

## **Learning Processes in Blended Language Learning: A Mixed-Methods Approach**

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### **Abstract**

This article attempts to investigate the learning processes in blended language learning through assessing sources of information: logs, chat and forum scripts, and semi-structured interviews. Creating a MOODLE-based parallel component to face-to-face instruction for a group of EFL learners, we probed into 2,984 logged actions providing raw information on 3 levels, 10 courses, 115 participants, 180 days, and 6 activities. Having analyzed the trends and determined the navigational patterns, we attempted to triangulate the findings with students' 5 chat and 5 forum interactions commenting on their online experience, and further 14 interviews. The results confirmed the trend in logged data, suggesting that the forum, messages, and chat were among the most favorite online tasks the participants attempted in their respective courses, allowing them to share ideas a/synchronously. Furthermore, the interview data indicated that the participants had an overall positive attitude towards blended language courses. The findings suggest that navigation in social-constructivist courseware is communication-oriented, with students trying to compensate for their face-to-face limitations through a/synchronous CMC tools. The results have implications for language teaching professionals and curriculum designers.

*Keywords:* learning processes; navigational patterns; blended language learning; computer-assisted language learning (CALL); computer-mediated communication (CMC); MOODLE

## *Introduction*

Technology has changed the perception of conventional classrooms. In a recent development known as electronic learning, virtual learning environments, either commercial or open-source, have found their way into language teaching syllabi (Martín-Blas, & Serrano-Fernández, 2009). The introduction of computer-mediated communication (CMC) tools and a/synchronous activities and resources make these learning management systems (LMS) versatile platforms in keeping with current theories of language teaching while offering unique opportunities for research. Indeed, one of such open-source systems is the Modular Object-Oriented Dynamic Learning Environment (MOODLE), one of the leading open-source LMS packages used by North American and European universities (Beatty, & Ulasewicz, 2006; Itmazi, & Megias, 2005).

Research into the effectiveness of CALL has relied upon diverse data collection tools and designs over the years (see Levy, 2000, for a survey), addressing issues of software, learner and task (Chapelle, 2003), and, lately, a growing interest in the process of CALL use (Chapelle, 2005; Sussex, 1991). One of the data collection tools used within this framework is the built-in automatic trackers (logs), which help capture traces of conversational exchanges in a/synchronous electronic tasks and activities (e.g., Chanier, et al., 1992; Negretti, 1999) and detailed reports of student navigational patterns (e.g., Desmarais, Laurier, & Renie, 1998) in a VLE. Logs are transparent (Moran, 2004), that is, the user is unaware of them as they are recorded in the background; therefore, they have an advantage over conventional process-oriented data collection tools such as interviews or verbal protocols in terms of accuracy, immediacy and reliability (Liou, 2000). On the other hand, there are certain caveats with logs. Logs might reflect the underlying processes in CALL through stored data such as IP addresses, date, time, and frequencies of clicks; however, they fail to expose the actual underlying reason behind them, that is, there might be a pattern in the clicks, yet clicks tend to increase/decrease for many technical reasons including page refreshes, or even loading time and internet speed which might canalize student navigations towards specific pages. Therefore, it is essential that, in addition to system logs, other data collection tools be employed (Liou, 2000) so that a more realistic picture of student CALL use may emerge.

Despite the emergence of highly sophisticated data mining capabilities (Spiliopoulou, 2000), unfortunately, such potentially valuable data collection tools have rarely been used in second language acquisition research (Estrada, Navarro-Prieto, & Quixal, 2009). Therefore, this study, which is part of a more detailed longitudinal analysis, attempts to answer two research questions:

What is the perception of language learners of different a/synchronous activities used in a virtual learning environment?

How does the perception of different a/synchronous activities orient the second language learning process in CALL?

First, we will present a description of the main features of MOODLE and our online course.

### *MOODLE*

Utilized in harmony with communicative and social-constructivist approaches to language learning and pedagogy (Amundsen, 1993; Jonassen, Peck, & Wilson, 1999), MOODLE is an open-source learning management system (LMS) which creates an environment for collaborative interactions between teachers and students, and among students (Brandl, 2005; Murray, & McPherson, 2004). The organization of linguistic materials and pedagogical activities on the template-based layout of the LMS creates a possible ease of access for both teachers and students. The intuitive interface consists of the left navigation panel, central weekly/topic outline, and right blocks (see Fig. 1). The editing for a standard package install allows the teacher to integrate resources (file, folder, page, IMS content package, label, page, URL) and activities (uploading of files, online text, offline activity, chat, choice, database, forum, glossary, journal, lesson, quiz, SCORM package, survey, wiki, workshop) into the course. The virtual attendance at the class requires the participants to log into the system by entering their login information.

The provision of quantitative and qualitative feedback is one of the strong points of MOODLE (Brandl, 2005) as almost all the activities offer sophisticated feedback provision facilities. Linked to this feature is the built-in grade book, which makes up a permanent part of student profiles storing the results of different types of assessment tools. Likewise, the records of student progress are stored in the database that can be accessed via the reports capability, providing detailed raw statistical data on courses, participants, days, activities, and actions.



**Figure 1. Typical MOODLE Classroom (navigation panel; weekly outline; blocks)**

### *Our course resources and activities*

Throughout the course, the students studied the materials outlined in the school curriculum, at the same time having the similar online syllabuses in their respective virtual classes at the school official website. The curriculum had been designed based on the Common European Framework of Reference (CEFR) ability descriptors with an eclectic choice of materials and supplementaries. The online component of the course included synchronous chat room and asynchronous forum, wiki, messages, journal and assignment activities. For all submissions, the teacher could provide quantitative and qualitative feedback on the participants' performances. The deployment quantity of these activities was kept the same across all courses held online. Through chat, the students could have a synchronous interaction; while, in the forum, the interaction was formed asynchronously. In wiki, the students could work collaboratively on a common project, being able to edit a common page several times until the desired piece emerged. The messages activity enabled participants to send personal messages to every registered user on the system, allowing them to search contacts and send textual messages. The journal activity created a private link between the teacher and individual students to share comments and feelings. Ultimately, the assignment activity required participants to write an online text and save it for further scoring and feedback provision by the teacher.

### *Methodology*

The research employed an exploratory-interpretive perspective (Grotjahn, 1987) and cyclical data collection and analysis phases (Delamont, 1992; Tesch, 1990) through which an inner understanding of the actions performed by the participants (clicks) in the study could materialize. The data collected in each phase of research were combined so that a more emic view towards the learning processes in CALL could emerge.

## *Participants*

The study relied on different participant counts in different phases of data collection, extracted from an overall pool of 115 (N=115) male participants, forming 10 classes of CEFR A1-C1 (Preliminary-Expert) levels. The students' language proficiency was determined thorough their participation in the Oxford Placement Test (Allan, 2004) as part of the registration process. OPT includes two sections, listening and grammar, which take about an hour to complete with the results being interpreted based on the test manual.

This study was conducted at Fahim Language School based in Dezful, Khuzestan, Iran. The school curriculum consisted of 12 courses, or terms, which covered CEFR A-C levels. The participants were placed into six classes, two classes of each term 3, 4, and 5 (N=53) enjoying the proficiency level A1-A2; two term 6 and 7 classes (N=33) possessing the proficiency level B1-B2; and two term-12 classes (N=29) enjoying the proficiency level C1. The participants ranged in age from 20-35 and all had the required background knowledge about Internet surfing as indicated in their registration profiles.

In the first phase of data collection, the logged performance of all the participants (N=115) was assessed. In the second phase, the chat and forum interactions of 10 participants (N=10) were examined. Chat interactions belonged to two term-12 (N=2), two term-7 (N=2), and 1 term-6 (N=1) participants; whereas forum posts reflected the ideas expressed by three term-7 (N=3) and two term-4 (N=2) participants. In the third phase, there were 10 term-6 (N=10), 2 term-3 (N=2), and 2 term-12 (N=2) participants in the study (N=14).

The participants were informed of the focus of research at the end of the term when the logs and chat and forum scripts were anonymously analyzed. For the interview sessions, the participants voluntarily participated in the study.

## *Materials*

The first step was analyzing MOODLE logs as the main exploratory tool. Logs in MOODLE can be accessed in four different formats: display on page or downloaded in text, OpenDocument Spreadsheet (ODS), and Excel formats. All formats used six categories, namely course, time, IP address, full name, action, and information to sort the data. For instance, as can be seen in Figure 1, in the second row of the table, the course FCE-12 has been accessed on 2011 October 19 at 13:50 from the IP address 217.219.227.148, and the user *Silver Moonlight* has performed the action "forum view discussion" on the forum entry "Website." Then, the third row suggests that the same

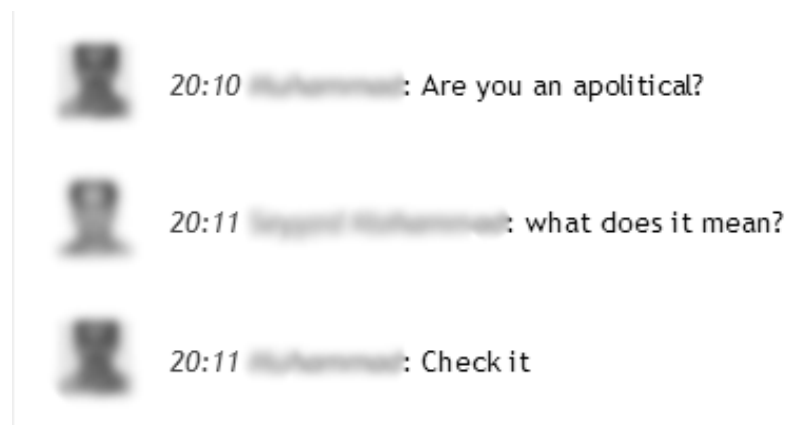
user with the same specifications has tried to provide a reply to the topic by adding a post “Re: Website.”

	A	B	C	D	E	F
1	Course	Time	IP address	User full name	Action	Information
2	FCE-12	2011 October 19 13:50	217.219.227.148	Silver Moonlight	forum view discussion	Website
3	FCE-12	2011 October 19 13:50	217.219.227.148	Silver Moonlight	forum add post	Re: Website

**Figure 2. MOODLE Logs Extracted in MS Excel Format**

One possible interpretation for this action is that once the user has viewed the discussion topic, he has reacted by writing a reply on the post, and these two actions, that is viewing the post and starting to reply, have taken one minute. How long the user has been engaged in the writing activity may be delineated from subsequent entries in the spreadsheet.

The second data collection tool was chat and forum scripts, which were available to all users. The chat activity was a PHP-based (HTML-embedded scripting language) textual platform, allowing the participants to have real-time communication with a three-second delay (see Figure 3).



**Figure 3. Chat interactions (profile pictures and names blurred for ethical reasons)**

Through forum, on the other hand, the interactions took an asynchronous form, textually threaded with possible attachments of different file types (see Figure 4). Since these two activities were means of public interaction, no intervention was made to collect data; they emerged as the students freely added discussions and replies or engaged in chat sessions.



**Figure 4. Forum Discussions (profile pictures and names blurred for ethical reasons)**

The third instrument was a semi-structured interview based on the results obtained from the two earlier data collection phases. The interview protocol listed a fixed number and order for categories and questions, which were developed based on analyzing frequency counts of logs and content analyses of chat and forum scripts. In order to make certain the participants fully understood the questions, and were comfortable expressing themselves, the interview sessions were conducted in Farsi—the mother tongue (see [Appendix A](#) for the English version of the protocol). In addition, a narrative was developed based on the ideas expressed in the interview and was further given to participants as to triangulate the findings (see [Appendix B](#)).

### *Procedure*

After three months of functional testing by three school staff who volunteered to test the capabilities of school LMS and report their attitudes and potential technical difficulties, the school LMS was officially opened to all participants on 12 July 2011. Through a hands-on workshop, both teachers and students were briefed on their respective roles and privileges in the system, that is how they could navigate the system appropriate to their needs. The teachers were provided with guidelines on implementing different types of activities, track student progress, and provide feedback. The students were registered as new users and introduced to the new medium and its built-in plugins. Furthermore, they were given specific instructions on personalizing their accounts by uploading profile pictures and personal details. Likewise, since students had no prior experience with MOODLE, all the activities in the study were fully introduced and practiced.

As the course progressed, in twenty sessions, a host of online activities including online submission of texts, collaborations in a wiki, chat appointments, and forum discussions accompanied face-to-face classes. The offline component of the study centered around the textbook and student-teacher classroom practices. Aligned with face-to-face

sessions, new projects and exercises appeared in relevant boxes in the weekly outline section of the online class (Fig. 1). The participants had a week, as set in the activity settings, to complete each activity as they were building up towards twenty percent of each course passing-grade. To each activity one point was assigned, and the students received feedback on their performances. The scores and qualitative feedback could be viewed in the grade book.

In addition to teacher-led discussions and chats, which were textbook oriented, the students also used the two activities, that is, forum and chat, frequently for other social purposes. The online interactions and activity settings were in English. Topics ranged from class-related interactions including focus on grammar, new vocabulary and expressions, to extracurricular ideas including technical aspects of the website, poetry, life, politics, etc.

The classes concluded with the usual traditional paper-based final exam. By the end of courses, the MOODLE logs had been analyzed and recurrent themes in chat and forum scripts associated with technical aspects of the website and attitudes towards the virtual mode of instruction had been collected and analyzed; therefore, the participants were asked on voluntary interviews. Although it seemed straightforward to require all the students to participate in the study, we provided the students with an option to attend the interview session so that we could observe the ethical considerations in the first place, and create an atmosphere of trust and willingness to further enhance the credibility/internal validity of the research.

## *Results*

### *First phase of data collection: Logs*

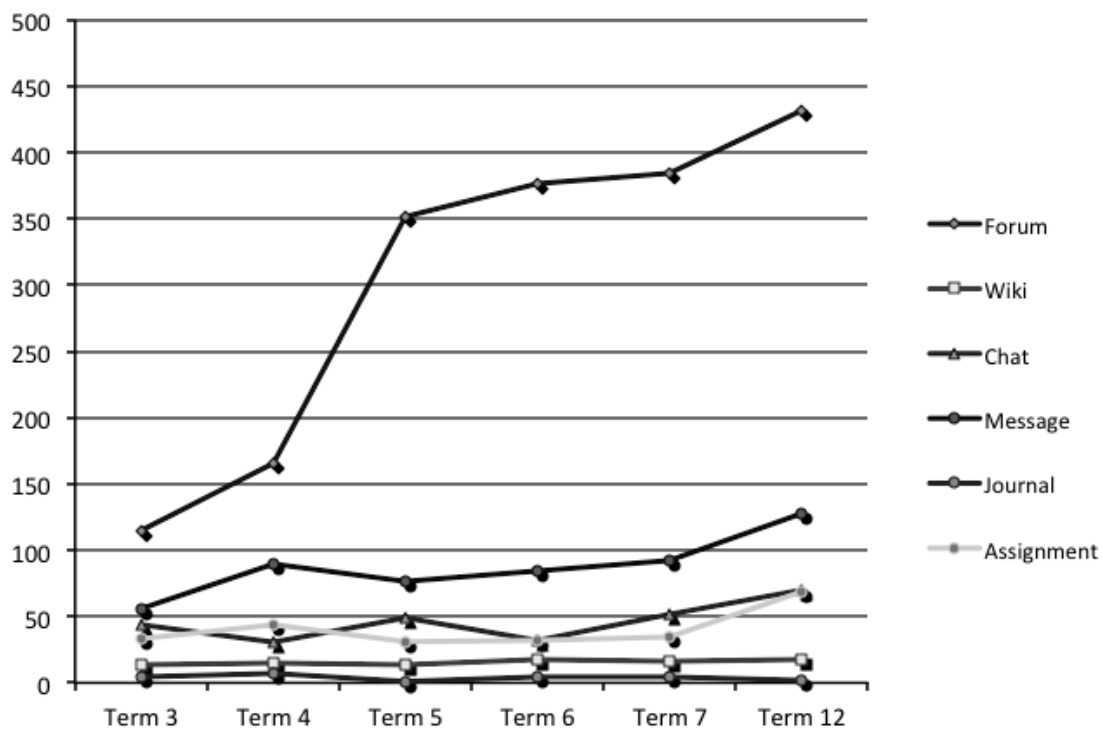
Having downloaded the logs, we scanned and located individual occurrences of entries corresponding to major activities in the study, that is forum, wiki, chat, message, journal and assignment. Table 1 lists the frequency counts of recorded actions by CERF level designations. The clicking trends of classes in the study, whose language proficiency level mapped onto A-C levels of CERF, justified the total 2,984 frequency records, with the exclusion of other technical incidents of the database such as failed logins. The trend in the analysis suggests that forum (61.09%), messages (17.56%), and chat (9.24%) were among the most frequently clicked activities (87.89%) attempted by the participants. Wikis, likewise, were more popular (3.15%) than journals (0.80%). Assignments, which were obligatory exercises, also accounted for 8.14% of clicks.



**Table 1. Frequency of Recorded Actions**

Activities						
CEFR Level	Forum	Wiki	Chat	Message	Journal	Assignment
<b>A (Term 3)</b>	115	13	44	56	5	33
<b>A (Term 4)</b>	165	15	30	89	7	44
<b>A (Term 5)</b>	351	14	49	76	1	31
<b>B (Terms 6)</b>	376	18	32	84	4	32
<b>B (Term 7)</b>	384	16	51	92	5	34
<b>C (Term 12)</b>	432	18	70	127	2	69
<b>Total</b>	1823	94	276	524	24	243
	(61.09%)	(3.15%)	(9.24%)	(17.56%)	(0.80%)	(8.14%)

The following chart presents a visual description of the trends:



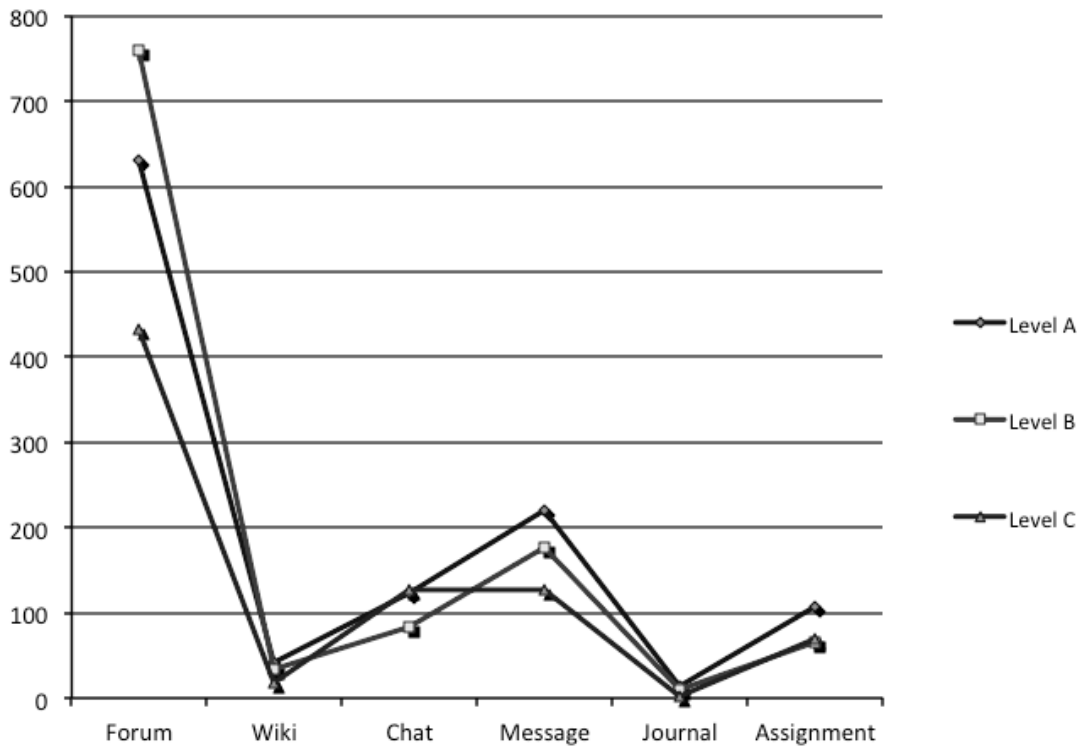
**Figure 5. Patterns in Clicks**

In addition, the click frequencies were also examined in light of the different language proficiency levels in the study (Table 2). As can be seen in Table 2, the results showed that click frequencies decreased in order of language proficiency, A (38.13%), B (37.80%), C (24.06%). Likewise, such a pattern was also found for every individual activity, except for assignments and forum.

**Table 2. Language proficiency and click patterns**

<b>Activities</b>	<b>Level A N=53</b>	<b>Level B N=33</b>	<b>Level C N=29</b>	<b>Total</b>
<b>Forum</b>	631 (34.61%)	760 (41.68%)	432 (23.69%)	1823 (61.09%)
<b>Wiki</b>	42 (44.68%)	34 (36.17%)	18 (19.14%)	94 (3.15%)
<b>Chat</b>	123 (44.56%)	83 (30.07%)	70 (25.36%)	276 (9.24%)
<b>Messages</b>	221 (42.17%)	176 (33.58%)	127 (24.23%)	524 (17.56%)
<b>Journal</b>	13 (54.16%)	9 (37.5%)	2 (8.33%)	24 (.80%)
<b>Assignment</b>	108 (44.44%)	66 (27.16%)	69 (28.39%)	243 (8.14%)
<b>Total</b>	1138 (38.13%)	1128 (37.80%)	718 (24.06%)	2984 (100%)

Figure 6 illustrates the results obtained:



**Figure 6. The click patterns across language proficiency levels**

*Second phase of data collection: Forum and chat scripts*

The data in the first phase had some indications of the learning processes; however, we could not consider them as completely accurate for the mere reason that clicks may increase/decrease for many possible reasons, and yet, we had some criteria now. The data suggested that except journals, assignments and messages, whose presence in the system builds upon personal interactions, the other three activities, namely, forum, chat, and wiki, which allowed participants to express self publicly, had accounted for most of the clicks (73.48%). Furthermore, the trend in the clicks suggested that the number of clicks decreased with collective language proficiency levels (Tables 4 and 5).

Having these criteria in mind, we attempted to probe into forum and chat scripts looking for evidence supporting the logged trends. Since clicks implicitly link to student choices in navigating the LMS, we decided we might be able to spot this preference by locating forum and chat interactions in which some sort of affective orientation had been explicitly stated. Because both activities were public means of interaction, the findings were deemed to be unmanipulated measures of participant views of the system, reflecting reasons behind clicking patterns. Through gathering such qualitative data, we might be in a better position to decide if the trends shown in clicks in the previous phase

were in line with a certain logic—a process. In addition, since the number of actual forum posts and chat sessions—products— was lower than the frequency of clicks in these two activities (Table 3), a qualitative approach to interpretation of data was thought to help shed some light on the reasons behind clicks.

**Table 3. Frequency of Forum Posts and Chat Sessions**

<b>Classes</b>	<b>Forum Posts/Clicks</b>	<b>Chat Sessions/Clicks</b>
Term 3 (N= 19)	62/115	37/44
Term 4 (N= 19)	67/165	22/30
Term 5 (N= 15)	47/351	38/49
Terms 6 (N= 18)	32/376	21/32
Term 7 (N= 15)	54/384	29/51
Term 12 (N= 29)	41/432	47/70

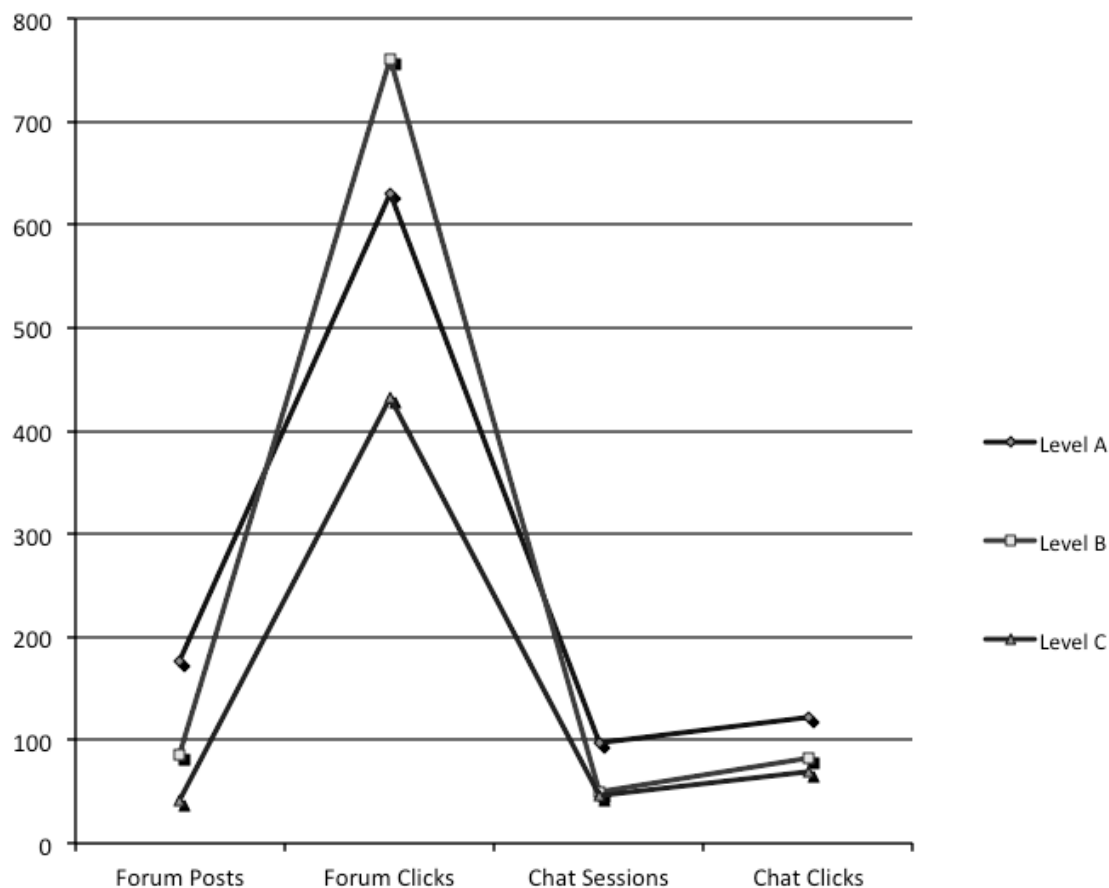
Furthermore, cross-tabulation of the results by proficiency level (see Table 4 and Figure 7) confirmed that the number of clicks was still higher than the number of forum posts or chat sessions.

**Table 4. Frequency of Forum Posts and Chat Sessions by CEFR Level**

<b>CEFR Level</b>	<b>Forum Posts/Clicks</b>	<b>Chat Sessions/Clicks</b>
A (N=53)	176/631	97/123
B (N=33)	86/760	50/83
C (N=29)	41/432	47/70

This is further evidence that mere dependence on patterns shown in clicks may yield inconclusive results, if not completely unreliable, and other sources of information revealing the underlying behaviors of participants need to be inferred as well (Liou, 2000). It is logical that such a pattern may be found for all the activities as it may take

some time for the participants to be familiar with the online tasks before interacting with the system productively.



**Figure 7. Frequency of Forum and Chat Interactions by CEFR Level**

*Chat interactions*

Of all the chat scripts, we could locate five interactions that converged on some difficulties using the system: using the interface and expecting technical enhancements. The following will present the extracted themes.

*Using the interface*

As can be seen in the following interaction, the first student complains that he is confused as not to know what to “do” or “study,” which is greeted by the second student’s direction that the materials can be found on the “lesson page” and “weekly outline.”

## **Term 12**

(interlocutors **A** and **B**)

**A:** 10:41 i'm confused?

**B:** 10:41 confused! why?

**A:** 10:42 because i don't know what to do, what are we going to study!!!

**A:** 10:42 because i don't know what to do, what are we going to study!!!

**B:** 10:43 check the lesson page! it's on the weekly outline!

**A:** 10:43 it's so confusing!

Although the entry to class chatroom was on the lesson page, it seems that student A failed to locate course resources/activities. Strange as it may seem, the final expression "it's so confusing!" seems to be more confirmative. Likewise, in a chat conversation between a teacher and his student, we noticed the same problem with the interface leading to the student being absent from the class for a few sessions.

## **Term 12**

(interlocutors **T** and **S**)

**T:** 22:09 So, you have missed all your classes?

**S:** 22:10 i didn't know about classes until tonight.

**T:** 22:11 oh, really? So what do you think?

**S:** 22:11 i was in web site about 8.30 but i couldn't enter chat

**S:** 22:11 how can i see tonights chats?

**T:** 22:12 There is a record of previous chat logs.

**S:** 22:13 that's just my luck.

**T:** 22:14 No problem! Please use the interface you used to enter chat and click in "view past chat sessions" to see the previous chat logs.

**S:** 22:15 i'm there but theres nothing about tonight

**S:** 22:16 i'll be going now. thanks for your help. good night.

**T:** 22:16 Great talking to you! See you soon :-h

As can be seen, the student states that he did not know about the classes and even if he was in the class at 8.30, that is the beginning of the class, he could not attend the chat meeting. When the teacher advises the student to view the chat logs, he finds out the student, although being "there," fails to locate the chat logs. Although the student thanks and leaves, we cannot verify whether he has found the logs or not as the parting occurs one minute after the previous negative assertion.

Another instance of possible difficulty in using the interface can be seen in the following interaction:

### **Term 7**

(pseudonyms **Jim** and **Pat**)

19:12: **Jim** has just entered this chat

19:18: **Pat** has just entered this chat

**Jim**: 19:20 Are you there?

**Jim**: 19:22 I am still expecting you

**Jim**: 19:23 helooooooooooooo

**Jim**: has just beeped you!

19:24: **Pat** has left this chat

19:23: **Pat** has just entered this chat

**Jim**: 19:23 how do you see the discussion?

19:24: **Pat** has left this chat

**Jim**: 19:24 what are you doing?

19:24: **Pat** has just entered this chat

**Jim**: 19:20 Come on!

19:24: **Pat** has just left this chat

Here **Jim** tries to chat with **Pat** who has entered the chartroom six minutes earlier; however, it seems that **Pat** does not receive **Jim**'s messages or "beep" during six times of entering and leaving the chartroom. As **Pat** seems to be lost at sea, **Jim**'s expressions "what are you doing?" and "Come on!" seem to reflect his dissatisfaction with **Pat**'s inability to engage in chat interactions (however easy it might be for himself).

#### *Expecting technical enhancements*

Other comments included references to technical characteristics of the activity. For instance, as can be seen in the interaction below, one of the interlocutors complains about the fact that classroom chats, in addition to other problems, were partly limited in functionality as they only provided for public interactions, that is everyone could see chat messages:

### **Term 6**

(interlocutors **A** and **B**)

**A**: 22:25 i just found another problem

**A**: 22:26 we can't talk in private

**B**: 22:29 why not?

**A**: 22:30 everybody can see what we say

Furthermore, the mere textual interface of the chat activity was another issue noticed in the following interactions between three participants:

### **Term 7**

(interlocutors **A**, **B**, and **C**; **X** [a chat application])

**A**: please choose a day to meet on the chartroom.

**B**: Let's chat on **X**.

**A**: I mean the class chartroom.

**B**: **X** is better, you can make a room, have voice chatting and of course, video chatting.

**C**: **X** is better.

The multimodality of chartroom, that is the combination of text, audio and video, is a strong point for **X** chat client. In addition, the fact that **A** encourages others to take chat appointments to **X** instead of their usual classroom seems to be building upon the issue of privatization of the chat as well, as he mentions they can "make a room."

### *Forum interactions*

Content analyzing the forum posts revealed both confirmatory and contradictory results. For instance, the following discussion topic lauded the "many capabilities" of the forum which was met with a nodding "it's perfect" response:

### **(Discussion Topic (DT), interlocutors (A and B))**

#### **Term 7**

**DT**: Forum!

**A**: This is our class forum! It is has many capabilities! Thanks!

**B**: As **A** said, it is perfect!

However, the four remaining posts cited difficulties with the two activities of the system: wiki and forum. In the following interaction, one of the participants expresses difficulty in completing the class project, short story wiki, and; thus, he has written the story in the forum. To this post, then, the other interlocutor has replied that he has encountered another problem, that he has completed the project although the text has "disappeared":

### **(Discussion Topic (DT), interlocutors (A and B))**

#### **Term 4**

**DT**: help me!

**A**: I can't write my short story in View in Wiki and I put in it here.

**B**: really? Me too. I wrote my story in new and save that but it disappeared!

In another interaction, a student asks a question about adding a page in the course wiki to which the teacher replies with the procedure:

### **(Discussion Topic (DT), interlocutors (A and B))**

#### **Term 7**

**DT**: A question



**A:** How can I add a topic on Short Story Wiki? Please help me.

**B:** go to the wiki and click “new” on the right navigation panel, enter your topic and click create.

**A:** tnks a lot!

In the following post, the student raises a question about enclosing pictures to his forum posts to which the teacher has supplied the procedure:

**(Discussion Topic (DT), interlocutors (S and T))**

**Term 4**

**DT:** help

**S:** I can't add pictures on my posts

**T:** Just locate the image icon on your text editor. Then upload your file.

**A:** thanks.

In still another problem about forums, two participants state that they are unable to add new discussion topics on the forum. However, a third student admits that he, indeed, “could add discussions”:

**(Discussion Topic (DT), interlocutors (A, B, and C))**

**Term 7**

**DT:** problem with the forum

**A:** There is a problem with the settings of the forum; I can't add discussions. What can I do?

**B:** Yes, the problem I noticed too.

**C:** But I could add discussions!

It might be interesting how participants with similar system privileges expressed rather opposing experiences in working with the same forum activity even though all of them had used the forum to interact.

*Third phase of data collection: Interview*

The main reason we probed into chat and forum scripts was to find evidence justifying the trend in the clicks. Although we could locate only a limited number of forum and chat interactions, the findings seemed to underline a familiar issue: there were some qualitative sources of fluctuation in the number of clicks we could not discern from the logs. That is, based on the results, both familiarity with the system and enduring attitudes about its activities might have influenced the participants' online behaviors. For instance, student unfamiliarity with the system might have naturally caused them to undergo additional clicks to learn the walkthrough even though for a limited time, and,

assuming the participants passed this stage, their navigation in the LMS would have become attitudinally determined. If negative, they might have discarded some activities in favor of some others; hence, changing the click balance. We used these findings to form the basic structure for the interview protocol: attitudes towards virtual learning environments, the system and its activities, and expectations and fulfillment (Appendix A).

The interview sessions were conducted in the language school where the participants had met for face-to-face classes. Drawing on Polkinghorne (2005), three interview sessions were conducted, each lasting for about 15 minutes. The first interview helped the interviewer develop rapport with the participants while the two subsequent interviews probed into the areas outlined in the protocol. The sessions were audio recorded and transcribed word for word and subsequently analyzed for themes (Kvale, 2007). Furthermore, to alleviate the researcher bias (Creswell, 2007), we conducted independent analyses on the data and then shared ideas. As a final cross-examination measure, we developed a narrative (Appendix B) based on the interview data and asked the participants to read and confirm if it reflected their opinion. The following reports on the recurrent themes found in the responses.

#### *Attitudes towards virtual learning environments*

All the participants had a positive attitude towards virtual learning; they believed it provided for an “exciting” and “interesting” learning experience and “enabled them to proceed at their own pace,” giving them “sufficient time to reflect” on the learning materials. The only problem two participants referred to was “low dial-up internet connection.”

As with the effectiveness of virtual learning, thirteen participants suggested that virtual learning should be “subordinated to face-to-face instruction” and that “a blended instruction mode” would be “most favorable.” One participant, however, asserted that virtual learning outperforms the face-to-face mode due to “its interactivity” and “accessibility outside the classroom” having the potential to be used in a “stand-alone” fashion.

Regarding the characteristics of virtual learning, twelve participants referred to “the variety in online applications,” such as “digital libraries” and “online dictionaries,” as “distinguishing” features “enhancing the quality of instruction,” especially as regards with mastering “language skills.” Likewise, they believed that the “accessibility” and “intuitive interface” helped ease the operation of a learning management system.

#### *Attitudes towards the system and its activities*

In response to questions about the school LMS, all the participants shared the view that it was “beneficial,” relying on the features they mentioned for virtual learning environments (see the previous section). However, two students stressed the issue of “logistical means” of studying online and that “not all students have access to internet or computer devices to surf the net.” They drew on their own “limitations” during the course and mentioned they simply could not attend online classes for a number of sessions. One of them also believed working with the system was “a little complicated.”

All participants expressed familiarity with the six activities in the study, although assignments, forum, and chat were among the most frequently used. The reasons they gave for using assignments were their “reflective nature” and “out-of-class availability and accessibility” which allowed them to work “at their own pace” and “receive feedback from the teacher.” Besides, they were “obligatory” parts of the course whose completion at home “saved class time.” When asked if they had missed any assignments, seven participants stated that the “unfamiliarity” with the system during the initial sessions had caused them to miss the timed assignments.

The forum was deemed as the most “dynamic” and “exciting” part of the course by twelve participants. They believed it created “a collection of diverse and challenging issues” and “an asynchronous mode of participation where they felt at ease” when contributing to the discussions. They also believed that when writing on the forum they “needed to check the pieces carefully for grammatical points” because “everyone could see their comments.” They also stated they could “learn from the feedback the received from other classmates.” However, one participant expressed concern over the “right use of this activity,” stating that the interactions “need to be polite.” Still another participant expressed that he “did not find any difference between forum and other assignments” in that they all demanded “some form of writing on the web.”

As with the course chartroom, all participants said they had tried this activity and that they “enjoyed” synchronous conversations. However, such problems as “lack of English knowledge,” “low internet connectivity,” and “failure to be online at the same time” made them “prefer forum” as “it was asynchronous in nature.” When asked about their choice between a/synchronous activities, eight participants preferred the former because “they needed some time to reflect” on their outputs; while, those who preferred the latter argued for “the spontaneity of interactions” and “saving the time.” Regarding the effectiveness of the activity, eleven participants called for the addition of “audio and video” transmission capabilities, whereas one expressed satisfaction with the present textual mode, and, the two others had no idea.

Regarding their online performance, the participants seemed to converge on the “ease of operating the virtual learning” as it provided them with a more “relaxed” and “comfortable” learning experience which allowed them to “learn out-of-class” and “express self more freely.” One participant, however, was dissatisfied with online classes due to interface “complexities.”

Attitudes towards using wikis were mixed. Five participants stated they “never used wikis” because of the “complexities in the task” although they “supported” the use of wikis in language learning due to “their editing capabilities,” especially in “writing classes.” Six other participants, however, who had used wikis during the course lauded the use of this activity in language learning as it encouraged a sense of “collaboration in doing a project” or “developing a writing piece.” They stated that they “learned from the editions they received from other classmates.” On the other hand, three participants opposed the peers’ editions, calling it “disrespectful.” They believed “instead of totally revising one’s text, one should provide suggestions” as to “the correct grammar or vocabulary usage.”

Views about journal and messages seemed to be overlapping with eleven participants considering “personal interactions between course participants useful,” and “adding advanced editing tools in the interface quite necessary.” Through these activities, they believed they could “build strong relationships with their classmates and friends” and “communicate their feelings about the course to their friends or teacher.” However, three participants expressed they did not use the journal activity because “there was nothing to inquire about.” In addition, a negative point was raised about the “privacy” of the messages activity. One of the participants feared the messages activity might turn into a tool via which he could be contacted by other website members he did not know.

### *Expectations and fulfillment*

As part of final comments, all the participants expressed satisfaction with the current system, asserting it included “useful capabilities which were accessible off-class,” “shareable contents,” and “many ways to keep in touch” even “when the face-to-face classes were not held.” However, among positive feelings about the system, there were calls for “reducing the loading time,” “designing an easier interface,” and “installing new add-ons.” Finally, when asked if they decided to use the system in the future, they expressed willingness to engage in virtual learning “in combination with face-to-face instructions.”

### *Discussion*

Set off from recorded logs in the system, this study attempted to triangulate the patterns found in clicks with participants' views about their online navigations through chat and forum interactions as well as semi-structured interviews. The findings mostly confirmed the patterns recorded by the built-in tracker.

### **Attitudes towards virtual learning**

Interview data assigned a positive attitude to virtual learning, especially when it was seen parallel to face-to-face instruction. In other words, participants converged on the idea that virtual learning, with all its merits, should complement a traditional face-to-face course. Accordingly, the idea of blended learning constitutes an important building block in today's education (Rovai & Jordan, 2004), creating a flexible and robust medium of delivery filling the gaps between each polar end of the continuum. Of course, this potential, if exploited properly (Voos, 2003), can result in significant student gains and motivations (Dziuban & Moskal, 2001). Research suggests that students with access to an adjunct online activity besides their face-to-face classes generally had a positive attitude towards their learning (Lapadat, 2002).

### **Click concentration for each activity**

Logs indicated that forum interactions accounted for most of student clicks (61.09%), which was confirmed in one forum post mentioning the "many capabilities" of the forum. Similarly, the interview also revealed the "dynamic" and "exciting" nature of online interaction found in the forum, which led to "informed" and "stress-free" participation in this activity. Furthermore, some participants commented on their preparedness before submitting a message to the discussion board and after receiving feedback on their posts. There are instances of such positive points in the CMC literature. When finding it hard to engage in face-to-face communication, students turn to discussion boards (Hampel & Hauck, 2004) for a more democratic (Hew & Cheung, 2003; Schallert, et al. 1999) equivalent to face-to-face interaction (Godwin-Jones, 2003) with posts topically classified (Abawajy, 2012) as students reflectively contribute to (Rourke & Anderson, 2002), exchange feedback (Díez-Bedmar & Pérez-Paredes, 2012), and learn from the interactions (Webb, Jones, Barker, & van Schaik, 2004).

The second highest concentration of clicks was found in messages (17.56%). We could not find any public comments on the use of this activity nor did we probe into the database, for ethical reasons; however, we did find supporting evidence in the interviews. The participants engaged in this asynchronous activity because it helped them form both intra- and inter-class connections with their friends and teacher. Therefore, the reason this activity came to be popular with the participants seems to be two-fold. First, the use of messages, unlike chat and forum, was not course-specific, and

the participants could connect with every registered user on the system. Second, unlike chat and forum in which every interaction was shared, messages seemed to be the only private link between individuals in a social-constructivist courseware. According to Hampel and Hauck (2004), students turn to online technologies when failing to communicate spontaneously in a foreign language. It obvious that participants' need to privacy drove them towards this asynchronous activity.

The third highest click source was chat. Despite the increasing popularity of chat rooms in language learning for simulating real-life conversations (Jepson, 2005), logs contained a small (9.24%) percentage of navigational clicks for this activity. Correspondingly, although the participants expressed that they enjoyed chatting, we found evidence for this trend in chat interactions and interviews, blaming such problems as "low internet connectivity," "failure to be online at the same time," and "limitations" in combining modes of delivery. These problems caused some participants to use commercial chat applications or turn to asynchronous forum discussions. Research shows that chat messages are sometimes incoherent and disjointed (Guardado & Shi, 2007; Honeycutt, 2001). Indeed, the problems mentioned by the participants could have caused this condition. For instance, in one of the chat interactions, one of the participants failed to receive the message even though the other interlocutor had noticed his entry into chat and tried to talk to him for several times to no avail. In addition, other characteristics of public synchronous chat rooms such as brief and socially oriented messages unlike topically-threaded forum-like posts (Lapadat, 2002), might have lead to participants' preferring the forum over chat. In fact, one of the problems we faced in our experience of MOODLE was the three-second delay in sending and receiving messages, sometimes creating a very confusing chatting experience.

Assignments ranked four in the number of clicks (8.14%). This activity, mainly computerized textbook exercises, was used to complement the face-to-face course objectives whose completion was obligatory. Except for some initial sessions, most participants attempted these timed exercises throughout the course. As also confirmed in the interview sessions, most participants were drawn to these activities so that they could do their assignments freely at home and receive feedback on their performance. Like asynchronous forums, these activities allowed the participants to "reflect" on their responses, engaging in higher-order thinking processes (Heckman & Annabi, 2003; Kanuka & Anderson, 1998; Rourke & Anderson, 2002) while risk taking (Ortega, 1997) at their own pace (McComb, 1993; Schallert, et al. 1999). Also, research suggests that asynchronous means of feedback provision deliver a more effective instruction (Walther, 1996) as they create a natural setting for language learners to discuss ideas without worrying about time constrains (Tannacito, & Tuzi, 2002).

Wiki was the fifth preferred activity (3.15%). We learned from the forum posts that participants had problems with writing on the wiki and uploading of files. When interviewed, almost half of the participants reported never having tried wikis during the course due to perceived difficulties in undertaking the task. On the other hand, the other half, who had tried the activity, had a positive attitude towards wiki collaborations when writing and the feedback they received through this activity. However, one of the participants considered peer edition “disrespectful” if the participants completely rewrote the writing piece. The findings seem to be consistent with those of previous studies (e.g., Kuteeva, 2011; Miyazoe & Anderson, 2010). The use of wikis in language classes as a Web 2.0 technology is a recent development with the activity often serving as a complete online classroom or used in writing instruction (Liu, 2012). The unique characteristic of a wiki is that, unlike other CMC tools such as forum and blog in which participants provide comments to the initial posts, it enables participants to edit the original text over and over again (Kessler, 2009); therefore, being “intensely collaborative” (Godwin-Jones, 2003, p. 15). Miyazoe and Anderson (2010) found that students had a positive attitude towards using wikis as an online medium for writing instruction. Likewise, Kuteeva (2011) revealed that in wiki collaborations students devoted more attention to accuracy because they knew an audience awaited their posts and edited them if not written accurately. However, despite the fact that using wiki encourages collaborated efforts, this strong point sometimes turns to one of the problems of the activity, as some do not favour others editing their additions (Paquet, 2003). The issue of edit war (Kittur et al., 2007) may as well be addressed since it may affectively determine the student precipitations in wikis. Informed contributions along with role definitions in wiki projects may help the effective use of this useful activity in language classes.

Finally, the least clicks were for the journal (0.80%). This activity, too, was private and asynchronous, used for student-teacher interactions. Indeed, some participants reported that they communicated their feelings about the course to the teacher, while others did not attempt this activity due to unfamiliarity or merely not having any suggestions. Of course, this might be a justified practice in a social-constructivist courseware with many forms of interaction. Since social-constructivism is about collective knowledge (Duffy & Cunningham, 1996), it might be construed from the data that the variety of a/synchronous tools in the LMS have phased out the necessity of referring to the teacher as the dominant power source in the online class, bringing about a more student-centered, collaborative, and dynamic community (Brown, 2001; Rovai & Jordan, 2004).

### **Language proficiency**

Not much difference could be found across different language proficiency levels in analyzing the chat or forum data, and the interviews; however, the cross-examination of language proficiency and clicks in all activities suggested that with higher proficiency comes less tendency to use private and public means of communication. Although the frequency of clicks would not determine excellence, this might indicate that proficient learners exploit deeper uses of the web; while, less proficient learners tend to use the web more broadly. Apparently, lower proficiency is correlated with more clicks on all activities, implying a higher level of motivation to discover the new learning medium. However, since it is the users who make the clicks, the number of group members, as unequal as it is, might have had a role in the formation of this pattern and needs further investigation.

### **Learning processes in CALL use**

Now that we have analyzed the results, the question is, what are the learning processes? Although we have uncovered some qualitative aspects of navigation in the six activities through a combination of data collection measures, still we seem to be back where we started from—the logs (Figure 1). The participants in the ten courses, regardless of their proficiency levels, strived to express themselves through a/synchronous activities both publicly and privately. We may be able to narrow down the issue of “learning processes” to “social orientation” as “communication is key to success for any class, and it’s even more important in an online environment” (Cole & Foster, 2008, P. 93). That is, it seems clicks are communication-driven in social constructivist courseware as students try to compensate for their limitations (Hampel & Hauck 2004) in face-to-face situations.

### **Pedagogical Implications**

The normalization process (Bax, 2003) of computer and ICT technologies is running its course, and technology is being integrated into our lives at a fast pace. The use of online courseware in general, and MOODLE in particular, has bridged distances of education in a borderless world. Our study revealed that participants had a positive attitude towards virtual learning, the system, and its activities. Furthermore, they considered the advantages of virtual learning to rise if in tandem with face-to-face instruction. Therefore, it seems promising that educational institutions design an online component to their traditional curricula. Of course, for this status change to be effective, sound theoretical and practical educational decisions and undertakings must accompany the new design (Voos, 2003).



### *Suggestions for further research*

This paper is far from complete as the study is still in progress. However, sticking to this level of analysis is missing on many other variables. For instance, in addition to the click frequencies, we collected on some specific activities, we could have also checked the time spent on each activity and screen the data for any biased patterns which might have emerged through not a student's preferred action but via technical aspects of web surfing. Likewise, although we found supporting evidence for many research findings in the field, we need to further the analysis by examining more participants' navigational preferences across different proficiency levels and virtual environments through both quantitative and qualitative measures. Furthermore, as the school had a male-only setting, we controlled for the gender variable. However, some research (e.g., Belenky, Goldberger, & Tarule, 1986; Rovai & Barnum, 2003; Swan & Shih, 2005) suggests that students' social presence in virtual environments might be gender-bound, with women being more community oriented. Since this study attempted to find the navigational patterns in a social-constructivist courseware, it does not depict the complete picture. In addition, research on web 2.0 technologies has shown (see Crook et al., 2008, for a survey) that other demographic variables such as age, race, social class, and academic designation (e.g., Dutton, Cheong, & Park, 2003; Hargittai, 2007; Kabilan, Ahmad, & Zainol Abidin, 2010; Lenhart et al., 2007) might modify users' navigational patterns.

This research assumed the participants possessed the respective language proficiency levels outlined in the study based on their OPT results at the time of enrolment in the school and further completion of courses and levels. Coupled with this issue was the unequal number of participants in each level, which had a role in the materialization of click patterns. Therefore, to help shed more light on the relationship between students' language proficiency and preferred navigational patterns and learning processes, it is suggested that a more focused study be carried out.

### *Conclusion*

Our study has attempted to uncover the learning processes in CALL use by triangulating data collected through a built-in tracker, chat and forum scripts, and semi-structured interviews in a MOODLE-based language course. The findings suggest, in line with the tenets of social-constructivism, that communication drives the learning process in social-constructivist courseware, as the students actively engage in the development of knowledge (Duffy & Cunningham, 1996; Jenkins, 2000). Furthermore, the results contribute to a growing body of research (e.g., Dziuban & Moskal, 2001; Lapadat, 2002; Rovai & Jordan, 2004; Voos, 2003) that highlights the positive role of blended instruction in language learning. Proper theoretical and practical decisions need to

accompany the use of learning management systems and emerging technologies in the classroom.

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## **Appendix A. Interview Protocol**

What is your opinion about virtual learning?

In your opinion, how effective can virtual learning be either independently or in tandem with face-to-face instruction?

In your opinion, what characteristics should a virtual learning environment possess?

What is your opinion about the school LMS?

What is your opinion about the activities in the school LMS (chat, forum, wiki, messages, assignments, and journal)?

Which of the activities interested you the most?

Which type of interaction, synchronous or asynchronous, interests you the most?

Do you have a different behaviour in online classes?

What is your opinion about privacy in online classes? Do you feel safer in online or face-to-face classes? For instance, how do you feel about other students being able to see your posts in the forum?

What is your opinion about the students being able to edit wiki pages? Were your text edited? Did you edit others' texts?

What is your opinion about the chat environment? Do you consider a text-based environment suitable for having a synchronous interaction?

What is your opinion about private interactions through the journal and messages activities?

Did you face any problems when operating the school LMS?

Which aspect of virtual learning is un/satisfactory?

Would you like to continue learning English online?

Is there anything else you would like to add? Any suggestions?

## **Appendix B. Narrative**

Please read the following text that has emerged out of ideas expressed by you and your classmates about the School Virtual Learning program. You may read the text, especially the quotes, critically and provide feedback on attitudinal discrepancies.

### **Attitudes towards virtual learning**

Generally, I have a “positive” attitude towards virtual learning. I believe it provides for an “exciting” and “interesting” learning experience and “enables students to proceed at their own pace” while “having sufficient time to reflect” on the learning materials.

As with the effectiveness of virtual learning, I think virtual learning should be “subordinated to face-to-face instruction” and that “a blended instruction mode” would be “optimal.” However, I also agree that virtual learning “might outperforms the face-to-



face mode” due to “its interactivity” and “accessibility outside the classroom,” having the potential to be used in a “stand-alone” fashion.

Regarding the characteristics of virtual learning, I think there is a great “variety in online applications,” such as “digital libraries” and “online dictionaries,” which help “enhance the quality of instruction,” especially as regards with “language skills.” Likewise, I think the interface of such programs is very “intuitive.”

### **School Learning Management System (LMS)**

In response to questions about the school LMS, I think the website is “beneficial,” due to reasons I provided above; however, there is the issue of “logistical means” of studying online which I like to raise here. I think that “not all students have access to internet or computer devices to surf the net.” Some students “might be faced with such limitations” during the course and “might have missed” online classes for a number of sessions. Furthermore, working with the system might have been a little “complicated” for some students.

The reasons I attempted class assignments were their “reflective nature” and “off-class availability and accessibility” which allowed me to work “at my own pace.” Besides, they were “obligatory” parts of the course whose completion at home “did not interrupt class time.” Of course, “unfamiliarity with the system during the initial sessions caused me to miss some timed assignments.”

Forum was a “dynamic” and “exciting” part of the course. It sorted “a collection of diverse and challenging issues” and “an asynchronous mode of participation where I felt at ease” when collaborating on the topics. When writing on the forum, I “needed to check the pieces carefully for grammatical points” because “everyone could see my comments.” I also could “learn from the feedback I received from my other classmates.” There is one issue, however, which makes me worried about forums; I think it is very important the forum contributions be “polite.”

As with course chartroom, I have tried this activity at “least for once” and that I “enjoyed” synchronous conversations. However, such problems as “lack of English knowledge,” “low internet connectivity,” and “failure to be online at the same time” sometimes made me “prefer forum” as “it was asynchronous in nature.” It would be good if I had some time to reflect” on my responses although I like “the spontaneity of interactions” and “saving the time in the chartroom.” I think it would be great if the school could add “audio and video” transmission capabilities to the activity as well.

Regarding my online performance, I think most of my classmates agree that virtual learning provides for a “relaxed” and “comfortable” learning experience, allowing one to

also “learn off-class” and “express oneself more freely.” However, there may be some students who are dissatisfied with face-to-face classes due to interface “complexities” involved in surfing the virtual environment.

I have rarely used “wikis” because of the “complexities in the task” although I “support” the use of wikis in language learning due to “their editing capabilities,” especially in “writing classes.” Wikis, I believe, are great tools for “collaboration in doing a project” or “developing a writing piece.” Students can “learn from the editions they receive from their other classmates.” On the other hand, I think there may be students who oppose the idea of the peers’ editing their writing pieces, calling it “disrespectful.” I think, “instead of totally revising one’s text, one should provide suggestions” as to “the correct grammar or vocabulary usage.”

Journal and messages seem to be useful tools to “build strong relationships with my classmates and friends” and “communicate my feelings about the course to my friends or teacher.” However, a negative point about the messages activity is the issue of “privacy.” I fear it might turn into a tool via which “I could be contacted by other school members I do not know.”

In conclusion, I am “satisfied” with the current system and its “useful capabilities which were accessible off-class,” “shareable contents,” and “many ways to keep in touch” even “when the face-to-face classes were not held.” Furthermore, I think the school manager should “reduce the loading time of the website,” “design a more friendly interface,” and “install new applications” on the system. I “am willingness to” engage in virtual learning “in combination with face-to-face instructions” in the future.

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