Evaluating User Experience of the Online Dictionary of the Slovenian Sign Language

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Abstract

The extensive use of mobile devices and tablets has resulted in an increasing need for the ubiquitous availability of different types of dictionaries online. The purpose of our study was to evaluate the user experience and usability of the online dictionary of the Slovenian Sign Language. Six Slovenian hearing non-signers were included in the study. While using the online dictionary, participants were asked to complete six tasks: searching for a letter, a word, written explanation of the word, thematic section and particular fairy tale, as well as completing the quiz. In addition, the participants evaluated the usability of the online dictionary with the System Usability Scale. The findings revealed that participants perceived the tasks "searching for the word" and "searching for the thematic section" to be the most difficult in comparison with other tasks. In contrast, they found completing the quiz to be the easiest one. Regarding the time measured, the task "searching for the word" was the most time-consuming (29.17 seconds) and the task "searching for the letter" was the least time-consuming (10.75 seconds). This study provides interesting insights into how Slovenian hearing users perceive using the online dictionary of the Slovenian Sign Language, which could be a basis for future research with D/deaf and hard-of-hearing users of the Slovenian Sign Language.

Keywords: online dictionary, sign language, usability, evaluation

1. Introduction

In recent years, the need for the availability of different types of dictionaries online has increased. With the spread of mobile devices, the requirements for the availability of these dictionaries have expanded to them. For sign language users, dictionaries on mobile devices could thus be a significant education tool.

Previous studies, mainly conducted for American Sign Language, showed that d/Deaf people may have several problems when reading in the language of their local hearing community. For instance, Traxler (2000) determined that half of deaf high school students read at the 4th-grade level or below. It is thus necessary not only for those who use sign language as their primary mode of communication but also for those whose primary language is the same as the written language to have access to a sign language dictionary. It may improve communication between both parties and help people understand unknown written words and phrases.

Existing solutions for sign language dictionaries are available on web pages and in mobile applications (Jones, 2015). These on-line and off-line dictionaries are mostly used in such a way that one particular word is chosen among others, or it is inserted in a textbox for translation in sign language to be displayed. For instance, Jones (2015) introduced a mobile application that allows a user to point the mobile phone camera at a page of text, take a picture and then click on a word to access the definition. The definition is then displayed as a video streamed from a YouTube, a social video-based network.

Unfortunately, these dictionaries are mainly available only for American Sign Language and are web-based (i.e. only available for use on web pages). A lack of Android-based dictionaries is evident, especially in non-English speaking countries. For instance, in Slovenia, there was no dictionary of Slovenian Sign Language available as a mobile application.

Thus, in this paper, we present the online dictionary of the Slovenian Sign Language developed by the University of Maribor and the company NUIMO in close cooperation with the Slovenian Association of the Deaf and Hard of Hearing. The software allows searching for sign language interpretation of words in Slovenian Sign Language both from a list of words and by typing words in a textbox. Moreover, in contrast to other existing dictionaries, we created quick access to a set of words collected in the most important categories. These categories can be built either automatically by the system or by users themselves. This software is available for both websites (browsers) and mobile devices (apps).

Furthermore, in this paper, we present the user experience and usability evaluation of the online dictionary of the Slovenian Sign Language. The paper is organised as follows. First, we introduce the online dictionary, next, the methods and procedure of the study are described in detail. Moreover, the results are presented and discussed. Finally, some conclusions are based on the lessons learned.

2. The Online Dictionary of the Slovenian Sign Language

2.1 Front-End

There are three elements on the front-end: a search engine, a list of topics, and a quiz (see Figure 1).

The users can search for a term with the help of a smart search feature, which is able to automatically handle the user's input and show the available terms within the dictionary. When a term has been selected, the user is redirected to the video unit (Figure 2).

The video unit is the core element of the dictionary. It is composed of several elements: video links and metadata. The video links include a standard term interpretation in sign language and a list of links for different term variations. The metadata represent written information, such as synonyms, written sentences, sign language explanations in the online Dictionary of the Slovenian Sign Language, and explanations in written form from the Dictionary of the Slovenian Literary Language. The video player uses a two-fold video-playing technique. Primarily, video is played with a Flash player. For non-Flash compatible browsers, HTML5 video has been implemented.

Another possible scenario to find a video unit within the list of topics. On the index page, two lists are available: popular topics and selected topics list. Popular topics are shown based on the impressions (user clicks), while the selected topics are controlled from the back-end by a moderator. When the user clicks on a topic, a list of all videos within the selected topic is shown.

The quiz was designed for practicing the written and signed language. Each quiz unit is composed of a sign language video, which poses a question, and multiple written answers, of which only one is correct. The user selects an answer and is moved to the next quiz unit. At the end of the quiz, the score of correct vs. wrong answers is computed and displayed.
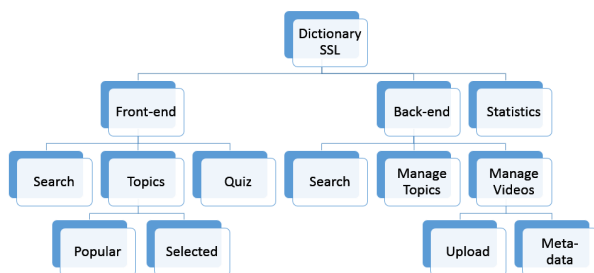

Figure 1: Architecture of the online Dictionary of Slovenian Sign Language.

2.2 Back-End

From the back-end, the moderator controls the topics, videos, and metadata. Videos and topics can be found in a search engine by using filters. The videos are uploaded to a dedicated video server from which they are streamed.

2.3 Statistics

The system uses internal and external statistics. The internal statistics log all user interactions such as video clicks, topic clicks, and participations in quizzes, while the external statistics use Google Analytics to obtain additional insight.
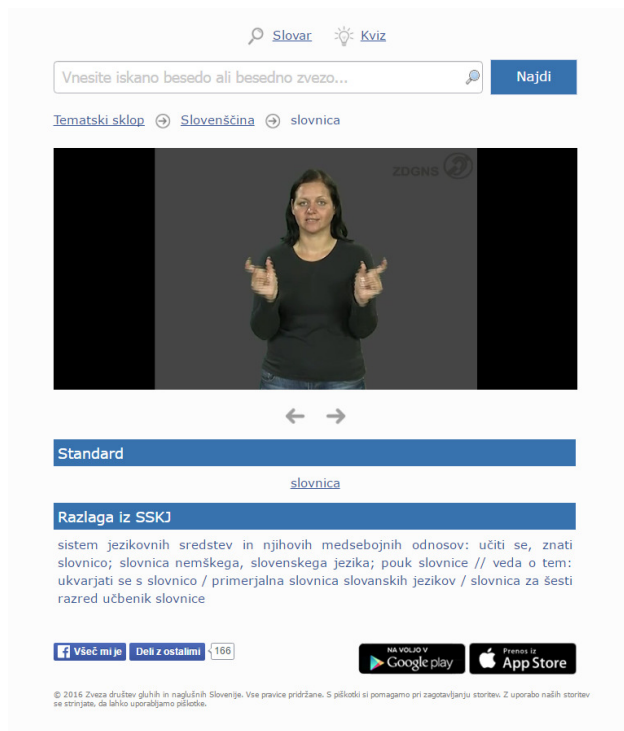

Figure 2: Video unit of the online Dictionary of the Slovenian Sign Language (http://www.szj.si; 2016).

3. Methods

3.1 Participants

Six participants were included in the study. They were master students of media communications, aged between 23 and 25 years; five were female and one male. They reported no hearing loss. All of them had graduated in media communications.

Skills	M (mean)	SD (standard deviation)
Written language skills	4.39	0.54
Sign language skills	0.56	0.64
ICT skills – PC	4.83	0.37
ICT skills – Tablet	4.50	0.76
ICT skills – smartphone	4.33	0.75

Table 1: Demographic data about the sample.

3.2 Measures

The measuring instruments used in the study were: a demographic questionnaire, the System Usability Scale (SUS) and an assessment instrument for observation.

3.2.1 Demographic questionnaire

The demographic questionnaire contained eight questions; participants provided information about their genders, ages, education, types of hearing loss if any, sign and written language skills, skills of using information-communication technology (ICT), and perceived ease of completing the tasks in the experimental session.

Hearing loss was measured according to the American National Standards Institute (ANSI, 2010), in which an unaided hearing loss of 27 dB is considered to be a threshold for hard of hearing people, while people with an unaided hearing loss of 91 dB are considered to be deaf.

Both sign and written language skills were assessed, each with three question items administered with five-point Likert-type response categories ranging from 1 (very poor) to 5 (excellent). The questions were developed on the basis of the adjusted Deaf Acculturation Scale (DAS) (Maxwell-McCaw & Zea, 2011). Item example: "How well do you understand Slovenian Sign Language?"

Skills of using ICT were assessed with three question items administered with five-point Likert-type response categories ranging from 1 (not using at all) to 5 (can use very well). The questions covered personal computers, tablets, and smartphones.

Perceived ease of completing the tasks in the experimental session was measured with six question items administered with five-point Likert-type response categories ranging from 1 (extremely difficult) to 5 (extremely easy). One question item was provided for each task described later in Section 3.3.

3.2.2 SUS Questionnaire

The purpose of the SUS method was to evaluate the usability of the online Dictionary of the Slovenian Sign Language. The SUS questionnaire, translated into the Slovene language by Assoc. Prof. Dr Matjaž Debevc and Dr Ines Kožuh from the University of Maribor, as published in Kožuh (2010), was used.

Every participant was asked to go through the system and evaluate it according to 10 Likert-type statements, ranging from 1 (strongly disagree) to 5 (strongly agree).

The calculation procedure according to SUS method (Brooke, 1996; as cited in Kožuh, 2010):
(1) Values of individual items are total.
(2) The value of an individual item is ranked on a scale between 0 and 4.
(3) For items 1, 3, 5, 7 and 9, the value is calculated so that 1 is subtracted from the answer value of the scale.
(4) For items 2, 4, 6, 8 and 10, the value is calculated so that the value (position) is subtracted from 5.
(5) The sum of all items is multiplied by 2.5 so that the overall value of system usage is obtained.

Based on the abovementioned procedure, the output is expressed in points between 0 and 100. The closer the grade to 100 is, the better the quality of the system is. Figure 3 shows the SUS scale between 0 and 100 with an explanation of scores (Kožuh, 2010).
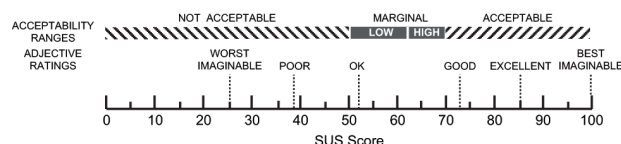

Figure 3: Explanation of the SUS score (Brooke, 1996; cited in Kožuh, 2010).

3.2.3 An assessment instrument for observation

The assessment instrument for observation aided the observer in noting the time each student spent on each task. All tasks were listed on the paper where the observer was allowed to write down number of seconds spent on each task.

3.3 Procedure

The experiment was conducted in January 2016 at the University of Maribor. Although the dictionary is available both as a mobile and web application, in our experiment we used only the latter. The experiment comprised three sessions:

(1) Introduction to the experiment.
Prior to the experimental session, the participants were informed about the procedure of the experiment. Next, they signed a written consent form.

(2) Experimental session.
Participants were asked to perform six tasks and the time of completing each task was measured. The tasks were:
- searching for the word "Australia",
- searching for the letter "F",
- searching for the thematic section "Children's signs",
- searching for a written explanation of the word "Academy",
- searching for the fairy tale "Peter Klepec", and completing the quiz "Animals".

While completing the tasks, the time spent for each task was measured.

(3) Evaluation session.
Participants completed two questionnaires. First, the SUS questionnaire, because it is known to be a reliable, quick tool for measuring usability (Brooke, 1996). Second, participants complete a questionnaire in which they provided information about their demographic data and background regarding sign and written language use, as well as ICT technology.

4. Results

The results from the experimental and evaluation session revealed that participants perceived the tasks "searching for the word" (M = 3.29, SD = 1.03) and "searching for the thematic section" (M = 3.29, SD = 1.16) to be the most difficult compared to other tasks (see Table 2). However, they found completing the quiz to be the easiest of all the assigned tasks (M = 4.43, SD = 0.90).

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Task	Perceived ease of completing the tasks		Duration (seconds)
	M	SD	
1. searching for the word	3.29	1.03	29.17
2. searching for the letter	3.86	1.25	10.75
3. searching for the thematic section	3.29	1.16	15.00
4. searching for the written explanation of the word	4.00	0.53	18.17
5. searching for the fairy tale	3.86	1.36	14.20
6. completing the quiz	4.43	0.90	25.6

Table 2: Perceived ease of use and duration of completing the assigned tasks.

Regarding time measured, we found out that the task "searching for the word" to be the most time-consuming (29.17 seconds). This result can be understood in the context that this was the first activity conducted by participants; it may have taken some time for users to become familiar with the system. The least amount of time was spent on searching for a letter within the online dictionary (10.75 seconds), which was expected since this task was the least complex of all.

Intriguingly, participants perceived the task "completing the quiz" to be the easiest for use, although this task took them only 3.57 seconds less than the task "searching for the word", which was the most time-consuming task. Also relatively well assessed were the tasks "searching for the written explanation of the word", "searching for the letter", and "searching for the fairy tale". The task "searching for the thematic section" has the lowest score in perceived use of completing the task (M = 4.00, SD = .53).

Analysis of individual SUS scores revealed that the final SUS score is 69.2. According to Figure 2, the result can be interpreted such as marginally acceptable, although it is close to the level acceptable. Among individual SUS scores, the highest score was 95.0, while the lowest was 40.0.

5.   Discussion and Conclusion

In this paper, an overview of the online dictionary of the Slovenian Sign Language along with lessons learned from usability and user experience evaluation of the system has been provided. The results showed that the first task, in which participants had to find a particular word, was the most time-consuming. This is reasonable due to the sequence of activities, although the task was not complex compared to other tasks, such as "searching for the fairy tale".

Considering the perceived ease of completing tasks and the duration of completing these tasks, we found no consistency in terms of the principle of the better-perceived ease of completing tasks being reflected in the shorter duration of completing the tasks. The SUS method revealed that the system was marginally acceptable, while the score was close to the threshold for an acceptable system.

Our study has a few limitations. For instance, one stems from the self-reporting used in the questionnaire to collect data. Consequently, we cannot exactly know what language skills participants actually have and how difficult the tasks actually were. In addition, the study is limited in the number of participants included, which provides opportunities for future research where more participants are proposed to be involved. Furthermore, in the future, it would be intriguing to conduct the experiment with D/deaf and hard-of-hearing sign language users in which the mobile app would also be tested.

In the study presented in the current paper we did not include D/deaf and hard-of-hearing people since it was only a pilot study. Its intent was to solicit feedback from a small number of participants in terms of understanding the tasks and finding any ambiguity which may appear in instructions. These pieces of information may help us further improve the measuring instruments before the actual study with D/deaf and hard-of-hearing people would be held. For instance, in this study we received information on how the sequence of tasks should follow each other in order to proceed from less to more complex tasks.

6.   Acknowledgements

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