

# Japanese Onomatopoeia Learning Support for International Students Using SCROLL

Norio UOSAKI<sup>\*</sup>, Hiroaki OGATA<sup>b</sup>, Kousuke MOURI<sup>c</sup> & Erdenesaikhan LKHAGVASUREN<sup>d</sup>

<sup>a</sup>Center for International Education and Exchange, Osaka University, Japan

<sup>b</sup>Faculty of Arts and Science and the Graduate School of Information Science and Electrical Engineering at Kyushu University, Japan

<sup>c</sup>Graduate School of Information Science and Electrical Engineering, Kyushu University, Japan

<sup>d</sup>Faculty of Engineering, The University of Tokushima, Japan

\* uosaki@ciece.osaka-u.ac.jp

**Abstract:** This paper describes our study where we have aimed to facilitate Japanese onomatopoeia learning for international students using the learning log system called SCROLL (System for Capturing and Reminding Of Learning Log). About 180,000 students are studying in Japan. In order to live in Japan, learning Japanese is a necessity. Japanese language is full of onomatopoeia. A pre-survey reveals that only 9% felt no difficulty in learning onomatopoeia at all and that most students do not do anything to learn onomatopoeia and if they do, they learn it without help from any technology. In order to facilitate their onomatopoeia learning, we propose Onomatopoeia Learning Support System using SCROLL. The result of its pilot evaluation demonstrates that the users benefited from the system. However some bug in the quiz function has been found and our future work includes its improvement together with the refinement of the learning contents and message functions.

**Keywords:** Japanese onomatopoeia learning, mobile assisted language learning, second language learning, ubiquitous learning

## 1. Introduction

According to JASSO (Japan Student Services Organization), 184,155 international students are studying in Japan as of May 1, 2014. Besides, Japanese Government has been promoting a “Plan for 300,000 Exchange Students” as a policy measure since 2008. Though EF English Proficiency Index (3rd ed.) indicates that Japanese people have moderate English proficiency, many international students report the inability of Japanese local people to communicate in English as one of their biggest culture shocks. Therefore in order to live in Japan, learning Japanese is a necessity. But learning Japanese language is a big challenge for international students. In particular, Japanese language is filled with onomatopoeia. A questionnaire survey reveals that only 9% of international students feel no difficulty at all in learning them. How can we support their onomatopoeia learning? Our main objective in this study is to facilitate their onomatopoeia learning with our developed system.

## 2. Backgrounds

### 2.1 Japanese Onomatopoeia Learning

Learning onomatopoeia is a challenge for learners of Japanese as a second language (Inose, 2007, Asaga et al., 2008; Ho et al., 2010). There are mainly two types of onomatopoeias in Japanese: ‘*giongo*’ (phonetic expressions that imitate real sounds such as ‘*wan-wan*’, barking sounds of dogs) and ‘*gitaigo*’ (mimetic expressions of the states which do not actually produce any sounds such as ‘*mero-mero*’ meaning madly in love). The latter one is occasionally translated into English as “mimicry”, but in this paper we define “Japanese onomatopoeia learning” as “Japanese ‘*giongo*’ and ‘*gitaigo*’ learning” as following reasons: 1) there is no actual equivalence of ‘*gitaigo*’ in English language, 2) ‘onomatope’ (オノマトペ), phonetic translation of English word, ‘onomatopoeia’, includes

both 'giongo' and 'gitaigo', 3) 'giongo' and 'gitaigo' are closely related in terms of usages, structures, morphology, and syntax. In fact sometimes it is difficult to categorize which belongs to which, 4) 'giongo' and 'gitaigo' are usually dealt as one set of learning.

Japanese onomatopoeia is difficult to learn because of the following reasons (Flyxe, 2002; Inose, 2007):

1) It is difficult to describe.

It is difficult to explain its meaning, especially 'gitaigo'. It is possible to explain roughly about it such as happy status or unhappy status, good feeling or bad feeling, but it indicates more complicated feeling or status. There are many similar onomatopoeias which are very hard to distinguish even for native speakers.

2) It is difficult to translate.

It is difficult to translate it into other languages. Some onomatopoeia have equivalences in other languages such as animal sounds: 'wan-wan' meaning bow-wow in English, but in most cases it is difficult to find its equivalences in other languages. When it is difficult to translate it into their native languages, it is difficult to grasp its meaning.

There are a few research studies where they have developed Japanese onomatopoeia learning systems (Ochi & Kawasaki, 1997; Ochi et al. 1997; Asaga et al., 2008; Ho et al., 2010; Tomoto et al., 2010, Kaneko & Miyakoda, 2013). Asata et al. (2008) developed Onomatopoeia Online Example Dictionary System called *ONOMATOPEDIA* extracting from data on the web. They reported the system had a problem with accurateness of the image search. Ho et al. (2010) developed Japanese mimicry and onomatopoeia learning assistant system called *JAMIOLAS* using wearable sensors and sensor network to support learning Japanese mimicry and onomatopoeia. The number of the onomatopoeia words which can be learned through their system was limited to the terms which are related to temperature and humidity. Thus we have to admit that too highly technology oriented system limits the range of learning. Therefore we have explored effective onomatopoeia learning system with the use of both technology and manual power. Li et al. (2013) and Uosaki et al. (2013) have reported that quiz function was effective in language learning. One of the main functions of our developed system is to generate multiple-choice quizzes automatically. It is expected that our system could play an important role in facilitating onomatopoeia learning process for JFL (Japanese as a foreign language) learners.

### 3. Pre-survey

#### 3.1 Participants and questions

In order to find out how they learn Japanese onomatopoeia, a questionnaire survey was conducted to the international students who are studying in a university in western Japan. The objective of this survey is 1) to find out if JFL learners feel it difficult to learn Japanese onomatopoeia, and 2) to find out how they learn it. A web-based survey was conducted to ask: Q1. Nationality, Q 2. Gender, Q 3. Approx. duration of your Japanese studies, Q 4. Do you feel it difficult to learn Japanese onomatopoeia (imitation of sounds such as murmur or buzz)? Q 5. Do you do something specific to learn Japanese onomatopoeia? Q 6. If "Yes", how do you learn onomatopoeia? Mark all reasons that apply.

#### 3.2 Survey results

Ninety-one international students participated in the questionnaire. Figure. 1 shows the result of Q4. Twenty-eight students (31%) chose "Yes", eight (9%) chose "Lean Yes", thirty-five (38%) chose "So-so". Twelve (13%) chose "Lean no", eight (9%) chose "No". This rate was not correlated with the duration of Japanese studies (correlation coefficient  $r = 0.09$ ). Figure. 2 shows the result of Q5. Seventy-one students (78%) do not do anything specific to learn Japanese onomatopoeia.

Twenty (22%) students who answered "Yes" to the Q5 were further asked to answer Q6 (cf. Figure 3). All marked more than two. Thirteen out of 20 (65%) are learning through talking with their

Japanese friends, nine (45%) are learning through manga or anime. It means most students are learning in a very casual setting. It is in line with the fact that onomatopoeia is usually used in a spoken language. Figure 3 also indicates that only two students use web sites and only two students use learning applications. Since one student uses both methods, 18 out of 20 are learning it in without help from any technology. Therefore technological enhancement of learning in this field is yet to be promoted. In order to contribute to technological enhancement of Japanese onomatopoeia learning, we have proposed SCROLL Onomatopoeia Learning Support which is to be described in the next chapter.

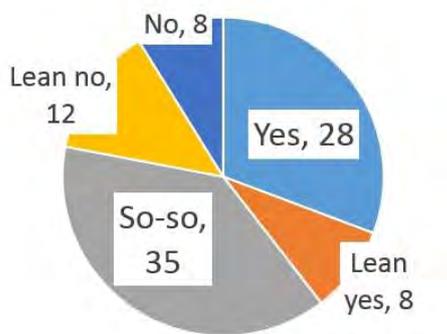


Figure 1. Q4. Do you feel it difficult to learn Japanese onomatopoeia?

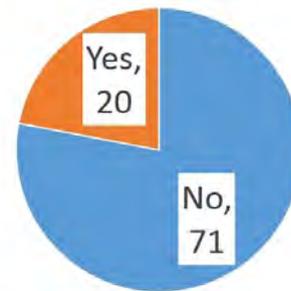


Figure 2. Q5. Do you do something specific to learn Japanese onomatopoeia?

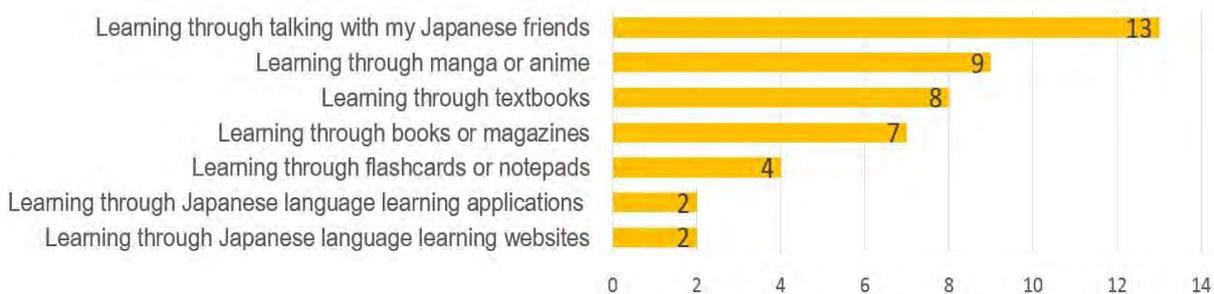


Figure 3. Q6. If "Yes", how do you learn onomatopoeia? Mark all reasons that apply.

## 4. Onomatopoeia Learning Support Using SCROLL

### 4.1 SCROLL (Learning Log System)

Learning new information can happen in a variety of situations. When we come across new information, we may take notes. However, the notes will not remind us of what we have learned. SCROLL has been developed in order to support learners to record new information, to remind them, to share and reuse them in future learning (Ogata et al., 2010). The system is designed to support every aspect of a learner's activity model called LORE (Log-Organize-Recall-Evaluate) (Ogata et al., 2010).

#### 4.1.1 Design of the System

In this paper, we define the term, ubiquitous learning log (ULL) as record of what a learner has learned in the daily life using ubiquitous technologies. Each recorded object is called ubiquitous learning log object (ULLO). SCROLL is a client-server application. The server side runs on Linux OS. It runs on different platforms such as smart phones, PCs, and tablets.

#### 4.1.2 ULLO recorder (Log)

This component facilitates the way learners record their newly learned terms to the server. In order to add a ULLO, a learner can take a photo, ask questions about it and attach different kinds of meta-data with it. Figure 4 shows the web interface of adding a ULLO and its result, while Figure 5 shows its mobile version.

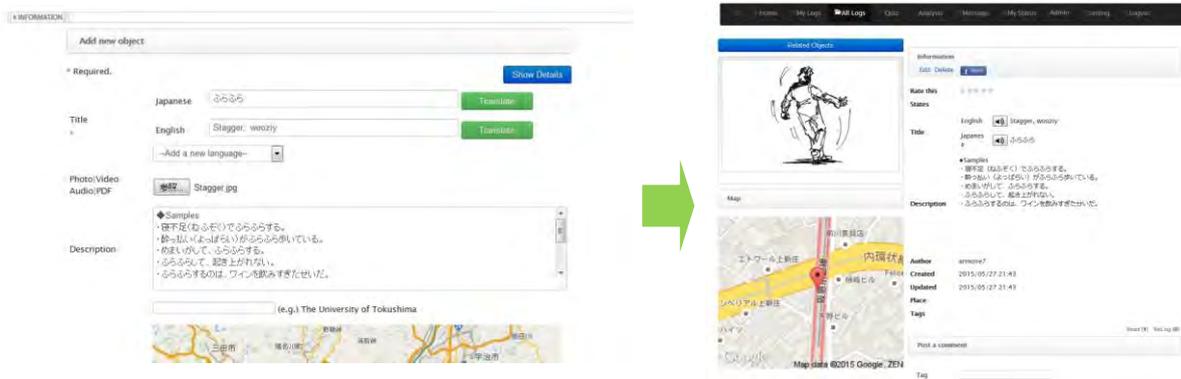


Figure 4. Adding ULLO and ULLO interface on the web.

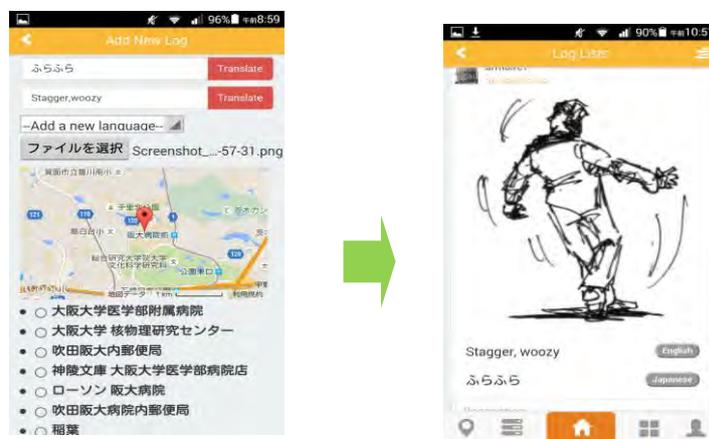


Figure 5. Adding ULLO and ULLO interface on mobile.

#### 4.1.3 ULLO finder (Organize)

If a learner registers a new ULLO, the system checks whether the same object has been already stored or not. Also, the learner can search ULLOs by name, location, tags and time. Using this function, a learner can understand what, where and when he learned before.

Figure 6 shows the list of ULLOs. Besides, it allows him to be aware of others' learning objects and to relog them if he regards it as useful. This means that he can make a copy of another learner's learning object into his own log. Therefore, learners can obtain a considerable amount of knowledge from others even though they have not experienced that knowledge themselves. By sharing ULLOs with others and relogging other learners' ULLOs, the acquisition of knowledge is enhanced. The system shows some recommended objects by showing knowledge map (cf. Figure 7).

|  |   |
|--|---|
|   | English Slimy<br>Japanese ぬるぬる                    |
|   | English Staring<br>Japanese じろじろ                  |
|   | English Sound of rushing water<br>Japanese ざあざあ   |
|   | English laugh with great guffaws<br>Japanese げらげら |
|   | English Giggle<br>Japanese くすぐず                   |
|   | English Glitter<br>Japanese きらきら                  |
|   | English Irritabilit, frustrating<br>Japanese いらいら |
|   | English Pounding, thumping<br>Japanese どきどき       |
|  | English Thrilled<br>Japanese わくわく                 |

Figure 6. ULLO list.

Recommendation objects

You might study these objects in the next place

- 1. Barely (importance:4)
- 2. Onomatopoeia Learning video (importance:1)
- 3. Slippery, feeling silky smooth (importance:0)

These users are famous or representative learners in SCROLL system

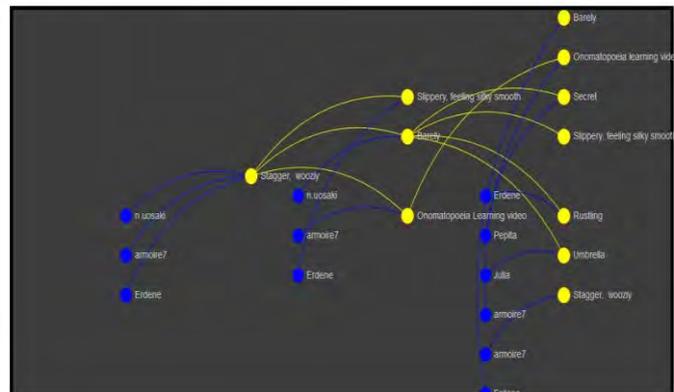


Figure 7. Knowledge map.

#### 4.1.4 ULLO reminder (Recall)

Figure 8 shows a multiple-choice quiz and after-quiz interface. Quizzes are generated automatically by the system. The system immediately checks whether the answer is correct or not. These quizzes are generated according to the learner's profile, location, time and the results of past quizzes.

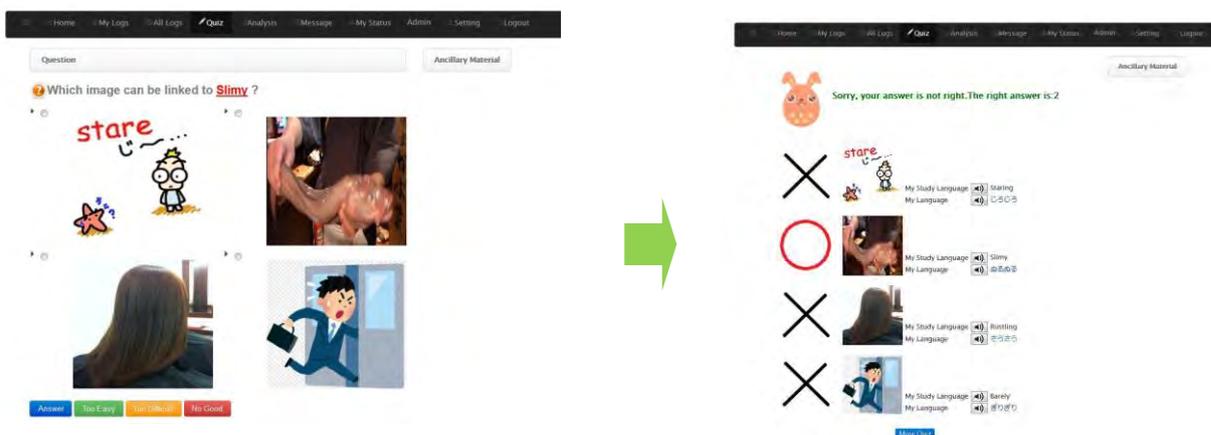


Figure 8. SCROLL multiple-choice quiz and after-quiz interface.

#### 4.1.5 ULLO review and evaluation (Evaluate)

Johnson and Wilson (2009) has developed a tool called TimeMap to show temporal data within a geographical framework. It has been implemented to the system to show the users when and where they

learned their logs for reviewing (cf. Figure 9). Location information plays an important role in retaining memory (Baddeley & Hitch, 1974). Figure 10 shows the dashboard on the top page which shows the statistics of their learning activities. Figure 11 shows Quiz Logs by which they can learn how many correct and wrong answers they give. They can evaluate their learning activities by viewing them.



Figure 9. SCROLL TimMap.

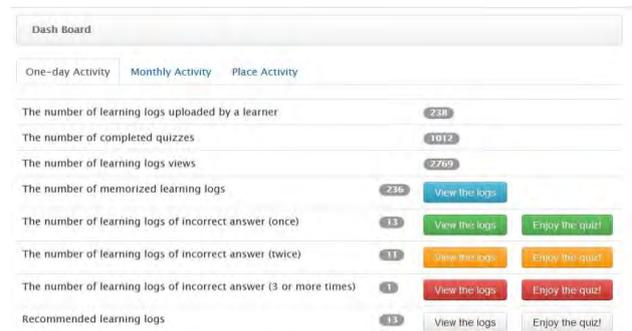


Figure 10. SCROLL Dashboard.

| Answerstate | Description                               |
|-------------|---|
| 0           | Wrong quiz                                |
| 1           | Correct quiz                              |
| 2           | "No Good" button                          |
| 3           | "Too easy" button and the wrong quiz      |
| 4           | "Too difficult" button and the wrong quiz |

| Nickname | Answerstate | The number of quiz logs |
|----------|-------------|-------------------------|
| 뽕구발사     | 0           | 6                       |
| 뽕구발사     | 1           | 58                      |

Figure 11. SCROLL Quiz Logs.

#### 4.2 Onomatopoeia Learning Support with SCROLL

The objective of this system is 1) to share onomatopoeia learning contents among onomatopoeia learners, 2) to organize and reinforce their knowledge. Figures 12 and 13 show its learning process.

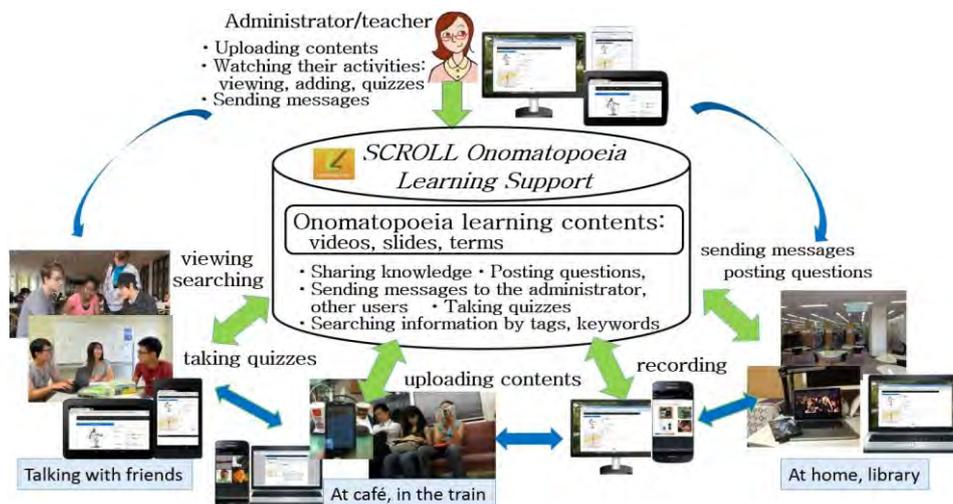
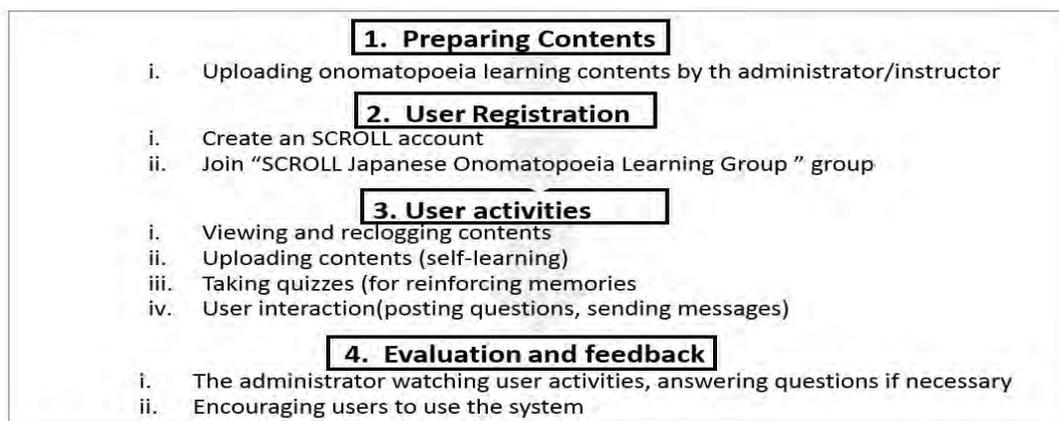


Figure 12. SCROLL Onomatopoeia Learning Support (overview).



**Figure 13.** SCROLL Onomatopoeia Learning Support (chronological order).

#### 4.2.1 *Uploading contents*

The administrator/instructor, uploads useful contents for onomatopoeia learners such as YouTube videos, glossaries, pdfs, photos etc. Aiming for an effective support, it is recommended to ask Japanese language teachers to join Onomatopoeia Learning Support group.

#### 4.2.2 *User registration*

Any students who are interested in learning Japanese onomatopoeia can create an account and join “Onomatopoeia Learning Support” group for free.

#### 4.2.3 *User activities*

They learn onomatopoeia by viewing uploaded contents. They can search learning contents they are interested in by keywords, tags, and location and so on. They can upload their newly learned knowledge themselves and they can take quizzes for reinforcement of their memories. When they upload a new object, the system will show its related contents and recommend them to learn. They can also post questions on comment columns to other users. On posting comments on some ULLO, the system will automatically send an e-mail to its author. Besides, the system shows who are online, and they can send messages directly to the online users. These functions facilitate user interaction. They can post questions about language usages, how to use them properly and so on. If the learners/users cannot solve the questions, the administrator or instructors are supposed to answer their questions, or they can send messages directly to the administrator or instructors. These comment and message functions are expected to contribute to facilitate the learning.

#### 4.2.4 *Evaluation and feedback*

Users evaluate and review their learning activities by viewing TimMap, dashboards, quiz logs (cf. Figures 9, 10, 11). The administrator or instructors watch user activities such as how often they log in, view contents, take quizzes etc. and they can send messages to encourage inactive users to use the system by recommending some useful information. In the future, these processes are expected to be automatically proceeded by the system.

### 5. Pilot Evaluation

One of the authors has been in charge of supporting international students’ Japanese language learning at university. In this pilot evaluation, she took the role as an administrator/instructor and recruited the

participants through her personal connection. She uploaded onomatopoeia learning contents to the system.

### 5.1 Participants and questions

Five international students (2 Mongolians, 1 Danish, 1 Swedish, 1 Chinese) participated in the evaluation. (cf. Table I). After trying this system for a certain period of time (from one day to one week), they were asked to answer the questionnaire as shown in Table 2. Q1 and Q2 were created based on the technology acceptance model proposed by Davis (1989). Q3, Q4 and Q5 were created to examine effectiveness of the functions of our system respectively. Q6 and Q7 were created for examining the user acceptance of its interface and the whole system.

Table 1: Participants.

|            | Nationality | gender | age     | Length of stay in Japan(total) | Duration of your Japanese language studies | Year in the university | Major                             |
|------------|-------------|--------|---------|--------------------------------|--|------------------------|-----------------------------------|
| Student #1 | Mongol      | f      | 30 - 34 | 3 ys and 4 ms                  | 1 year                                     | D3                     | Faculty of Engineering            |
| Student #2 | Denmark     | f      | 20 -24  | 5 ms                           | 6 months                                   | B3                     | Faculty of Engineering            |
| Student #3 | Sweden      | m      | 20 -24  | 0                              | 10 months                                  | M2                     | Faculty of Technology and Society |
| Student #4 | Mongol      | f      | 30 - 34 | 5 ys                           | 4 years                                    | M2                     | Faculty of Art and Science        |
| Student #5 | China       | m      | 25 - 29 | 2 ms                           | 2 years                                    | Research Student       | Faculty of Art and Science        |

Table 2: The result of five-point score questionnaire.

|    | Question   | Mean | SD   |
|----|--|------|------|
| Q1 | Was it easy for you to use SCROLL?                             | 4.4  | 0.43 |
| Q2 | Was the system helpful for you to learn Japanese onomatopoeia? | 4.8  | 0.43 |
| Q3 | Did the relog function facilitate your learning                | 4.6  | 0.5  |
| Q4 | Was the message system helpful for your learning?              | 3    | 2    |
| Q5 | Was the quiz function helpful for your learning?               | 4.5  | 0.5  |
| Q6 | Please rate how much you liked or disliked its interface       | 4.6  | 0.43 |
| Q7 | Please rate how much you liked or disliked the whole system    | 4.4  | 0.5  |

### 5.2 Evaluation Results

The result of the five-point-scale survey is shown in Table 2. In all the questions but Q4, they gave high scores. It had a high usability and users were satisfied with its functions. The highest score was given to Q2. We can see that the system was helpful in their onomatopoeia learning. It indicates that we are in the right direction in developing our onomatopoeia learning system. The lowest point was given to Q4. In fact only one participant have actually used this message system. They seemed not motivated to use its function. We will consider the improvement of the message function in our future work.

Table 3: What is your impression of using SCROLL Onomatopoeia Learning System?

|            | Comments  |
|------------|---|
| Student #1 | The onomatopoeia words were interesting. I've re-logged the words to my vocabularies in scroll. The images and usage examples were very helpful for me to understand and memorize the onomatopoeia word. I'd like to learn many onomatopoeia words again.   |
| Student #2 | I found it helpful to learn some Japanese Onomatopoeia! I did prefer to relog those words with some pictures in them though. I normally learned some Onomatopoeia from reading Manga, since these sounds are rarely translated and appear as Hiragana or Katakana :-)   |
| Student #3 | I think it is good if you specifically aim to learn Japanese Onomatopoeia as there is a big collection of words that you can browse. I really like the relation between the image and word as it was easy to make the connection. The sound was also a great addition as it is helpful to hear how it is pronounced. It would be nice if you could hear the example sentences as well since i was only able to read a small amount of the kanji in the sentences. I think the re-log function was convenient as it provided easy access to logs that you might want to review later. I think using quizzes are generally a good approach when it comes to learning, i am also quite surprised as i got asked questions about the material i looked at yesterday when i was browsing the logs which is very good!. I managed remember the words i reviewed yesterday by looking at the images in the quiz which i thought was quite nice. When i tried the my quiz section i got a Java error message saying index out of bounds, after i took some more quizzes that part worked. |
| Student #4 | I guess how it could be useful for us to exchange opinion and impression of each other since there are more unknown useful Onomatopoeia. I want to write any comment which was really new for me. That is why I am sure that I will use it anyway.  |
| Student #5 | The pictures are helpful. I will appreciate it that someone add more interesting pictures. Good luck.   |

Table 3 shows free comments from the participants. Most part of their comments were positive ones. Especially contents with images gained good reputation (Student #1, # 3 & #5). Our system seemed to enhance Student #1's motivation of learning onomatopoeia. However as Student #3 pointed it out, it was found that there was a bug when taking the quizzes. Its refinement will be included in our future works.

## 6. Conclusions and Future Works

The objective of this study is: 1) to find out if JFL learners have a difficulty in onomatopoeia learning together with their learning methods, and 2) to propose an effective Japanese onomatopoeia support system to facilitate their learning. The result of the Pre-survey reveals that only 9% felt no difficulty at all and that most students learn onomatopoeia in a very old-fashioned way. A pilot evaluation revealed that the system has a high usability and users were satisfied with using it. It is expected to help JFL learners with their onomatopoeia learning. However some bug in the quiz function has been found and our future work includes its improvement. With the refinement of the learning contents and message functions, more detail examination of effectiveness of our system will be conducted. We believe that our system will contribute to the enhancement of JFL learners' onomatopoeia learning.

## Acknowledgements

Part of this research work was supported by the Grant-in-Aid for Scientific Research No.26350319 from the Ministry of Education, Culture, Sports, Science and Technology (MEXT) in Japan.

## References

- Asaga, C., Mukarramah Yusuf, M., & Watanabe, C. (2008). ONOMATOPEDIA: Onomatopoeia Online Example Dictionary System Extracted from Data on the Web. *Proceedings of Asia-Pacific Web Conference (APWeb '08)*, 601-612.
- Baddeley, A.D. & Hitch, G. (1974). Working memory. In G.H. Bower (Ed.), *The psychology of learning and motivation: Advances in research and theory*, Vol.8, 47-89, New York: Academic Press.
- Davis, F. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology, *MIS Quarterly*, 13(3), 319-340.
- EF English Proficiency Index (3rd ed.) <http://www.ef.com/ca/epi/> (last access: August 26th, 2015).
- Flyxe, M. (2002). Translation of Japanese onomatopoeia into Swedish with focus on lexicalization. *Africa & Asia*, 2, 54-73.
- Hou B., Li, M., Ogata, H., & Yano, Y. (2010). JAMIOLAS3.0 Supporting Japanese Mimicry and Onomatopoeia Learning Using Sensor Data, *International Journal of Mobile and Blended Learning*, 2(1), 40-54.
- Inose, H. (2007). Translating Japanese onomatopoeia and mimetic words. *Translation Research Projects* 1, 97-116.
- Johnson I. and Wilson A (2009). The TimeMap Project: Developing Time-Based GIS Display for Cultural data, *Journal of GIS in Archaeology* 1, 123-135.
- Kaneko, K. & Miyakoda, H. (2013). Development of an Onomatopoeia Learning System Based on Multi-media Material (in Japanese), in *Sound symbolism and mimetics: rethinking the relationship between sound and meaning in language*, 279-297, Hituzi Syobo.
- Ochi, Y., & Kawasaki, K. Y. (1997). JAMIOS: Japanese Onomatopoeia Dictionary For Foreign Students. *IEICE Trans. on Information and Systems D-II*, 3210-3219.
- Ochi, Y., Kawasaki, K., Yano, Y., & Hayashi, T. (1997). JAMIOS : Development of Japanese Mimesis and Onomatopoeia Dictionary System for Foreigners. *The transactions of the Institute of Electronics, Information and Communication Engineers*, 80(12), 3210-3219.
- Ogata, H., Kondo, T., Yina, C., Liub, Y., & Yano, Y. (2007). Computer Supported Ubiquitous Learning Environment for Japanese Mimicry and Onomatopoeia with Sensors. *Supporting Learning Flow Through Integrative Technologies*, 463-470.
- Ogata, H., Hou B., Li M., El-Bishouty, M.M., Uosaki, N., & Yano, Y. (2010). What if we can log our ubiquitous learning? *Proc. of the 18th International Conference on Computers in Education*, Putrajaya, Malaysia, 360-367.

- Ogata, H., & Uosaki, N. (2012). A new trend of mobile and ubiquitous learning research: towards enhancing ubiquitous learning experiences. *International Journal of Mobile and Learning Organization*, 6(1), 64-78.
- Ono, M. (2007). *Japanese Onomatopoeia Dictionary*. Shogakukan Press.
- Plan for 300,000 Exchange Students (2008). Ministry of Education, Culture, Sports, Science and Technology et al. [http://www.nafsa.org/uploadedFiles/NAFSA\\_Home/Resource\\_Library\\_Assets/Japan\\_SIG/plan\\_for\\_exchange.pdf?n=8523](http://www.nafsa.org/uploadedFiles/NAFSA_Home/Resource_Library_Assets/Japan_SIG/plan_for_exchange.pdf?n=8523). (last access: August 26th, 2015).
- Result of an Annual survey of International Students in Japan (2014). JASSO (Jappn Student Services Organization) [http://www.jasso.go.jp/statistics/intl\\_student/data14\\_e.html](http://www.jasso.go.jp/statistics/intl_student/data14_e.html) (last access: August 26th, 2015).
- Tomoto, Y., Nakamura, T. Kanoh, M. & Komatsu, T. (2010). Visualization of similarity relationships by onomatopoeia thesaurus map. *Proc. of FUZZ-IEEE 2010 - 19th IEEE International Conference on Fuzzy Systems*, Barcelona, Spain, 1-6.