

# Web Technologies for Language Learning and Implications for the Design of CMS for Language Instruction

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**Abstract**—This paper presents a study on the use of web technologies for language learning. What the study aims to do is answer the question of what kind of web technologies have been used for language learning in a systematic manner. The methodology used is qualitative document analysis carried out on 40 selected journal articles. Each article was analyzed for mention of the use of web technologies and the analysis noted into a matrix display that is used to categorize the technologies. The findings indicated that web technologies used for language learning fall into four broad categories: synchronous and asynchronous communications, language production technologies, language testing and web resources.

**Keywords**—Course management systems, language learning.

## I. INTRODUCTION

THE use of the internet and the web for the purpose of language learning and teaching has been gaining ground since the phenomenal growth of the web since the early 1990s. A plethora of technologies have been adapted for the purpose of language learning since then. These range from the ubiquitous emails to the more recent instant messaging and mobile communication systems.

The study presented by this paper is part of a broader study to develop a design framework for a course management system (CMS) oriented for language instruction in Malaysia institutes of higher learning. This study specifically aims to identify the technologies used by for the purpose of language learning and teaching in a systematic manner. It will contribute to the larger study by providing a focus on the kinds of technologies that needs to be integrated within the course management system. This paper will be divided into the following sections: data selection and methodology; findings and discussion; and conclusion.

## II. DATA SELECTION AND METHODOLOGY

The initial problem faced by this study after choosing the appropriate methodology is data selection. If the subject

(language learning and web technologies) is taken as the sole criteria for data selection, then the data will be large and unmanageable. Decision is made to use the Thomson Social Science Citation Index as the basis for data selection with the following justifications:

- i. The Social Science Citation Index is the established and recognized index for leading journals and publications within the larger domain of social sciences. It provides a solid basis for initial selection of data sources.
- ii. Although there is only one journal (Language Learning and Technology), the number belies the true amount of data as the journal itself specializes in the field of technology-assisted language learning. All articles within the journal have a high potential of being used as the data for the research question.
- iii. In a qualitative study, the amount of data is not as important as the quality of data (Eisner 1991). This is especially true provided the criteria for selection are adequately justified.

The only journal within the index that deals with the subject is Language Learning and Technology. There are other journals outside the index that deal with the subject such as System, CALL-EJ, The Reading Matrix and CALL. However, there is no common justification for including them in the list of sources. An attempt to include one or any of the other would result in arbitrary criteria that would not be justifiable and indefensible for the purpose of research.

Once the basis for selection has been established, the next step is to refine the selection based on the question that is to be investigated. As the aim is to identify the web technologies used in for web language learning and teaching, the first step is to determine whether the article examined is about web technologies or traditional computer-assisted language learning. This is a pretty straightforward process, with one exception. If an article that discusses traditional CALL applications suggests that the technology is portable to the web or internet then the article will be included in the data.

The next step is to identify the web technologies or applications used within the articles selected. In order to assist in this process, a matrix display is used to organize the data. The display is used then to assist in the discussion on the

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findings. Any qualitative research (or any other type of research) will inevitably deal with the question of validity and reliability. The more appropriate term is trustworthiness as defined by Lincoln and Gruba (1985) as this research is qualitative in nature. In order to ensure trustworthiness, a panel of experts reviewed the analysis and acts as interraters. The input from the expert panel is used to improve the analysis although there are no major or critical changes to the original analysis. The figure below illustrates the data selection and analysis process:

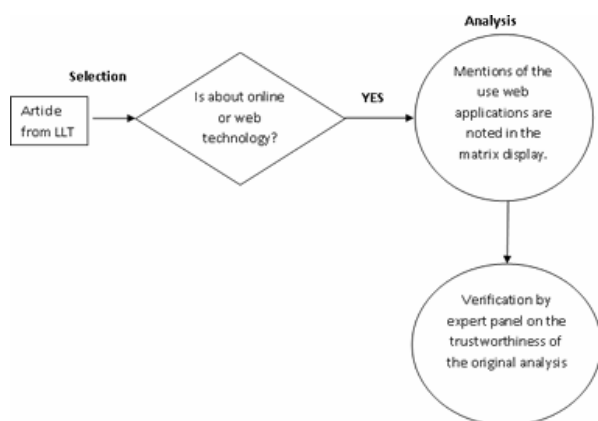


Fig. 1 Data Selection and Analysis Process

### III. FINDINGS AND DISCUSSION

The following categories of applications emerge from the data available: synchronous and asynchronous communications, production technologies, web resources and testing.

#### i. Synchronous Communications

Synchronous communications are communications that have no or insignificant delay between initiation and response of the communication. Synchronous communication technologies allow for almost simultaneous or real-time communication between users.

The most common form of synchronous communication is the text-based chat. There are 14 articles within the data that specifically mentioned the use of text chats, some in combination with audio chat. Data 001 (Basharina 2007) for example, mentions the user preference for chat as opposed to the slower message boards:

“This tension reveals students’ desire to approximate delayed bulletin board interaction to the immediate response (Thorne, 2003). Based on this, several students from all three cultures expressed their preference for chat over the asynchronous bulletin board interaction.” (p.94)

Data 007 (Lai and Yong 2006) points out the advantages of text-based chat compared to other forms of synchronous chats like audio and video chat. Using Noticing Hypothesis as its theoretical framework, Data 007 argues that “Two inherent features of online chat might have contributed to its facilitative role in promoting more noticing of learners’ own errors: longer processing time and relative permanency of the

text” (p.112).

Other forms of synchronous communication on the web include audio/video chat and desktop conferencing. Eight of the data mention the use of voice or video-based chat facilities. Data 011 (Strambi and Bouvet 2003) mentions the use of voice chat in order to help prepare students for oral tests (p.94). Data 024 (Payne and Ross 2005) describes an experiment using voice chat and concludes that the chat may provide a unique form of support to certain types of learners in L2 oral proficiency (p.50).

Data 006 (Jepson 2005) states that voice chats are superior for the purpose of negotiation of meaning than text chats, giving an edge for the use of voice chats in certain situations.

“This study suggests that although text chat is the more widely available and most studied form of chat, voice chat offers an environment in which learners are more apt to negotiate for meaning. Voice chats in this study generated a number of repair moves, specifically negotiation of meaning-type repair moves, which was significantly higher than the number in text chat. Conversations in voice chat rooms would thus seem to benefit learners in the repair move aspects of language development, especially in pronunciation repair and in the incorporation of repair moves. Indeed, the data provided evidence that many of the repair moves were made in efforts to attend to pronunciation breakdowns in particular.” (p.92)

Another form of synchronous communication is the web whiteboard, which basically allows users to communicate and share ideas in graphical forms over the web in real time. Data 036 (Hampel and Mauck 2004) describes the use of such a tool which forms a part of a system called Lyceum that was used at the UK Open University. The authors called the system an ‘audio-graphic’ conferencing tool as it allows users to conduct voice chats while working on the web whiteboard. They also reported finding that the use of the system helps in the sense that “Student feedback suggests that participating in intense interactions with fellow learners as well as collaborative tasks is the most exciting aspect of learning and practicing a language in a VLE like Lyceum.” (p.76)

Data 030 (Warner 2004) presents an interesting although rare form of synchronous communication, the multi-user dungeon (MUD). The MUD is basically an open chat room with multiple users interacting at the same time. It has a beginning as a way to conduct fantasy role playing games (Wikipedia 2007 - [http://en.wikipedia.org/wiki/Multi\\_User\\_Dungeon](http://en.wikipedia.org/wiki/Multi_User_Dungeon)). Naturally, it involves interactions between characters (users) in a textual or graphical world. In a way, MUDs are precursor to current generation’s popular MMORPG like Ragnarok and World of Warcraft. Data 030 reports that the use of MUD shown that the communication is mainly ‘playful’ (non-academic), nevertheless, this is significant because such non-academic and informal form of communication has been neglected by past research in Second Language Acquisition.

#### ii. Asynchronous Communication

Asynchronous communication is communication where

there is perceptible and expected delay between the messages. On the web, the most common forms of asynchronous communication are emails and web forums (sometimes also called threaded discussion forums or bulletin boards). Emails are popular due to their accessibility and ease-of-use (Heisler and Crabill 2006). The web forums are perhaps one of the most popular of web technologies for communication (Lally 1995).

Eleven of the forty articles that make up the data mentioned the use of various forms of emails, either on its own or in combination with other applications. The articles deal more with the aspects of language use within emails rather than email as a technology. For example, Data 032 (Chen 2006) highlighted the issue of language pragmatism when communicating using emails. It puts forth the argument that since emails lack paralinguistic clues, communication could be challenging especially for unequal-status communication. Similarly, Data 017 (Biesenbach-Lucas 2005) also looks at the language use of emails between two different groups of users, noting "that messages from both groups of students contained substantial relational communication, perhaps in an attempt to compensate for the lack of visual and paralinguistic clues in the e-mail medium." (p.1).

Data 018 looks at the difference between the language used in emails and word-processing for the purpose of academic writing. It finds that email writings tend to be shorter while having less text-initial contextualization compared to word-processed writings. Data 018 (Biesenbach-Lucas and Weasenforth 2001) suggests that the use of emails may not be appropriate for the development of academic writing and questions suggestions for using emails for the drafting process:

"Hawisher (1992) discusses misuses and appropriate uses of e-mail, arguing, for instance, that e-mail can be effective in conferencing. Based on the results of our study, it appears that the effectiveness of using e-mail during the drafting and revising stages of writing should be questioned. It may be more effective to have students draft and revise their writing in a word processor and then upload/download it in the event that the writing was to be mailed." (p.156)

Data 028 (Volle 2005) present a research on the use of audio emails in a distance learning environment. Students are judged on three criteria: articulation, accuracy and proficiency scores. The results indicate significant gains on proficiency only. According to the author, using audio emails in distance education setting provides one advantage, "Instead of choral responses or mimicking (lip-synching) a response that may happen in F2F classes, each student has a true voice and cannot hide online." (p.156).

Ten of the data mention the use of another form of popular asynchronous communication tool: the web forums. Data 013 (Weasenforth, Biesenbach-Lucas and Meloni, 2002). provides a detailed and well supported treatment on the use threaded discussion boards for language learning:

"The additional processing time provided through the asynchronous medium is particularly important when dealing

with non-native speakers (Kamhi-Stein, 2000a; O'Malley, 1995). It promotes careful deliberation over course content, which in turn encourages critical thinking as students develop knowledge at their own pace (Jonassen, 1994; Kamhi-Stein, 2000b; Scarce, 1997). Merron (1998) found that students using threaded discussions wrote more thoughtfully than students who were not afforded such opportunities. Similarly, Parker (1999) and Irvine (2000) found significant improvement in students' metacognitive reflection and depth of thought with the use of threaded discussions. Chong (1998) reports that students became actively engaged by course materials which provided opportunities to test understanding of the materials. The interactive and collaborative nature of asynchronous technology allows students to share perspectives and experiences, to establish relationships, to seek assistance (Chong, 1998), to exchange information that can influence intercultural attitudes (Müller-Hartmann, 2000), and to support and encourage each other (Collins & Berge, 1996; Kamhi-Stein, 2000b; Sengupta, 2001). Further, it "allows everyone to be heard" (Greenlaw & DeLoach, in press), including students who do not normally participate in face-to-face discussions (Kamhi-Stein, 2000b; Schallert et al., 1998)." (p.59)

Data 013 also argues that the use of threaded discussion forums open up new learning possibilities that may not be available in a face-to-face environment. However, it also cautions that such a use must be well integrated into the learning process to achieve any benefits for learners.

In a study on the use of discussion boards in teacher training, Data 015 (Arnold and Ducate 2006) presents a view based on previous literature that the lack of social context cues might hinder communication. This is put together with a counter argument that such deficiency often leads to equal participation when compared to a normal classroom. It must be noted however, that any text-based online communication will suffer from the same lack of social or paralinguistic clues. Furthermore, the use of emoticons, while being far from a perfect representation of human emotions does help to provide visual clues for better communication in an online, text-based environment such as a web board or a chatroom.

Data 019 (Fitze 2006) presents a comparative look at face-to-face and electronic discussions using threaded discussion boards. It notes that "during written electronic conferences, students were better able to use and practice a wider range of vocabulary related to the topics." (page 67). The lack of paralinguistic clues may have contributed to this, as "In written electronic conferences, information that in face-to-face conferences can be communicated through paralinguistic cues, attitudes like boredom, curiosity, or agreement for instance, must be expressed in explicit language (Kiesler et al., 1984)." (p.78).

Using the concept of "reflective conversation" as its theoretical anchor, Data 021 (Goodfellow and Lamy 1999) looks at the value of asynchronous web forums for this particular concept. The researchers define reflective conversation as computer mediated asynchronous discussion

around language learning issues and topics. They argue that interaction-rich exchanges of the types “input-modification” and “social-interactionist” occur around discussions concerning language learning issues and language topics. Within the Lexica On-Line learning system created by the researchers to support their concept of reflective conversation, a threaded asynchronous forum plays the central role. As compared to synchronous communications, the authors believe that:

“When considering the aim of encouraging reflection on metalinguistic issues, asynchronous conferencing may prove even more appropriate because of the flexibility that learners have to ponder messages and their own productions, the explicit structuring of the users' input into "messages" and "replies," and the ease with which a record of exchanges can be accessed later. (p. 45)”

### *iii. Production Applications*

Production applications refer to the use of technologies that allow students to practice the language production skills in the form of writing or speech. The most prominent of speech-based production technologies has been covered in the discussion of asynchronous voice chats earlier. Similarly the use of voice mails would be considered as the use of a production technology as well.

This section would therefore focus on the technologies so far not covered by discussions in the other sections. Data 040 (Sengupta 2001) mentions the use of individual student pages where the students write their learning logs and critiques of the assigned reading. The description fits what is known as weblogs or more popularly ‘blogs’. The author reported an increase sense of responsibility on the parts of the students to be more active in classroom participation (p.121)

Data 031 (Bloch 2007) is a specific look into the use of blogs for language learning, specifically for composition. The researchers put forth the claim that blogs have transformed the nature of authorship on the Internet in comparison to other forms of computer mediated discourse. They conclude that the use of blogs in the composition classroom is beneficial to the development of students writing ability and make them active contributors to the contents of the internet.

Production applications also refer to the use tools that enable content produces, both learners and teachers, to produce materials suitable for language learning. Data 002 (Brandl 2002) discusses the use of production technologies for creating reading materials and argue that the ability to use images within authoring environments would greatly enhance the effectiveness of reading materials. In addition, image manipulation abilities in authoring tools would provide a better range of options for students responding to reading materials.

### *iv. Online and Web Resources*

The use of web-based resources is hardly a surprise within an online environment, especially for the teaching and learning of languages. The abundance of materials and

resources that are authentic is a strong attraction for use in language learning and teaching.

Data 014 (Horst, Cobb and Nicolae 2005) discusses the use of online resources for vocabulary learning for an ESL course. These resources include concordance, dictionary and a database with self-quizzing feature. The article argues that vocabulary building exercises need to do more than just present learners with words and definitions. One of the ways the research use to achieve this is through the use of a collaborative word database that allows students to add word definitions to the database. The addition of self-quizzing feature, also added collaboratively, enhanced the contextual understanding of the vocabulary. The research also makes use of an online dictionary that is accessible to students while interacting with the assigned reading materials. The article concludes that while the efforts have been positive, more needed to be done in the area of user interface and especially testing of vocabulary skills.

Data 011 ( Strambi and Bouvet 2001) also mentions the use of shared resources in the form of hyperlink database that can be built p by the students. Data 023 (Liaw 2006) discusses the use of similar technologies for a web-based EFL reading and writing environment. The research includes the use of an online dictionary and concordance, much like the research in Data 014. However, the system used in Data 023 offers tighter integration for the purpose of record keeping and user tracking. Each word looked up by a student will be added to the student’s “vocabulary notebook” for later review.

Data 026 (Stepp-Greany 2002) presents a study on the use of web technologies for the learning of Spanish. In addition to the use of online resources such as vocabulary lists, dictionaries and grammar explanations, the students are also assigned Hispanic pen pals as an added exposure to the target language. However, only 38% of the students indicated that they enjoyed the activity; this is attributed by the authors to the different personality types and their reaction to authentic assignments such as interacting with native speakers.

### *v. Testing*

Web-based testing is discussed by Data 009 (Roever 2001). The article itself is not a research article but is more of a state-of-the-art article that discusses web-based language testing in terms of its technical requirements and advantages. The technology mentioned in the article is quite outdated and is not as important as the type of tests mentioned as any technology would need to be able to cover for the needs of such tests. These include multiple choice tests for grammar and vocabulary items and cloze tests for brief response items, essay-type tests and reading comprehension tests ‘with frames’ (p.86). Also mentioned is the testing of oral skills via the use of one-on-one voice chat applications (p.92).

## IV. CONCLUSION

Thirty two out of forty articles that form the data are about the use of communication technologies for the purpose of

online language learning. Based on the data available, it is clear that a CMS designed for the purpose of language learning, should also be focused on enabling and facilitating communication. In the paper titled "Design Considerations for A CMS Based On Communicative Language Teaching", Hamat and Embi (2005) identified 4 design considerations: integrated communication design, conversational design, social communication design and multimedia communication design. The aim of these four design considerations is to enable and facilitate communication processes within a course management system.

The next category of technology discussed is the use of production technologies. These technologies include blogs and web page publishing. They allow students to use their production skills such as writing and speaking within an online environment. Speaking is closely associated with communication technologies like chat and teleconferencing although by definition it is a production skill. A framework for the design of a CMS oriented for language learning should therefore integrate technologies that enable students to make use of their production skills.

Technologies for web-based testing are also covered by the data, however, the number of article discussing online language testing is only one. Although the number is not significant, the article gives a well-rounded discussion on online language testing. A course management system cannot hope to integrate every piece of technology available; however, since testing is an integral part of language learning, it is a necessity within a CMS geared for language learning.

The last category of applications, online and web resources, is not something so simple to integrate into a framework as it involves external resources and different decision-making processes. A course management system is already embedded into the web, therefore inclusion of databases or lists of hyperlinks to available resources as mentioned in Data 011 should not be a problem. Integration and access to specialized, third-party resources however, is a decision that would require input from policy makers because it involves financial and administrative decisions. A CMS should be designed to allow easy access to available resources, but as stated, the design framework cannot accommodate other external factors.

In conclusion, based on the available data, a CMS designed for language learning should include technologies for communications, production, testing and access to online resources.

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