

Development of E-Learning Service of Computer Assisted Sign Language Learning: Online Version of CASLL

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Abstract

In this study, we introduce the problems for realizing an e-learning system available online and outline some ethical issues behind these problems. The difficulties faced to us, when we were going to open Computer Assisted Sign language Learning (CASLL) system online, were one to expose the sign language movies to public with downloadable way, one for increasing the course materials, and one to enhance the collaboration between learners. The ethical discussions revealed that the reliability for the system and the collaborative work for expand the number of course materials were necessary for overcoming the difficulties. In order to realize the reliable and the collaborative e-learning system, we implemented CASLL within Moodle, an open-source Course Management System. For re-designing the system to actual use for sign language learners and teachers, we added new functions to Moodle; the protection function for the right of publicity, the wiki function to enable collaborative course editing and finally the Link function to enhance public relations. We are going to evaluate the system design from the view point of the usability for teaching, the effectivity for learning, and the utility for collaboration.

1. Introduction

In recent years there are strong demands for sign language teaching and learning. Computer Aided Education (CAE) of sign language is considered as one of the most effective way to assist teaching and learning activity of sign languages.

In the previous researches, technology that has used sign language can be classified into two groups of different aims. One group is the research aimed to support the deaf people themselves, in order to fill the social gaps between the deaf people and the hearing people. The other the research aimed to disseminate the knowledge of sign language in a society, so that the circumstances around the deaf people are improved.

In the first group for supporting deaf people themselves, the research for building animation generation system is in progress for Greek sign language (Efthimiou et al., 2004). This system is aimed to assist deaf people by converting the spoken language to the sign language. In Japan, based on the knowledge that the speed for playing JSL movies depends on the level of proficiency for JSL, a system for playing JSL movies in five speed level has been developed (Isono et al., 2006) to support the deaf people who has difficulty to read the sign language in fast speed.

In the second group for supporting disseminate the sign language knowledge, a remote communications system to connect a class of American sign language has been developed (Lehman and Conceicao, 2001) to assist the learning activity of the student who learn in different sites. In Japan, a learning system of finger spelling with feedback function (Tabata et al., 2001) has been developed for self learning activity. There is also the JSL database with search function based on the linguistic knowledge of native Japanese signers (Fukuda, 2005), and the video teaching material of JSL to assist teaching activity of the sign language (for JSL Learning,). The current situation for the

second group of research is that there is no e-learning system where the learners can learn JSL by themselves and collaborate with other JSL learners in remote areas at the same time.

Our study can be categorized in the second group of research for supporting disseminate the sign language knowledge. In the previous research, we have proposed a new learning program CASLL (Computer Assisted Sign Language Learning system) (Tanaka et al., 2007a) and compared to existing learning systems, as one of our series of studies for developing human interface by using JSL contents (Tanaka et al., 2007b; Nakazono and Tanaka, 2008; Tanaka et al., 2008). The system show some effectiveness, but we also have found new problems we did not expected (explained in Section 2.1.). The aim of this research is to improve the CASLL system by introducing the new design.

2. New System Design of CASLL

2.1. Problems in the Previous Version of CASLL

After we have started the development for online version of CASLL system in 2008, we encountered following difficulties in actual operation:

Difficulty to expose the movies to public In the previous version of CASLL, there are no function protect downloading the movie materials. Many signers resisted to expose the movies which captured their faces to online in downloadable way.

Difficulty for increasing the course materials In the previous version of CASLL, teacher had to edit the course in script form using a text editor. There was no easy interface that the JSL teachers who does not have knowledge on the script could edit the course.

Difficulty to enhance collaboration between the learners

In the previous version of CASLL, there was a function to give a feedback about the answers, but there

was no way to give feedback from the teacher or collaborative between the learners. Such collaboration is essential to make learning activity effective.

2.2. Ethical Background of the Problems

To understand the cause of above problems, we believe, not only the consideration for the technical issues of the system, but also the one for some ethical backgrounds of the training target is crucial.

Since 2004, the academic societies in Japan, especially for the engineering societies, researchers have been more strictly required to discuss about the research ethics and inform the purpose and risk of their research in easy-to-understand language to ordinary people (S. Tanaka, 2009b). As part of this movement, the Japanese Association of Sign Language Linguistics (JASL) also held a symposium which theme is “Ethics for Sign Language Studies” and the related special issue was published in 2009 (Ichikawa et al., 2009). In this symposium, the hearing and the deaf researchers including ordinary people are discussed what is required of the members when they are going to start and publish their researches. Based on the lessons and reflections from the hearing researchers-led sign language studies, new approaches including development of code of ethics (S. Tanaka, 2009a) and collaborative researches with the deaf and the hearing researchers are proposed.

In the field of developing CAE for sign language learning, more than the difference between the professional researchers and the ordinary people, more divers kind of people are involved; the deaf people who use sign language in daily life, the researchers who study sign language or deaf culture, the sign language learners, the children of deaf adults, the sign language teachers, the interpreters and so on. Therefore, in the development for the new version of CASLL, we need to clarify our philosophy and operation policy in easy-to-understand language, and also, we have to realize a system which has a function to protect the teachers and learners from possible violation of the policy, so that all the above people can participate the sign language learning at ease.

In Japan, beside of the ethical issues described above, there is a big argument whether the one should take excessive personal profit or not by teaching JSL as well as the other foreign language teaching businesses. Some people think that teaching JSL should directly connect to training the JSL interpreters and then contribute to better welfare of the deaf people. Therefore, they think the community of JSL teachers should always be recognized by and somewhat under the control of the deaf community. On the other hand, some people think that JSL teachers should be independent from the deaf community and completely free to get more JSL learners.

In the history of JSL, a hierarchical structure with the deaf association on the top and each interpreter training classes on the bottom has been formed to strengthen power of the community. Formulation of the structure made possible to let authorize the JSL interpreter license as one of the national licenses. Therefore, deaf associations cannot admit promotion of the personal JSL teaching business out of their control.

Because of this background, for researchers who have less connection and no authority of the deaf community, it has been difficult to utilize their CAE system into the field. Most of signers who helped researchers to make education materials also resist if the movies with their faces are used for business of their personal profit. For this problem, we always have to care how we can gain trust to our CAE system from the deaf community and how flexibly we can control the training material under the control of both us and signers.

2.3. The Goal

Based the above ethical considerations for building CAE system for sign language learning, we set two goals to develop the new version of CASLL.

1. The signers can rely on the system and willing to be shown in the movies for course materials.
2. Anyone who is interested in JSL learning and also anyone who is interested in teaching JSL from the deaf community can collaborate each other to describe the background knowledge of the JSL.

To reach this goal, we implement following functions to the new CASLL system:

Function to protect the right of publicity In order to prevent the movie materials under control, a function to prevent downloading the movie is needed. There are other options to describe “Creative Commons” or “All Rights Reserved” on the movie to prohibit business use or make the movie under control, but we think that more fundamental design is needed to make the system reliable for all signers who have helped making course materials.

Function to enable collaborative course editing For making CASLL widely used, we think that the material to teach learner about the background of JSL is essential. Since most of existing interpreters’ training class begins their course with teaching deaf culture in advance of the actual teaching of the signs. To create the teaching material which is easy-to-understand for all the learners with different backgrounds, we think a function for collaborative editing is effective. By using this function, people involved in JSL research, movement, and other activities can get together to promote the diffusion of knowledge for JSL beyond each different positions. For JSL teachers, a function for easy editing or adding course materials is also needed.

Function to enhance public relations In order to invite people outside JSL communities, a function for promotion is also needed.

From following sections, we describe the actual implementation of the system.

3. Implementation

3.1. System Architecture

The new CASLL system is implemented by extending open-source Course Management System (CMS) “Moodle”. Moodle has following characters:

- An open-sourced CMS available free of charge.
- Has easy to use course editing interface built in for basic question types.
- Has flexible user management function which can give authority to create a course to specified user.
- Has modular mechanism to extend a function, and has world wide communities where developers are getting together and posting their custom code to extended the functions.
- The design and development of Moodle is guided by a social constructivism pedagogy that enhances a student’s activity in the learning environment (Docs, 2006).

Moodle is the most popular open-source CMS in the world. Also in recent years in Japan, the number of universities are start operating their original e-learning website under the Moodle environment.

However, Moodle does *not* have following functions:

- Contents protection function.
- Question types specific to sign language learning.

As we have discussed in the previous section, above functions are essential to CASLL. To give Moodle the above functionality, we have extended the Moodle by using the module mechanism.

3.2. Contents Protection Extension

Protection of the online contents can be accomplished by several ways.

The first approach is to use a video streaming server which only allows the video player which can communicate to the server using a specific protocol. We can protect the video from downloading, because the user cannot download the video unless using this specific protocol. This approach can protect the video strongly. However, most of the video streaming server is expensive in both computing resources and service price.

The second approach is to use cookie mechanism on the browser. “Cookie” is the default function the browser which can store the information given from the web server. Moodle sets unique string to the cookie when the user logged to the system. We can prevent downloading of the content by only allowing the access from the browser which has specific string in the cookie. However, if the user login to the system, we can not prevent downloading of the content (the user can download the content by right clicking the link on the browser: this is the default content protection policy of Moodle).

The third approach is to use a token with time expiry. We can prevent the content from downloading by generating an

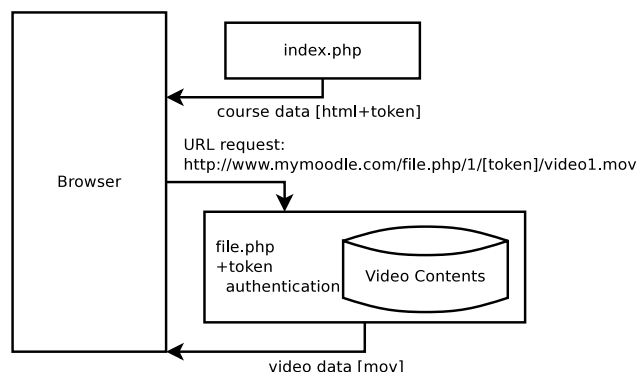


Figure 1: Content protection with token based authentication.

unique URL each time we gives access to the content. By generating an unique URL, the user cannot access to the content by using the same URL as before. This way we can prevent the downloading of the content. This approach generates the unique token with time expiry, and generate the URL based on the token. We only issue the token to the user with specific cookie and who will access the content for the first time. This approach can realize affordable strength content protection in low cost.

We take the third approach. Figure 1 shows the content management mechanism of Moodle. In Moodle, downloading of the contents is done always by calling a single script named “file.php”. Our contents protection extension is realized by applying a patch to the script “file.php”. This patch implements token based authentication function in addition to standard cookie based authentication function in Moodle.

3.3. Sign Learning Question Types Extension

We have implemented sign learning specific question types developed in our previous study(Tanaka et al., 2007a).

User interface for slider and reordering question types are implemented using jQuery UI library¹.

In previous study we only had interface for learners, but in this study we also have implemented an interface for teachers which is integrated to course editing interface of Moodle.

3.4. Wiki Function

The wiki function is originally available as one of Moodle’s default functions. We used this function so that any people can describe and edit the background knowledge which will be needed for the learners working on course materials.

3.5. Link Function

We made a link to the CASLL system from the external multilingualized (sign language enabled) website. Because not only the sign language signer but also the people who are not familiar with sign language will visit the page, multilingualized website is one of the most useful place to invite ordinary people to learn sign language. By showing the logo of CASLL beside the sign language video on the

¹<http://jqueryui.com/>

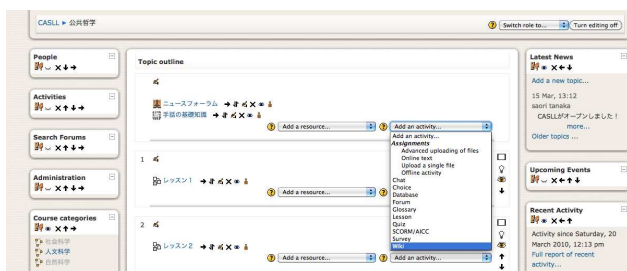


Figure 2: Edit mode of Moodle

website, we have succeed to build a system which attract the visitors' attention into sign language learning in natural way.

4. Current Operation Status

Figure 2 shows a editable page for adding wiki function to CASLL on Moodle. The teachers having the login username and password can enter this page and add the course materials. Each teacher can establish his/her own wiki and also edit the existing wiki to describe about his/her knowledge related to each course material. There are other useful functions. For example, if a teacher wants to ask question to administrator or other teachers, he/she can use forum function in the activity list.

The learning page also have a link from a multilingual website where the original JSL movies are embedded. We are going to increase the same type of link and invite new JSL learners outside existing communities.

5. Conclusion

In this study, we sorted out the problems for the development of online version of CASLL and outlined some ethical issues behind the problems. The difficulties faced to us were one to expose the movies to public, one for increasing the course materials, and one to enhance the collaboration between learners. The ethical discussions revealed that the reliability for the system and the collaborative work for expand the number of course materials were necessary for overcoming these difficulties.

In order to realize the reliable and the collaborative e-learning system, we implemented CASLL within Moodle. We added new functions to Moodle; the protection function for the right of publicity, the wiki function to enable collaborative course editing and finally the Link function to enhance public relations.

Although our development for the online version of CASLL has just started, we are going to evaluate the system design from the view point of the usability for teaching, the effectivity for learning and the utility for collaboration.

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