex search methods based on Chinese radicals, characters and their combinations, to quick information about the readings and meanings of unknown words in the form of pop-ups, lists of entries, sentence analysis, text analysis. Naturally, the quality of such systems is dependent on the electronic dictionaries and the tools of morphological analysis incorporated within the systems. Moreover, the overall usability of such systems greatly depends on the interface, customization options, user and the possibilities of interacting with other language resources, such as corpora and lexical databases, including various learning aids and materials, as well as other incorporated functions.

This paper focuses on an evaluation of e-resources that support reading skills; the Japanese Language Reading Tutorial System "Reading Tutor" and an e-dictionary server with extended functions "WWWDJDIC". The paper also notes some other tools relevant for Japanese language learners.

2. Evaluation targets and methods

The evaluation of CALL systems is a challenging task and requires the involvement of both teachers and students.

Chapelle (2001) introduces a number of principles for the evaluation of CALL systems. One of the principles is the need to provide judgmental and empirical analysis within an evaluation. According to Chapelle, there are three levels of analysis and three objects of evaluation: CALL software, teacher-planned CALL activities and learner performance during the CALL activities.

Hubbard (2006) describes the evaluation of CALL software as a three-stage process consisting of (a)

¹ Details on the current *j*ō*y*ō *kanji* list (常用漢字, Chinese characters in regular use) are provided at the web site of the Japanese Ministry of Education:

 $http://www.mext.go.jp/component/b_menu/shingi/toushin/_ic sFiles/afieldfile/2010/10/08/1298254_02.pdf$

selection: investigating a piece of CALL software to judge its appropriateness for a given language learning setting, (b) implementation: identifying ways it may be effectively implemented in that setting, and (c) assessment: assessing its degree of success and determining whether to continue using or to make adjustments to the implementation for future use.

This paper only briefly covers the selection and the implementation of the resources in order to concentrate on the third process of assessment. The targets of the evaluation are e-resources for support in reading Japanese texts. These e-resources were demonstrated during a Japanese text processing course organized for fourth grade students of Japanese studies at the University of Ljubljana. The students' knowledge of Japanese is at the intermediate to advanced levels.

During the class, a number of teacher-planned e-resource activities were organized. Students used the systems to undertake various reading and comprehension tasks and they were asked to provide some feedback on the difficulties that they had encountered or to describe advantages of the used tools. Thus, the systems were evaluated based on the student feedback and issues identified as being either inappropriate or absent from the content, as well as the coverage of the systems, in adopting a judgmental approach to the evaluation.

In addition, quantitative comparisons were carried out on the results for content coverage and for the accuracy of the lexical information within the systems, to also provide an empirical basis to the evaluation. Although an overall evaluation of the e-resources is not conducted, the paper focuses on aspects deemed to be important for performing the teacher-planned reading and comprehension tasks.

Finally, a survey was conducted to gather information concerning student usage preferences, usage habits and their overall opinions and judgment of the target e-resources and other e-resources for Japanese language learners.

3. Japanese CALL systems and other e-resources supporting reading of Japanese

CALL systems are typically created with the objective of assisting one or more of the four foreign language learning skills: reading, writing, listening or speaking. The targets of this paper are CALL systems and other e-resources that have been created to support the reading of online texts in Japanese.

3.1 Reading Tutor

The Japanese Language Reading Tutorial System "Reading Tutor"² is a CALL system created to help Japanese language learners to start with reading in

- Japanese-English Dictionary Tool, where all words have an explanation in English, their English equivalents, and furigana (indicating the reading of the Japanese words).
- Japanese-Japanese Dictionary Tool, where all words have an explanation in Japanese, their English equivalents, and furigana.
- Vocabulary Level Checker, which analyzes all the words in a text according to their level of difficulty. These levels correspond to the four levels of the Japanese Language Proficiency Test.
- Kanji Level Checker, which analyzes the kanji (Chinese characters) that appear in the text according to their level on the Japanese Language Proficiency Test.

The Japanese-English and Japanese-Japanese Dictionary Tools operate so that users copy and paste any Japanese text into the toolbox, and then a user-friendly interface is provided with the original text on the left side and the lexical items with their descriptions, readings, translations on the right side. When clicking a word in the text, the word appears on the right side with all its lexical information (Figure 1).

In the background, the tools use the Japanese-Japanese and Japanese-English EDR dictionary and morphologically analyse texts into segments using the ChaSen morphological analyzer. In addition to the language pairing of Japanese-English, there are also pairings of Japanese-German, Japanese-Dutch, and Japanese-Slovene.³ Each pairing employs the appropriate dictionary for the respective languages. In addition, the site provides a collection of reading materials and quizzes.



Figure 1: The Reading Tutor user interface

Japanese and to improve their reading skills (Kawamura, 2001). It was created at Tokyo International University and is freely available on the internet. The tool consists of four main functions:

² http://language.tiu.ac.jp/

³ The Japanese-Slovene Dictionary Tool is also available from http://nl.ijs.si/jaslo/chuta/ (Hmeljak-Sangawa & Erjavec, 2010).

3.2 WWWJDIC

The online Japanese dictionary service WWWJDIC has been developed by Jim Breen and others at the Electronic Dictionary Research and Development Group at Monash University. The dictionary server is associated with the JMdict/EDICT and KANJIDIC projects.⁴ It offers various functions to Japanese language learners, such as:

- Word Search with lexical entries including furigana, translation, examples, part of speech annotation and pronunciation. It also offers various links to other e-resources: example sentences from the Tanaka corpus, verb conjugations, Japanese WordNet, Japanese Wikipedia, Google search and Google images, goo and ALC dictionary servers, and lessons from JapanesePod101.com
- Text Glossing, which is function most similar to the Reading Tutor, and supports learners in reading Japanese language texts. The main difference is in the display, as WWWJDIC divides a text into sentences and then provides the lexical entries for each word in a sentence including translations and other information (**Figure 2**).
- Kanji Lookup with animation of kanji stroke order and links to various Chinese character dictionaries.
- Multi-Radical Kanji to search for a kanji based on its components which are classified into a set of 250 basic shapes.

In addition, the server provides example search, word lookup in various bilingual dictionary combinations with specialized Japanese language dictionaries. customization options for its user interface, the ability to add new entries or examples, and to search using romanized Japanese. The server has six mirror sites and provides online help and up-to-date information about changes on the server. It can be also accessed on Japanese mobile phones. The main dictionary within the server is EDICT, which has been constantly improved over the last twenty years, and which has been integrated into a number of other e-resources that are being used recently, as Rikai-chan and Perapera-kun (see 0).



Figure 2: The WWWJDIC user interface

3.3 Asunaro

The Japanese Reading System for Multi-Lingual Environments "Asunaro"⁵ is a reading-support tool for a range of languages: English, Chinese, Thai, Malaysian and Indonesian. The system has been created at the Tokyo Institute of Technology and is also freely available on the internet (Nishina et al., 2004). It has the following components:

- Morphological analysis of sentences with information about part of speech categories and meanings.
- Syntactic analyses of sentences using various methods (i.e., tree diagrams, box structures, and dependency structures).
- Example-sentence display. Sentences can also be morphologically and syntactically analyzed and the meaning of each lexical item is provided.
- Compound word elements with their idiomatic meanings.

The tool operates so that a user type in or copy in a sentence and the system provides the requested analyzes (Figure 3). In the background, this system also uses the Japanese-English EDR dictionary and the morphological analyzer ChaSen. Furthermore, it uses XPath to extract compounds, idiomatic phrases, and proverbs. The tool CaboCha is used for the dependency-structure analysis.

Although Asunaro is a reading support system, it was not evaluated within the present study. Because of its sentence-oriented user interface, it seemed less appropriate for undertaking the reading tasks planned during the course.



Figure 3: The Asunaro user interface

3.4 Other e-resources

Although a number of other CALL systems exist, such as e-dictionaries, corpus-query systems, and e-learning tools, which were noted during the course and within the survey, they are not evaluated in the present paper. This is because either they are not created specifically for reading-skill support or they were not planned for within

⁴ http://wwwjdic.com/

⁵ http://hinoki.ryu.titech.ac.jp/asunaro/index-j.php

the present course curriculum, and, thus, were not thoroughly presented and used within the classes. Such e-resources include:

- Natsume Writing Support System, a CALL system that supports learners' writing skills in Japanese. (Abekawa et al., 2011).⁶ The tool provides frequent and statistically relevant collocational relations across various types of corpora.
- Sketch Engine, a corpus-query system where the main function is the presentation of word sketches; a summary of the collocational and grammatical relations of a particular word (Kilgarriff et al., 2004; Srdanović et al., 2008; Kilgarriff et al., 2010).
- Tools that provide online dictionary lookup in the form of pop-ups on a particular web-page, such as PopJisyo,⁷ Rikai-chan,⁸ and Perapera-kun.⁹
- Sanseido dictionaries, Yahoo dictionaries, Wikipedia, Google translator.

4. Teacher-planned task and tools evaluation

The course curriculum included demonstrations of and the utilization of the Reading Tutor, Asunaro, WWWJDIC and Natsume e-resources during the classes. The students had to perform a number of tasks to become familiar with the tools and their support function for reading and writing in Japanese. The teachers selected these tools to be part of the curriculum because they have been used for a number of years and have proven to be useful and supportive to Japanese language learners.

This section of the paper presents the reading and comprehension tasks that were mainly carried out using the two reading support resources: Reading Tutor and WWWJDIC. Specifically, it presents the issues highlighted by the students, and compares how successful the resources are in terms of content coverage to support the students in undertaking the tasks.

4.1 Reading and understanding news articles online

One of the tasks was to choose online newspaper article(s) in Japanese (between 3,500-4,500 characters in length), read them using one or more e-resources and write a resume of the content in Slovene. The resume part of the task was used to verify if students adequately comprehend the respective texts.

The students reported that they were satisfied with the support provided by the e-resources. However, the students also expressed various preferences about the use of these e-resources, from various perspectives including their content and coverage, the user interfaces, the ease-of-use, and whether or not internet connection was necessary. The students reported on a number of instances where the tools were unable to assist: including compound nouns, compound particles, names of books, people, places, colloquial terms, specialized terms, and words written in katakana. In such cases, the students frequently has to resort to searching for help in other resources; such as with dictionaries or e-dictionaries with more detailed information on the lexical entries, their usages and meanings, as well as Google search and Wikipedia for explanations of some terms, toponyms and proper names.

Overall, the students performed the tasks successfully with only minor reading and comprehension errors for the read materials.

4.2 Quantifying the content coverage of the resources

To quantify and compare the content coverage of the resources, the output results of the target resources for one newspaper article of about 1,400 words,¹⁰ were examined in detail, by counting incomplete, misinterpreted and missing analyses.¹¹ Case particles, such as *ga*, *wo*, *kara*, and the topic particle *wa*, were excluded from the list, because the target resources do not actually provide descriptions for them. The auxiliary verb *da* and its forms are also excluded because it is not listed and covered in the dictionaries.

A summary of the results is presented in Table 1, which indicates some of the weak points of both resources in terms of their content coverage and accuracy. In total, 25 issues were found for WWWJDIC and 56 issues for Reading Tutor.

The weakest areas for WWWJDIC are various types of words (such as verbs, particles, conjunctions, adverbs, and nouns) written in hiragana, such as $\hbar \hbar \hbar \delta kakaru$ 'to take', $\sharp \hbar \vartheta \mathcal{O}$ mawari no 'around'. Such words are not found in the dictionary. Also, the resource usually only partially covers compound particles, such as $\hbar \hbar \hbar \eta$ $tf \hbar \delta \delta \zeta \delta \vartheta \pm \ell \hbar$ nakereba naranaku narimashita 'it became so that we should (do)', and their meanings are not clear from the results.

The results for Reading Tutor clearly reflect ChaSen's fine-grained approach to morphological analysis, as the tool is incorporated within the CALL system and is used to analyze texts. Accordingly, there are numerous cases when compounds were divided into segments and the

⁶ http://wombat.ryu.titech.ac.jp

⁷ http://www.popjisyo.com/

⁸ https://addons.mozilla.org/ja/firefox/addon/rikaichan/

⁹ http://perapera.wordpress.com/perapera-kun/

¹⁰ http://cgi2.nhk.or.jp/kdns/mwakari/mwakari_detail.cgi?id=24 4&y=2010&s=asc&w=%89H%93c (visited 27.01.2011.)

¹¹ Refer to Srdanović (2011) for information on coverage of collocational relations in these and some other computer-assisted language learning systems and resources for the Japanese language.

Reading Tutor provided translations for each segment separately, such as 成田 *Haneda* 'Haneda [toponym]' and 空港 *kuukou* 'airport', for 成田空港 'Haneda airport', or 観光 *kankou* 'tourism' and 客 *kyaku* 'guest' for 観光客 *kankoukyaku* 'tourists'. In most cases, it is not difficult to understand the whole compound from its segments, but, naturally, there were also exceptions. This issue becomes even less user-friendly when one part of the compound had already appeared within the text and is therefore separated by a number of entries from the other part of the compound in the entry definitions view of Reading Tutor.

	Type of issue	Example	No of issues
WWWJDIC (25)	partial match (compounds, phrases)	ことになる, とする, な ければならなくなりま した, 人気のある	6
	wrong match	チャンギ,としている	2
	no match (words written in hiragana)	ほしい, いったい, でき る, 1つ,ことし,もらう, かかる,まわりの	17
Reading Tutor (56)	partial match (compounds, phrases)	江戸時代, 玄関口, ~階 建て, 本格的な	22
	wrong match and translation	ハブ, ローコスト	2
	no match	ではないか,だけでなく, 万,羽田,チャンギ,ある	17
	matched but without translation	およそ,直接,お隣,チェッ クインカウンター,1 つ, 東京ドーム, ~倍	15

Table 1: Classification of the issues identified for WWWJDIC and Reading Tutor

In some cases, it seems likely that this kind of incomplete information elicits student mistakes when reading. For example, Reading Tutor presents the compound 玄関口 as 玄関 genkan 'entrance' and \square guchi / kou / kuchi 'gate/mouth etc.' Based on this information, students can incorrectly read the compound as genkankou or genkankuchi instead of the correct genkanguchi.

There were also words (such as particles, compound particles, conjunction, verbs written in hiragana, and toponyms) that were not found in Reading Tutor, such as だけでなく *dakedenaku* 'not only that', 万 man 'ten thousand'. Examples of words that are linked to Reading Tutor's dictionary but did not have definitions are 東京 ドーム *Toukyou Doumu* 'Tokyo Dome', チェックイン カウンター *chekkuinkauntaa* 'check-in counter', and お よそ oyoso 'about'.

In addition, it should be noted that neither of the resources covers the frequent auxiliary verb $\bigcup \Im$ *iru* 'to be' and its conjugations well. In the case of WWWJDIC, the form is not linked and is described as a part of a main verb; there is no definition or description provided for the verb. In the case of Reading Tutor, the auxiliary verb is not marked as such but it always provides the following misleading definition/translation: "to do something with deep commitment; heartily / [respect] intensely / profoundly / deeply". The other frequent auxiliary verb of $\eth \Im$ *aru* 'to be' is well covered in WWWJDIC but not in Reading Tutor.

Given that there were a little more than twice the number of issues for Reading Tutor than for WWWJDIC, we may conclude that WWWJDIC performs better in terms of the accuracy and completeness of its lexicon entries.

5. Students survey

At the end of the two-semester course, a survey was conducted that asked the students about their preferences and habits concerning e-resource usage, and about their opinions of the two target e-resources, as well as other resources that they are fond of using. Nine respondents completed the six-page long survey.

The students all responded positively to the general question of whether they like to use e-resources as a support for learning Japanese. Each student listed the one or more e-resources that he/she most typically and most frequently use. The lists differed from student to student. Table 2 provides a summary of student responses, which indicates that the Reading Tutor followed by WWWJDIC were listed as most frequently used by the students. This might also be due to the fact that these were given the most attention during the class, compared to Natsume (and Rikai-chan, which was suggested as an add-on for Natsume).

The next group of resources, which were listed by three students, are Rikaichan, Natsume and Perapera-kun. It is rather surprising that Perapera-kun is so high on the list as it was not demonstrated or used in the class. It seems that it is preferred by some students and therefore it will be considered for inclusion within future evaluations. Clearly, the students also typically use online services, such as Jisho.org, Yahoo dictionaries and alc.co.jp with multiple monolingual and bilingual Japanese dictionaries.¹²

Table 3 shows the e-resources that were chosen by students as the most preferred support for the reading task in Japanese. Reading Tutor is the most preferred, with students stating that it is very systematic, clear, and easy-to-use. Also, it is regarded as being useful because

¹² The fact that the Asunaro reading support system was not listed probably reflects its limitation in only allowing searches for one sentence at a time, which indicates that it is not sufficiently effective for doing the planned reading tasks.

it provides various senses for a word, although it does not provide appropriate entries for all words (such as proper names). The next choices are Rikai-chan and Perapera-kun, both providing pop-up dictionary support, which they are praised for: ¹³

- (for Rikai-chan) "Its advantage is that you can read and understand any word while reading a text, all you have to do is to place your mouse on the unknown word.", "It supports more languages."
- (for Perapera-kun) "It is useful since it immediately translates words while reading text.", "The entries are detailed, with good definitions and the grammatical properties of words."

Most often used e-resources	No of students
Reading Tutor	6
WWWJDIC	5
Rikai-chan	3
Natsume	3
Perapera-kun	3
Jisho.org dictionaries	2
Yahoo dictionaries	2
Popjisho	1
Google translator	1
alc.co.jp dictionaries	1

Table 2: E-resources listed by students as being the most frequently used; some students listed more than one resource

Students also stated that one advantage of the tools is that they are very quick. Also, some minor disadvantages were noted: it is not possible to use it without an internet connection, one cannot use it for reading pdf files (for Rikai-chan), it doesn't always properly cover some compound words, the definitions exist only in English (for Perapera-kun).

One of the students chose Popjisho, also a pop-up dictionary support, as most preferred.

Most preferred e-resources for reading	No of students	
Reading Tutor	4	
Rikai-chan	3	
Perapera-kun	3	
Popjisho	1	

Table 3: E-resources listed by students as being the most preferred resource for reading in Japanese

Table 4 presents the e-resources that were chosen by students as being their most preferred support tool for writing in Japanese. Almost half of the students stated that they do not use e-resources for writing support. Three of the students indicated Natsume as being their most preferred, although some of them also wrote that they use additional resources (such as Perapera-kun, Rikai-chan and Google) in order to read and understand word combinations provided by Natsume. Natsume was also praised for its exhaustive word-usage information, but it was also criticized for its lack of clarity. Interestingly, WWWJDIC was not listed as a most preferred tool for reading but was for writing. It was described as being useful for writing because of its rich dictionary content, with examples and inflectional forms.

Most preferred e-resources for writing	No of students
(not using e-resources for writing)	4
Natsume	3
WWWJDIC	2
Perapera-kun (along with Natsume to check translations)	1
Google translator	1
Rikai-chan (along with Natsume)	1
Google, Wikipedia	1

Table 4: E-resources listed by students as being their most preferred resource for writing in Japanese

Furthermore, the students were asked to rate some of the e-resources on a 5-point scale in terms of the following four categories; a) usable for learning Japanese, b) easy and practical user interface, c) coverage and accuracy, and d) additional functions/data.

Figure 4 presents the results of the survey for the Reading Tutor and WWWJDIC resources.



Figure 4: Rating survey results for Reading Tutor and WWWJDIC

The results are high for all four categories indicating the students' level of satisfaction with the resources. While the students rated both resources similarly in terms of usability for learning Japanese and additional functions, there are also some noticeable differences in the rating for the easy-to-use/practical user interface and the coverage and accuracy of the resources. Reading Tutor

¹³ The author of the paper translated students' survey responses from Slovene to English.

was evaluated as being better in terms of its user interface - easy-to-use and practical. On the other hand, WWWJDIC was rated higher for its dictionary coverage and accuracy.

The pattern of ratings is in line with student comments about the advantages and disadvantages of these resources, as summarized in Table 5 and Table 6.

As these tables indicate, the majority of positive comments (C1– C7) for Reading Tutor refer to its user interface and its easy-of-use. Only C8 refers to the content of the dictionary. On the other side, only two negative comments (C1, C2) refer to the interface, technical aspects of the tools, and the rest (C3–C7) refer to the lack of data in the resource's dictionary.

Reading Tutor			
Positive comments	Negative comments		
(C1) Easy to use, systematic	(C1) Difficult to read if text is too long		
(C2) Clear interface, easy to search for words	(C2) Need to click on the words		
(C3) While reading, it is easy to search for unknown words and their readings.	(C3) Some words not found		
(C4) We can copy text into it (also pdf data that is not readable by Rikai-chan, for example).	(C4) Some translations are not correct, especially for proper names		
(C5) Easy to use	(C5) Rather poor dictionary, a lot of words (especially colloquial) not found		
(C6) Easy to use, no need to move from one window to another	(C6) Some words not covered, lots of words divided into morphemes		
(C7) Very easy to use	(C7) Poor vocabulary		
(C8) Able to provide definitions of words in more languages			

Table 5: Advantages and disadvantages of Reading Tutor

WWWJDIC				
Positive comments	Negative comments			
(C1) Good coverage of inflections, compounds, sayings	(C1) Also lists words that appear in example sentences			
(C2) Good dictionary, specialized dictionaries, links to other applications	(C2) Not easy to use, web page hard to follow			
(C3) Good coverage of inflections, good vocabulary (phrases, sayings)	(C3) Some words / meanings not covered			
(C4) Lots of words	(C4) Cannot find all the words I search for			

(C5) Kanji search through radicals	
(C6) Multiple ways to search for kanji, their readings etc.	
(C7) Lots of sentence examples	

Table 6: Advantages and disadvantages of WWWJDIC

In contrast, the positive comments for WWWJDIC mostly refer to the coverage of the dictionary content (C1-C4), and some to the tool's additional functions (C5-C7). Half of the negative comments address the not-easy-to-use interface (C1, C2), while the other half note missing data with the dictionary.

Finally, the survey also confirms that students frequently prefer to use a given e-resource in combination with other resources in order to recheck some meanings, readings, translation, as well as to search for entries not covered by other e-resources.

6. Conclusion

The evaluation presented in this paper confirms that the targeted e-resources for Japanese are supportive of learners in carrying out reading tasks in Japanese and that these Japanese language learners are positive towards using the resources. The research also sheds some light on aspects of the targeted resources and their tools that should be improved. Most frequently, misinterpretations occur because of overly-fine segmentation of Japanese words or combination of words, leading students to wrong readings of kanji characters and wrong translations. This is especially the case for proper names, toponyms, compounds and idiomatic expressions, and for foreign words written in katakana. The integration and use of multiple resources, with incorporated multiple dictionaries, proves to be the most efficient in achieving complete and accurate results.

It is interesting to notice that the students rather prefer Reading Tutor as a tool for reading support, even though WWWJDIC was shown to have better performance in terms of content coverage. This indicates that the user interface plays a very important role in selecting support resources for language learning. Japanese language learners also showed a preference for using pop-up dictionary support. Considering that some of the resources, for example Perapera-kun, use the data available at the WWWJDIC server, one may expect this to be a promising combination for language learners.

There is a gap, which we should be aware of, between how supportive an e-resource can be to language learners, on one hand, and how the resource actually enhances the language skills of a learner, on the other hand. Being supportive is helpful and time-sparing in most cases, and, in the long run, that is expected to help in enhancing learner skills. However, support can also lead to over-dependency, which is not inevitably connected to skill enhancement. This is an area where e-resources could be further evaluated and improved in order to create environments that enable learners to directly progress in acquiring their language skills.

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