HELP OPTIONS AND MULTIMEDIA LISTENING: STUDENTS' USE OF SUBTITLES AND THE TRANSCRIPT

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ABSTRACT

As multimedia language learning materials become prevalent in foreign and second language classrooms, their design is an important avenue of research in Computer-Assisted Language Learning (CALL). Some argue that the design of the pedagogical materials should be informed by theory such as the interactionist SLA theory, which suggests that input modification can help comprehension, but does not provide specific guidance regarding choices designers should make when they attempt to implement theory-based features like modified input. This empirical study was designed to provide evidence about one such issue: whether subtitles or transcripts are more effective in providing modified input to learners.

A multimedia listening activity containing a video of an academic lecture was designed to offer help in the form of target language subtitles (captions) and lecture transcripts in cases of comprehension breakdowns. Eighteen intermediate ESL students enrolled in an academic listening class at a research university participated in the study. Two tests and questionnaires in addition to screen recordings were used to analyze students' performance on the activity and their use of help.

The results indicate that participants interacted with the subtitles more frequently and for longer periods of time than with the transcript. Also, the study identified four patterns of learner interaction with the help options. Since, overall, the participants interacted with help less than half of the time they opened help pages, an important challenge in investigating help options lies in finding ways to promote the use of help.

INTRODUCTION

As multimedia language learning materials are becoming increasingly common in foreign and second language classrooms, the design of those materials is becoming an important avenue of research in Computer-Assisted Language Learning (CALL). Chapelle (2003) argues that the real challenge in applied linguistics at present is the search for "evidence for the most effective ways to design software for CALL, to use software effectively in tasks, and to help learners to take advantage of the electronic resources available to them" (p. xiii). Addressing the challenge, this paper offers suggestions on the design and implementation of software help options (L2 subtitles and L2 transcript) in a multimedia listening activity. Also, it investigates the learner's use of multimedia listening software with a particular focus on learner interaction with subtitles and transcripts in cases of comprehension breakdowns. Finally, the paper examines if and how learners take advantage of help options available to them.

REVIEW OF THE LITERATURE

Theoretical Framework

The interactionist SLA theory considers interaction to be a crucial factor for language acquisition since it can promote negotiation of meaning (Long, 1996; Pica, 1994). Although originally based on the study of the negotiation of meaning between human interlocutors, the notion of interaction in CALL was extended

to include person-computer interaction during a task completion by a single user (Chapelle, 2003). A key component of this theory—that only the input that is noticed, or apperceived, can become beneficial—provides guidance for the design of instructional materials, which should contain features that enhance input through modifications (Chapelle, 2003, p. 40) such as added redundancy and change of the input mode. Following Chapelle's (1998) suggestions relevant for the development of multimedia CALL, the online unit used in this study was constructed to investigate the effectiveness of two types of input modifications, subtitles and transcripts, within a listening comprehension unit centered around a video of an academic lecture. In particular, these two textual help options were selected because they can add redundancy to the aural input by changing the input mode from its aural form in the video into the textual form of subtitles and a transcript, hence addressing different learning styles.

Multimedia Listening and Help Options Studies

Quite a bit has been written about the different characteristics of multimedia that can enhance reading (Chun & Plass, 1997), vocabulary acquisition (Plass, Chun, Mayer & Leutner, 1998), and even speaking (Borras & Lafayette, 1994). However, a smaller number of studies (Brett, 1996, 1997) investigated the use of multimedia software for listening comprehension. When investigating learners' attitudes towards multimedia, Brett (1996) found that 86.9% of students believed that a multimedia application they were introduced to would improve their listening skills. Also, in questionnaires, participants preferred multimedia for listening over media such as video and audio (Brett, 1997). Finally, learners had better listening comprehension scores on a multimedia task than on a paper and pencil task in which the input was delivered via video and audio tapes (Brett, 1997). More research into the use of multimedia listening materials is necessary as is research into help options, which Pujolà (2002) defined as "resources of the program which assist the learner in performing a task" (p. 241). Since several studies investigating help options (Hegelheimer & Tower, 2004; Hsu, 1994; Liou, 1997, 2000; Pujolà, 2002) proved instrumental for the current research study, their main findings are briefly reviewed here. Appendix provides the summary of results of these help option studies.

Hsu's study (1994) was one of the first studies examining ESL students' use of help options (audio repetition, textual repetition, and the dictionary) while listening to a story delivered on the computer. Textual repetition was in the form of a transcript, which was displayed on the screen when students requested help after being unable to comprehend the spoken input. Frequencies of help function use showed that the transcript was the most often used tool followed by aural repetition and the dictionary. The participants also mentioned in questionnaires that the transcript was the most effective tool. Finally, Hsu (1994) found that the amount of requests for textual help positively correlated with participants' listening comprehension scores.

Liou (1997) also studied the frequency and effectiveness of help use. She examined how 20 college students at a Taiwanese university interacted with eight online help functions in a self-paced multimedia video disc. The textual help options included English and Chinese scripts in addition to the video control functions (pause and rewind) and five other options (see Appendix for details). Liou (1997) divided the participants into an "effective" and an "ineffective" group based on three factors: listening proficiency, direct student observation, and instructors' records. Frequency of help access showed that the ineffective group requested twice as much help as the effective group and used the replay of aural input more than the English and Chinese scripts. The effective group, on the other hand, used the English script most, followed by the replay function and the Chinese script. As can be seen from Hsu's and Liou's results, the transcript was among the most frequently used forms of help. In another article about the same study, Liou (2000) reported that 80% of participants found the English script useful. However, contrary to Hsu (1994), Liou (1997) found that frequency of help use did not correlate with listening scores.

In addition to the transcript, Pujolà (2002) examined the use of subtitles (which were in his study a part of one help option) as well as six other help facilities (Appendix). Based on participants' decoding level, the

ability to decode input, Pujolà divided 22 beginner EFL students into four groups (higher, average, lower, and poorer decoders) and observed their use of textual help. He found that participants in each group behaved in "varied, idiosyncratic ways" (p. 253), so it was difficult to draw conclusions that would apply to all participants in one group especially since some participants in lower groups never used textual help. Generally, the higher decoders used the replay and rewind functions more than the transcript and/or subtitles. The use of textual help increased as the decoding level decreased, so some poorer decoders relied on it to such an extent that at times "they were doing a reading task instead of listening" (p. 253). Pujolà believed that this was due to the participants' perception of the purpose behind textual help. While the higher groups used textual help as a backup for listening, lower groups tended to use it as a necessary part of the listening process. In terms of overall help use, there was no correlation between the use of any help facility (including textual help) and participants' linguistic level.

Another study that looked at the use of textual help in multimedia software was Hegelheimer and Tower (2004). The participants were 94 beginner EFL students at a university in the Middle East who used a CALL software program for self-study over a period of eight weeks. The use of the software was a required part of the course and students worked with it at their own pace. Options of the program included the Repeat button, which repeated the previous sentence aurally, and the ABC button, which repeated the previous sentence aurally together with its transcript. The teachers introduced the Repeat button to the participants, but not the ABC button, which may be a reason why, overall, the Repeat button was used more than the ABC button. The results showed that the simultaneous display of audiovisual and textual input (ABC button) was negatively correlated with comprehension scores. The ABC button was the most frequently used help option for the 30 lowest-performing participants. The thirty highest-performing participants used the Repeat button most frequently. As in Pujolà's (2002) study, the participants showed great variation when using help options. For example, half of the participants did not use the ABC button at all. More research is necessary to explain why that was the case. Liou (1997) hinted at this issue when wondering if it was the students who did not use the environment to their advantage or CALL designers who offer more help than necessary.

In sum, previous literature shows that help options to aid listening comprehension have not been thoroughly investigated, and that there are mixed results on the relationship between the use of help and comprehension scores (positive relationship in Hsu, 1994; no relationship in Liou, 1997; negative relationship in Hegelheimer & Tower, 2004). The current study attempts to address this gap by examining the use of target language subtitles and the transcript.

Subtitles and Navigational Patterns

Among the studies about help options reviewed in the previous section, only Pujolà's (2002) examined subtitles as a help option in multimedia listening materials. However, the research on the influence of subtitled/captioned TV programs on listening comprehension has been going on for a number of years as the work of Vanderplank (1988, 1990) and Garza (1991) shows. Borras and Lafayette (1994) investigated advanced learners' use of digital video with and without subtitles and concluded that learners who have control over subtitles exhibit better comprehension and better production of the language. Guillory (1999) also used digital video clips to check the comprehension of beginner French learners, dividing learners into three groups: no captions, full captions, and keyword caption. Guillory (1999) concluded that the full caption group performed better than the keyword caption group although both caption conditions proved beneficial for students' comprehension. Taking into account these findings, the present study implemented full, intralingual subtitles[1] that students had complete control over to look at students' interaction with them and describe navigational patterns necessary for better understanding the design and use of help in multimedia listening software.

Of the studies in the previous section, Hsu's (1994) was the only one to investigate navigational patterns. Hsu found that the higher and lower proficiency groups did not follow the same pattern when requesting

help. The lower group followed the audio repetition-transcript-dictionary pattern while the higher group followed the transcript-dictionary pattern. Hsu, however, did not attempt to explain the reasons behind this type of participant behavior. In another study, Desmarais, Duquette, Renie, and Laurier (1998) described and accounted for linear and chaotic patterns of interaction with a multimedia videodisc. In a linear schema, participants completed the activities and moved through them in a linear order. In a chaotic schema, participants switched from one activity to another and abandoned them, possibly because of the task type and task difficulty, as well as a lack of participant learning goals. In another article about the same study, Desmarais, Laurier, and Renie (1998) concluded that proficiency levels influenced navigational patterns since the intermediate learners established a more linear pattern while the beginners engaged in activities that were sometimes too difficult. This difficulty prompted learners to interrupt the activities, which resulted in a more chaotic pattern. This result corroborates Hsu's (1994) findings and calls for more investigation of similar multimedia environments, an aim of this paper.

Research Questions

Although the literature on multimedia listening has looked at help options, none of the studies, to our knowledge, has compared the use of subtitles and transcripts, which is important to understand, both for teachers who use multimedia materials with their classes and for software designers who create them. In this study, which was conducted in an intact class, these two textual help options are compared for frequency and time of use. In addition, the reasons for a learner's choice of a help option are explored through questionnaires and interviews. Furthermore, to better understand patterns of help option use or the ways in which learners access help, this study looks at participants' navigational patterns. Finally, this study examines the effect of proficiency level on the use of help and the performance of the participants. There are four research questions in the study:

1. How frequently and for how long do participants use two help options (subtitles and the transcript) offered in a multimedia activity?

2. Are there patterns of participants' behavior that suggest differences in how they approach help, and if so, how could those patterns be explained?

3. Are there differences in the use of help options between participants at different proficiency levels?

4. What are participants' attitudes towards two help options before and after the activity?

METHOD

Participants

Participants in this study were 18 ESL college students enrolled in one section of the Academic English Listening class at a large state university in the U.S. Midwest in the spring semester of 2004. The students were placed in the class based upon their scores on the listening section of an in-house ESL placement test. The participants were from 7 different countries: China (8), Korea (4), Japan (2), India (1), Malaysia (1), Peru (1), and Vietnam (1) with their self-reported TOEFL scores ranging from 500 to 615 on the paper-based version of the TOEFL test, with a mean score of 559 (SD 30). For the purpose of the study, the participants were divided into two groups: higher intermediate (10 students) and lower intermediate (8 students) based on a) the instructor's opinion of their listening ability, b) their present grade in the course, c) a self-evaluation of listening proficiency, d) scores on an initial academic listening test and e) self reported TOEFL scores.

Materials

The materials were integrated into the course syllabus and consisted of two tests (initial listening comprehension and delayed recall), two questionnaires (pre and post-listening), an unstructured retrospective interview, and the CALL multimedia listening activity, which was specifically designed for this research. To circumvent the issues frequently associated with the use of isolated tasks in CALL

research, such as the lack of motivation and engagement, the activity was made an integral part of the class and the topic was chosen based on the authors' previous experience teaching the same course. All the materials were tested and improved during two pilot studies (Grgurović, 2005).

The initial listening comprehension test consisted of an academic lecture of a similar format and length as the one used in the CALL activity as well as ten multiple choice questions. The pre- and post-listening questionnaires were given to participants before and after the main CALL activity. The pre-listening questionnaire examined participants' familiarity and previous use of two help options (subtitles and the transcript), as well as surveyed which of the two help options the participants would use in a hypothetical multimedia listening activity. The post-listening questionnaire looked at the participants' use of the transcript and subtitles and examined the rationale behind the use. At the end of the study, a retrospective interview was also conducted to gather more details about participants' behavior during the CALL activity.

The main material in this study was an online CALL activity entitled the 'Astronomy' unit. Although designed as an online unit that could be delivered via the Internet, the unit was accessed locally to avoid bandwidth problems. The Astronomy unit consisted of an eleven-minute video of a lecture on astronomy given by a professor in front of a group of students. Following suggestions regarding the ideal length of listening segments (i.e., 30 -120 seconds) for intermediate ESL learners (e.g., Rubin, Quinn & Enos, 1988; Thompson & Rubin, 1993), the video was divided into ten segments of approximately 30 to 90 seconds. This segmentation also enabled participants to check and monitor their comprehension of the lecture as they proceeded through the unit. The video segments could be played only once to make the delivery of input similar to delivery in a lecture hall where students usually don't hear the same lecture twice. Additionally, this kept the initial exposure to the lecture the same for all participants. This way, the viewing of the lecture *for the first time* was made as authentic as possible. Furthermore, each video segment was accompanied by a multiple choice comprehension question. In all, the activity consisted of ten questions and four cumulative multiple-choice, post-listening questions that appeared after the last video segment.

Apart from the video, the other core components of the unit were two help options—the subtitles and the transcript. These options were given to students only after they had viewed the video segment and answered the comprehension questions incorrectly. This meant that help was offered only in cases of comprehension breakdowns when students needed help in order to move on. Each of the help options included the video segment and, for *the second viewing*, the participants could choose either to a) open the page with the subtitled video (Figure 1) or b) open the page with the lecture transcript and the video (Figure 2).

Figure 1. Screen shot of a page containing the video, subtitles, and dictionary

Figure 2. Screen shot of a page containing the video, transcript, and dictionary

The participants progressed through the Astronomy unit as outlined in Figure 3. First, they went through a tutorial that explained how to go through the activity and offered a sample video segment they could interact with. This was done to give learners basic training in the application (Hubbard, 2004) and to minimize the exploratory behavior sometimes found in the initial steps of using the program (Desmarais, Duquette, Renie & Laurier, 1998). Then, the participants viewed video segment 1 for the first time and proceeded to comprehension question 1. If the answer was correct, they moved on to segment 2. However, if the answer was incorrect, they were offered to view segment 1 again either with the subtitles or the lecture transcript. The subtitles which appeared at the bottom of each video segment were synchronized with the video and the participants used the play and pause buttons to control the video and the subtitles. They could also rewind and fast-forward the video using the video controller. The transcript for each segment appeared next to the video, which was controlled in the same manner. When on the transcript page, the learners could choose whether to play the video or not, but the transcript was displayed even if the video was not played.
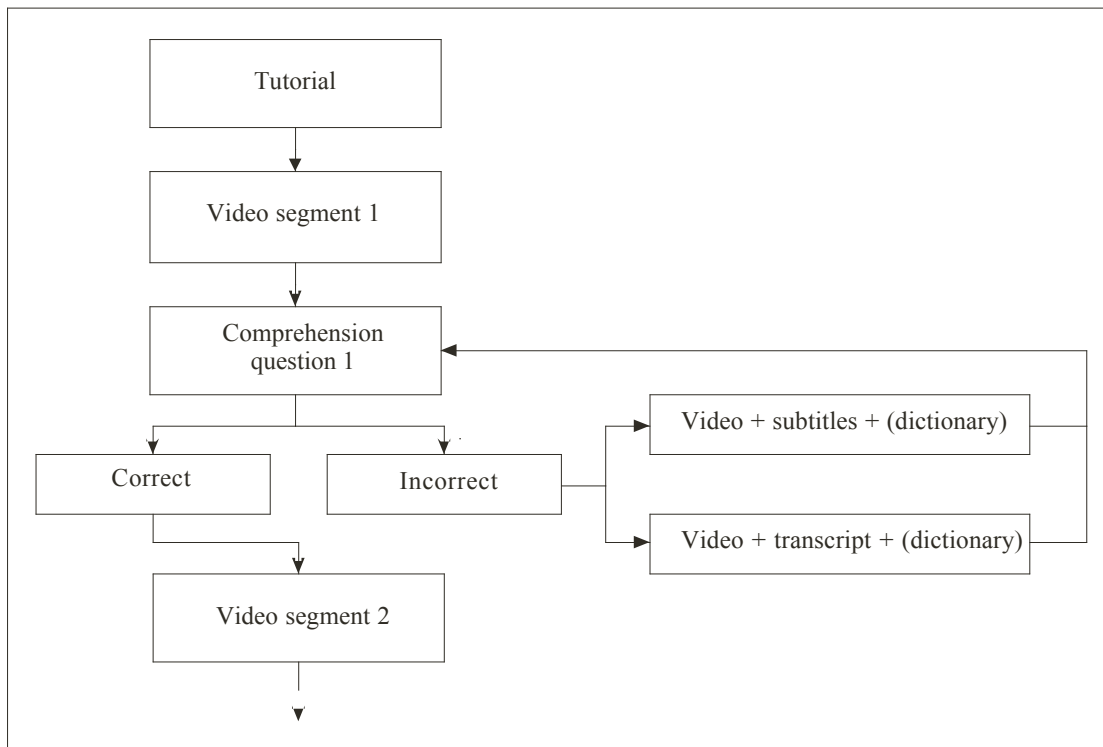

Figure 3. Progression through the Astronomy unit (Tutorial through Video segment 2)

The participants could interact with the help option for as long as they wanted to. Then, when they were ready, a slightly modified version of comprehension question 1 was presented, i.e., the answer choices were presented in a different order. If the correct answer was chosen, they went on to segment 2; if not, they were given the same help options until they got the correct answer. The activity ended once they had correctly answered all ten questions and received the score for the four post-listening questions.

As a part of each help option, the participants had access to an online English-English dictionary, which they could keep open or hidden. Originally, this research also aimed at investigating the use of the dictionary, which has been previously researched as a help option (Hegelheimer & Tower, 2004; Hsu, 1994; Liou, 1997; Pujolà, 2002). However, because the participants in this study did not access it at all, the use of the dictionary is not examined here.

When designing the Astronomy unit, special care was given to the following issues: primary users, user navigation, and control options. The primary users were the intact class of Academic listening students who interacted with the unit for only one class period. The navigation and control issues were implemented to narrow the realm of investigation and to control for variables. Since previous research has shown that students vary in their use of help (Pujolà, 2002; Hegelheimer and Tower, 2004), help use in the Astronomy unit was encouraged through linear navigation and an inability to skip help. To ensure this navigation, the right mouse click was disabled, the toolbar with the back button removed, and each new page opened in the same window. Furthermore, after each multiple-choice question, students received immediate feedback, which made them notice the input on help option pages better because of added redundancy and mode change. As for control options, the users did not have any control over the first viewing of the video but could choose the help option and could control the video as a part of help options during a second viewing.

Procedures

This study was conducted as a part of the academic listening course syllabus and took place over 3 weeks. The class met twice a week for fifty minutes in the classroom or the computer lab depending on the activities, while interviews were scheduled outside of class time. Since the computer lab had only ten computers equipped with the data collection software, the participants were divided into two groups using the alphabetical class list. After all participants had completed the pre-listening questionnaire, the first group did the initial listening comprehension test while the second worked on the Astronomy unit. The next class period the groups switched places. Before participants started the Astronomy unit, they were given verbal instructions on how to use the unit and were directed to explore the tutorial with written instructions and a sample video segment. The screen recording program Camtasia Recorder (2004) was used to capture participants' moves through the activity. In addition, the whole group was observed by one of the authors. The screen recordings were the core data collection instrument, while the observation helped select participants for interviews and helped explain sometimes atypical behavior noted in the recordings (for example, when students experienced technical difficulties). Since the participants were using headphones to listen to the lecture in order not to disturb one another, the screen recordings did not contain audio but only video of participants' interaction with the Astronomy unit. Once the participants completed the Astronomy unit, they proceeded to the post-listening questionnaire and, in the third week of study, they completed the recall test. After reviewing the questionnaires, tests, and several screen recordings, six participants were invited to retrospective interviews because they switched between two help options or did not use help at all. Only three of the participants agreed to meet for an interview, during which they were shown parts of their screen recordings and questionnaire answers to elicit details about their choice of help options. When all the data were collected, the screen recordings of all participants were transcribed.

Analysis

To answer the four research questions in this study, the data were analyzed using quantitative and qualitative data analysis approaches.

To address research question 1 about the frequency and time of participants' interaction with help options, the number of times each participant opened each help page and number of seconds spent on the page were examined. While all the learners who did not correctly answer a question had to go to the page with the help options, the screen recordings revealed that some learners did not use (or interact with) the help options. Rather, they simply clicked on the link to the help page and as soon as the page loaded they proceeded to the question page where they chose another option, i.e., they were fishing for the correct answer using the trial and error method. For learners who engaged in such behavior, no *useful interaction* was possible. Based on the loading times of the video clips embedded in the help pages and the rapid progression of participants, the researchers determined that to usefully interact with the help option,

approximately seven seconds needed to elapse. The same criterion was applied to the frequency of interaction so that only the help openings that involved *useful interaction* with help (called *instances*) were examined. Once this criterion was set, the following variables were examined: help page openings, instances of interaction, and time spent on the help page. Then, descriptive statistics were obtained for these variables and paired t-tests were performed to compare the two help options. The list of all the variables in the study is given in Table 1.

Table 1. Variables Examined in the Study

	Variable name	Explanation
1	Help page openings	Total number of times help pages were opened
2	Instances of interaction	Number of times help pages were opened and participants usefully interacted with them
3	Subtitles instances of interaction	Number of times subtitle help pages were opened and participants usefully interacted with them
4	Transcript instances of interaction	Number of times transcript help pages were opened and participants usefully interacted with them
5	Time on help page	Total time on help pages in useful interaction
6	Time on subtitles page	Time on subtitle help pages in useful interaction
7	Time on transcript page	Time on transcript help pages in useful interaction
8	Incorrect answers	Total number of incorrect answers on 10 multiple choice questions following video segments
9	Post-listening questions	Total number of correct answers on 4 post-listening questions
10	Recall test questions	Total number of correct answers on the recall test (max 10)

To address research question 2, help page openings, instances of interaction, and time spent on the help page were examined to group participants according to common navigational behavior. The data showed that there are four distinct patterns of interaction: a) subtitles pattern b) transcript pattern c) non-interaction pattern and d) mixed pattern. The participants following these patterns used only subtitles or only transcripts during the activity, did not use any help options (non-interaction), or used both help options (mixed interaction pattern). Based on the patterns, the participants were assigned into four groups and means for six variables (incorrect answers, time on help page, help page openings, instances of interaction, post-listening questions, and recall test questions) were calculated for each group. After that, the means were compared using a single-factor ANOVA to see whether there were significant statistical differences among groups, followed by a post hoc analysis (Tukey's Honestly Significant Difference, HSD) to determine exactly which group(s) were different.

To address research question 3 on the possible differences between groups at two proficiency levels, the higher and the lower group were compared across ten variables (see Table 1) using a two-tailed t-test ($p \leq$ 0.05).

To address research question 4, examining participants' attitudes towards help options before and after the Astronomy unit, pre- and post-listening questionnaire answers were compared to see how many students changed their preferences. Also, the reasons for the change of preferences were examined by using questionnaire and interview responses.

RESULTS AND DISCUSSION

Research Question 1: Frequency and Time of Help Option Use

Frequency

Overall, the participants exhibited great variation in help openings, a finding already reported in the literature (Hegelheimer & Towers, 2004; Pujolà, 2002). The subtitles pages were accessed more frequently than the transcript pages. In the course of the activity, the subtitles pages were opened on average 6.88 times (SD = 4.95) and the transcript pages 2.17 times (SD = 3.68). Thus, subtitles page openings accounted for 76% of all help page openings—three times more than transcript page openings (24%). Table 2 shows the descriptive statistics for frequency of help option use.

Table 2. Help Page Openings and Instances of Useful Interaction by Help Option

	Help page openings			**Instances of interaction (Useful interaction)**		
	Frequency	Mean, (SD)	Total in %	Frequency	Mean, (SD)	Total in %
Subtitles	124	6.88 (4.95)	76	48	2.66 (3.20)	65
Transcript	39	2.17 (3.68)	24	26	1.44 (2.15)	35
Total	163	9.06 (5.47)	100	74	4.11 (3.34)	100

When looking at the breakdown of instances of interaction by the two help options in Table 2, the results show that 65% of all interactions were those with the subtitles which is almost twice as many as with the transcript (35%). It could be that it was easier for the participants to play the video with subtitles than read the transcript and play the video at the same time because they could read smaller amounts of text or because they were accustomed to subtitles. Indeed, five participants who exclusively used the subtitles reported in questionnaires that they always (4) or sometimes (1) watched subtitled movies on DVD.

The comparison of help page openings and instances of interaction with help options revealed that only 45% of help page openings resulted in help use (Table 3). The remaining 55% of the openings were classified as non-interaction because the participants opened help (since that was the only way to proceed with the activity), but they did not use it.

Table 3. Comparison of Help Page Openings and Instances of Interaction with Help Options

	Total	**Total in %**
Help page openings	163	100
Instances of interaction (Useful interaction)	74	45
Non-interaction	89	55

The data also revealed an interesting finding about dictionary use. Not a single participant opened the dictionary link or interacted with the dictionary, which was available in both help options. Low dictionary use was noted in other studies as well (e.g., Hegelheimer & Tower, 2004; Kon, 2002).

Frequency of help option use is an important issue for research into design and implementation of help options in CALL listening materials since help may not be always used even when readily available. This may be due to a number of factors such as interface design and time on task. Thus, it is possible to add to claims that there may be more help than needed in multimedia materials (Liou, 1997).

Time

The results of the amount of time on the help options showed that the participants spent twice as much time on the subtitles pages (44 min 43 sec) than on the transcript pages (21 min 17 sec), which suggests that participants made more use of the subtitles judging both by amount of time and frequency of

interaction. Also, the participants varied greatly in their help time from no help openings, and thus no time spent on help, to more than 10 minutes on help which was almost one third of the amount of time spent on task for that participant. To further examine time spent on help, its distribution in one minute intervals is given in Figures 4 and 5.
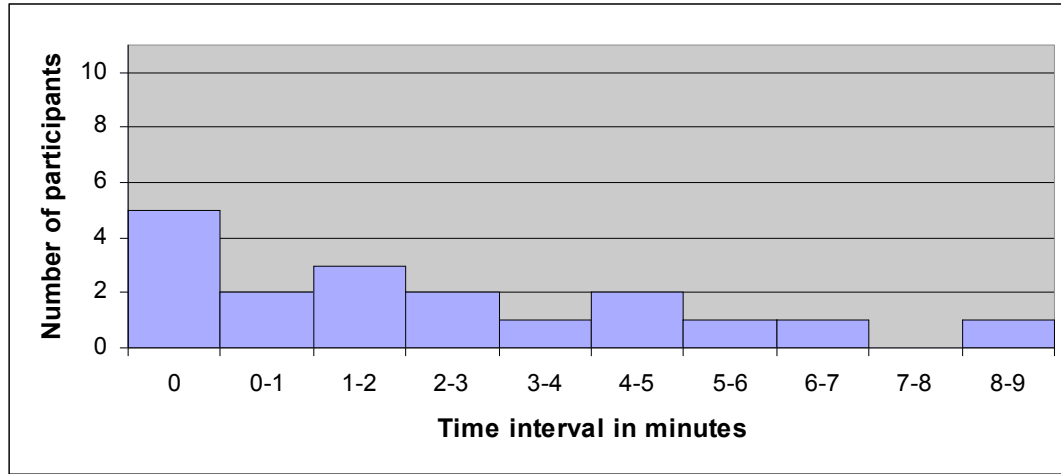

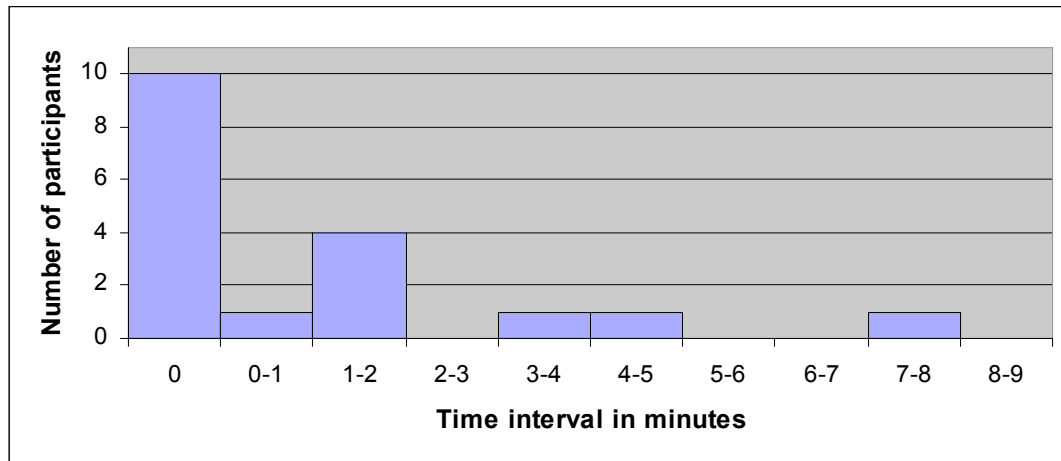Figure 4. Time spent on the subtitles in one minute intervals (N=18)

Figure 5. Time spent on the transcript in one minute intervals (N=18)

Figure 4 reveals that five participants did not use subtitles at all, two used it less than one minute, and the remaining eleven used it between 1 and 9 minutes overall. Figure 5 shows that ten students did not interact with the transcript, one used it less than a minute, and seven used it between 1 and 8 minutes. More explanation of the behavior of participants who did not use subtitles/transcript at all can be found in the results to research question 2.

As can be seen from both Figure 4 and Figure 5, the highest number of participants spent less than one minute both on the subtitles pages (n=7) and the transcript pages (n=11). Four participants spent between 1 and 2 minutes on the transcript (Fig. 5) and three participants spent between 1 and 2 minutes on the subtitles (Fig. 4), suggesting that this time interval is to be the most frequent for all participants, i.e., most participants got the information they needed in that time interval.

Both figures show that the number of participants accessing help decreased as the amount of time spent on help increased. In the case of subtitles, this decrease is steady and could be explained by the fact that

participants usually tended to watch the whole video segment without fast-forwarding it. Also, the average video segment in the activity was 1 minute and 5 seconds long. In case of the transcript, the decline in frequency is not so gradual, probably because *not* a lot of participants used the video when reading the transcript (only three students for a total of 4 times). Moreover, as some participants reported, it was quicker to read the transcript than view the video in real time. When shown his recording, participant 10 commented: "When I use the transcript it make[s] me speed up." Similarly, when talking about the transcript, participant 17 remarked: "I can get information very quickly." In sum, the differences in use of the two help options may be related to the nature of reading (quicker) and viewing (slower) in this type of activity.

To compare the use of the two help options on three variables (help page openings, instances of interaction, and time on help pages), a paired two-tailed t-test (df =17, t =1.6083) was run. The results (Table 4) show that the difference between the subtitles and transcript page openings may not be due to a chance ($p < 0.0089$), while no statistical significance was found for instances of interaction and time spent on help pages. When interpreting the results, it is important to note that the set up of the study and the use of an intact class of 18 participants does not allow for easy generalization of results to other contexts. Follow-up studies with a greater n-size would be necessary for that.

Table 4. Results of t-tests for the Use of Subtitles and Transcript

	Subtitles N=18		Transcript N=18		*p*
	Mean	SD	Mean	SD	
Help page openings	6.88	4.95	2.17	3.68	0.00894*
Instances of interaction	2.66	3.20	1.44	2.15	0.24493
Time on help pages	02:29		01:11		0.14990

Note: Time is displayed in minutes and seconds.

* $p \leq 0.05$

Research Question 2: Patterns of Interaction with Help Options

Based on the analysis of the number of help page openings, instances of interaction, and time spent on help pages, four patterns of navigational behavior emerged: a) subtitles pattern, b) transcript pattern, c) non-interaction pattern, and d) mixed pattern.

The participants in the subtitles group (n=7) used only the subtitles as help during the activity and did not use the transcript at all. The transcript group participants (n=3) used only the transcript and did not access the subtitles. Also for both groups, the number of incorrectly answered questions is similar to the number of subtitle instances of interaction (subtitles group) or transcript instances of interaction (transcript group). This means that the students used help when they selected an incorrect answer unlike the students in the non-interaction group who did not use help at all although the activity was designed to encourage help use. Retrospective interviews and questionnaires identified several possible reasons for using only one help option: level of ease in using the help option, personal preferences, and previous experience with the help option. Participants' comments are presented in Table 5.

The non-interaction group participants (n=4) exhibited very specific behavior in the activity since they had 10 or more openings of help pages per participant but mostly only one instance of interaction. This suggests that the participants did not use help even though they opened help pages. Moreover, it is interesting to note that all of the participants in this group belonged to the lower proficiency group. This finding supports the claim by Desmarais, Laurier, and Renie (1998) that navigational patterns may be connected with participants' proficiency levels.

Table 5. Participants' Reasons for Using Only One Help Option

Category	Participant's comment	Participant
Level of ease	*"Because it's the easiest way to follow all the words the speaker says"*	9
	"I chose subtitles since it was easy for me to find what information I missed to answer a question..."	11
Personal preference	*"I don't like transcript because I lost my concentration for listening from reading too much"*	12
	"In spite of learning English from the middle school, it's hard to speak and listen English for most [Korean] students. But most students can read and write. Anyway what I want to tell you is that this is the problem for English education in my country. So for me to read sentence is to easy for understanding some story"	6
Previous experience with help	*"I watch TV with subtitles"*	20
	"I'm accustomed to reading subtitles while listening"	11

The mixed interaction group (n=4) consisted of participants who used both the subtitles and the transcript at least once in the activity. These participants switched between two help options either within the same question or in the course of the activity. When compared to other groups, the mixed interaction group had the highest number of instances of interaction in addition to the longest total time spent on help on average per participant, which points to the interpretation that this group made extensive use of help. It appears that experimenting with help is one of the reasons for switching between two help options. For example, participant 18 remarked that she wanted to have a choice to see which help option worked better for her. Similarly, participant 10 commented, "I just want to compare them [the subtitles and the transcript]."

In order to get a more detailed analysis of the four different groups, a single-factor ANOVA with the *p* value set at the .05 level was used to compare mean scores of groups across six variables. Statistical significance between groups (Table 6) was found for three variables: incorrect answers, help page openings, and instances of interaction. Also, for time on help page variable, the *p* value is approaching statistical significance. However, since the division into groups was made after the experiment was conducted and since the groups were small, the results can only serve as indicators of statistically significant relationships that warrant further research.

Table 6. ANOVA Results for Group Differences on Interaction with Help

	Subtitles group N=7	Transcript group N=3	Non-interaction group N=4	Mixed interaction group N=4	*p*
	Mean	Mean	Mean	Mean	
Incorrect answers	4.14	4	7	5.5	0.0318*
Time on help page	03:52	03:53	00:54	05:55	0.0540
Help page openings	5.71	6.33	13	13	0.0379*
Instances of interaction	4	4.33	0.75	7.5	0.0234*
Post-listening questions	2.43	2.33	1.75	2	0.0740
Recall test questions	6.14	3.67	0	3.75	0.1630

Note: Time is displayed in minutes and seconds.

*$p \leq 0.05$

As shown in Table 6, the subtitles and the transcript groups have very similar performance on average in terms of incorrect answers, time spent on help, instances of useful interaction with help, and scores on the post-listening questions. The subtitles group seems to have, by far, the best recall test score. The weakest group overall is the non-interaction group whose participants have the highest number of incorrect answers, shortest time on help pages in useful interaction, smallest instances of useful interaction, and weakest score on the delayed recall test. As an example, not a single student in the non-interaction group could recall any ideas from the lecture.

In order to determine which specific group(s) may differ from others on the variables under investigation, a post hoc comparisons procedure—Tukey's Honestly Significant Difference (Tukey HSD) was used. Tables 7 and 8 show the pairs of groups whose differences between means were statistically significant at the .05 level when two-tailed t-tests for all pairs of groups were run. It is interesting to note that although four groups differed significantly on the help page opening variable (p=0.0379*) when the ANOVA was performed, Tukey's comparison method did not detect any significance probably because the p value was adjusted. Similarly, although the p value for the time on help page variable was not significant (p=0.540), Tukey's HSD method revealed statistical significance between the non-interaction and the mixed interaction groups (Table 8).

Table 7. T-test Results for the Differences Between the Non-interaction and the Subtitles Groups

	Non-interaction group		Subtitles group		*p*
	Mean	SD	Mean	SD	
Incorrect answers	7	1.6	4.14	0.9	0.03336*

* $p \leq 0.05$

Table 8. T-test Results for the Differences Between the Non-interaction and the Mixed Interaction Groups

	Non-interaction group		Mixed interaction group		*p*
	Mean	SD	Mean	SD	
Time on help page	00:54	00:59	05:15	3:22	0.0355*
Instances of interaction	0.75	0.5	7.5	5.1	0.0136*

Note: Time is displayed in minutes and seconds.

* $p \leq 0.05$

Tables 7 and 8 show that the non-interaction group significantly differed from the mixed interaction and subtitles groups on three variables. In addition to the weakest performance, this result makes the non-interaction group the most different from the other groups and thus of interest for CALL software designers and applied linguists who should try to create materials that would encourage useful interaction for this type of learner who chose not to use input modifications and thus did not benefit from the enhanced input.

Research Question 3: Performance of Participants at Different Proficiency Levels

The data about the performance of two proficiency groups showed that groups varied in their use of help options. The average performance of higher (n=10) and lower (n=8) groups is given in Table 9. When

examining total time spent on the help page, it can be seen that the higher group spent almost twice as much time on average interacting with help options. This finding is in contrast with Liou's (1997), whose results showed that the ineffective group requested twice as much help as the effective group. In this study, a possible explanation for the overall low time on help for the lower group could be due to the fact that two of the participants did not use help at all and that four of the eight participants in this group belonged to the non-interaction group as well.

When looking at time and frequency of useful interaction with each help option, data show that the higher group made more use of the subtitles, though the average difference between the means of two groups was not statistically significant. Interestingly, time and frequency of interaction with the transcript did not vary much between groups. The lower group, on average, opened help pages more times than the higher group, but the higher group had more useful instances of interaction—another proof that the higher group used help options more effectively. This result is similar to the finding of Hegelheimer and Tower (2004), who suggest that lower proficiency students may not only lack the competence to take advantage of help options, but also may not know which help options may be more beneficial to them.

Table 9. Performance of the Higher and Lower Proficiency Groups on the Activity

	Incorrect answers		Time on subtitles pages		Time on transcript pages		Total time on help pages		Help page openings		Subtitles help page openings		Transcript help page openings	
	H	L	H	L	H	L	H	L	H	L	H	L	H	L
Total	42	49	32:20	12:23	12:27	08:50	44:47	21:13	70	93	55	69	15	24
Mean	4.20	6.12	03:14	01:33	01:15	01:06	04:29	02:39	7.00	11.63	5.50	8.63	1.50	3.00
SD	1.48	1.64	2:50	01:53	1:33	2:30	2:41	2:31	4.57	5.68	4.67	5.01	2.07	5.10

Table 9. Performance of the Higher and Lower Proficiency Groups on the Activity (cont.)

	Instances of interaction		Subtitle instances		Transcript instances		Post-listening questions		Recall test questions	
	H	L	H	L	H	L	H	L	H	L
Total	51	23	37	11	14	12	26	13	62	7
Mean	5.10	2.88	3.70	1.37	1.40	1.5	2.60	1.62	6.20	1.17
SD	3.73	2.47	3.80	1.69	1.84	2.62	0.84	0.92	2.82	2.04

Note: Time is displayed in minutes and seconds

H-higher group

L-lower group

A two-tailed t-test revealed statistical significance between the higher and lower groups on three variables (incorrect answers, post-listening questions, and recall test questions). As could be expected, the means in Table 10 show that the higher group had better comprehension and recall. Obviously, the weaker students did not comprehend the content of the lecture well and did not answer many comprehension questions correctly. Immediately after the lecture, their comprehension is even lower, while a week after the activity, on the recall test, many of them could not remember any ideas from the activity. The reason for this may be that the lecture was too difficult for the students or that the help options were not employed

effectively to compensate for comprehension breakdowns, which consequently resulted in low learning outcomes. Finally, as already noted, some of the weaker students did not interact with the material at all, since half of the group exhibited the non-interaction pattern of help use. This result supports Pujolà (2002), who also found that some of the lower group participants never used help. As in all CALL research, the result can be interpreted in the light of motivation and student attitudes but the effects of those variables were minimized by the way the task was set up and integrated into the course.

Table 10. Comprehension and Recall Data for the Higher and Lower Proficiency Groups

	Higher proficiency group N=10		Lower proficiency group N=8		*p*
	Mean	SD	Mean	SD	
Incorrect answers	4.2	1.48	6.12	1.64	0.018682*
Post listening questions	2.6	0.84	1.62	0.92	0.032143*
Recall test questions	6.2	2.82	1.17	2.04	0.001977*

* $p \leq 0.05$

Research Question 4: Attitudes towards Help Options

To look at attitudes towards help options, participants' answers from pre- and post-listening questionnaires were compared. The subtitles were preferred over the transcript—thirteen students chose the subtitles and five chose the transcript both before and after the activity. Although the ratio between the preference for subtitles and the transcript did not change (13:5), only one student kept to the transcript and nine students to the subtitles (Table 11). This means that 8 students changed their preferences after they encountered help; 4 changed from transcript to subtitles and 4 from subtitles to transcript.

Table 11. Participants' preferences of help options as reported in questionnaires

Preferred help option		Number of students
Before the activity	After the activity	
Transcript	Transcript	1
Transcript	Subtitles	4
Subtitles	Subtitles	9
Subtitles	Transcript	4

A possible explanation for this shift in preferences could be that the participants realized which help option worked better for them. A comment from participant 5 supports this: "I think I switch my answer because I realized that it was easy for me to follow the lecture and understanding the speaking using subtitles (like a close caption on TV)." Also, it can be speculated that the participants chose the type of help they were most exposed to in everyday life. This was supported by answers to the question about familiarity with transcripts and subtitles—out of 18 participants, 10 were familiar with subtitles, 1 with both subtitles and transcripts, and 7 with none.

CONCLUSION AND LIMITATIONS

The results of this study about the use of subtitles and transcripts as help options in cases of listening comprehension breakdowns showed that the participants used the subtitles more frequently and for longer periods of time than the transcript. The subtitles were also the preferred help option before and after the activity, and it appears that the participants picked the help option they were predisposed to in daily life.

The higher proficiency group also used subtitles more frequently and for longer amounts of time than the lower proficiency group although both groups exhibited very similar behavior on the transcript.

Overall, the results show that the participants spent less time interacting with help options than was anticipated when the study was set up, since the help pages were used only 45% of the time they were opened. The failure of participants to make use of help options could be because of the task characteristics, such as the degree of control and time pressure. It appears that some of the participants did not like the fact that they could not skip help after answering a comprehension question incorrectly. Moreover, time on task was limited to one class period of fifty minutes, which may have forced some of the participants to finish quicker and did not allow them to use help to the extent they wanted, a factor that could be controlled in future studies. Additionally, it could be speculated that external factors such as motivation and attitudes towards the task could have influenced students' behavior as well.

In the course of the activity, the participants exhibited great variation in the time spent on help, and a large variation was also noted in frequency of help page openings and instances of useful interaction with help. These findings support Hegelheimer and Tower (2004), and Pujolà (2002), who also found variations in the use of help.

This research also identified four patterns of participants' interaction with help options (subtitles, transcript, non-interaction, and mixed interaction pattern) and described behavior of participants following those patterns. The analysis showed major differences between subtitles and transcript groups on one side and the non-interaction group on the other in terms of performance, help page openings, and instances of useful interaction with help. While the subtitles and the transcript groups performed similarly on comprehension questions during and after the activity as well as on time and frequency of help use, the non-interaction group varied the most in behavior and performance from all other groups, probably due to task difficulty and lack of motivation.

The results of this study need to be interpreted with the following limitations in mind. First, the number of participants was relatively small and homogeneous in terms of proficiency levels. Second, the time constraint of one class period limited the time spent on task, while technical limitations (no audio with screen recordings, time-consuming transcriptions) slowed down the data analysis process. However, some of these issues are difficult to circumvent when conducting research in an authentic classroom where many of the variables cannot be controlled.

Implications

The fact that students preferred subtitles and used subtitles more than the transcript calls for making subtitles the help option in multimedia listening materials of this kind. However, if CALL designers are not limited to only one help option, offering transcripts in addition to subtitles is likely the best solution because it provides learners with a choice. Also, rather than superimposing a prescribed route through the material as was done here, we would now argue for giving users more control over the choice of help by introducing the option to skip help altogether to accommodate different learning styles and preferences.

Based on the results of this study, it seems that the real issue of investigating help options lies in help use vs. no help use. The non-interaction group participants who opened help pages but did not use help showed the weakest performance during and after the activity. All of the participants in this group were also in the lower proficiency group, which could partly explain their weak performance. From the point of view of SLA acquisition theory, low comprehension could have resulted from no/minimal use of input modifications available in the form of subtitles and transcripts. All of the other groups that made use of input modifications demonstrated better learning gains overall.

If help use is found beneficial, then the question for CALL designers, teachers using CALL materials, and learners interacting with help options is how to encourage the use of help. CALL designers could implement software demos and tutorials that would promote the use of help. Teachers could prompt the

use of help for both in-class (use of lecture transcripts, subtitled digital video) and out-of-class listening (captioned TV program, subtitled movies on DVD). They could also create CALL tasks that would require the use of help, as well as observe students using help to encourage an effective use of learning strategies. Finally, learners could be trained by teachers to use help options to their advantage (Hubbard, 2004).

Suggestions for Future Research

There are several possible paths to follow regarding future research on help options in multimedia listening materials. First, if a replication of the present study is to be done, it could include a different setting. The research could compare the use of the software in class, outside of class for homework, and for independent study to see whether user interaction with help options would be different. Second, future studies could be longitudinal and investigate help option use over a longer period of time for the same group of participants. Also, future research could look at a different and larger sample of participants. The use of the program by beginner and advanced students could add to the understanding of user behavior as influenced by the proficiency level. Other important variables, such as student computer familiarity and attitudes towards computers for language learning, could be taken into account when designing future studies. Finally, the issues of motivation and student engagement should be assessed as a part of CALL research because they affect student performance and consequently implications drawn from the data.

No matter which of these paths future research takes, the goal should remain to help CALL researchers and practitioners, CALL software designers, and CALL users get a better understanding of interaction and help use in multimedia listening materials.

APPENDIX. Summary of studies dealing with help options in multimedia listening materials

Author year	Title	Participants	Materials	Help options used	Frequency of help option use	Patterns described	Usefulness (self-reported)
Hsu, 1994	Computer assisted language learning (CALL): the effect of ESL students' use of interactional modifications on listening comprehension.	15 beginner ESL students divided into higher and lower group	Interactive Active English CD-ROM program	Three input modifications displayed from the beginning aural repetition text reinforcement dictionary	1. text reinforcement 2. aural repetition 3. dictionary	Lower group: aural repetition-text reinforcement-(dictionary) Higher group: text reinforcement-(dictionary)	Most beneficial modifications are: text reinforcement audio repetition dictionary
Liou, 1997 Liou, 2000	Research on on-line help as learner strategies for multimedia CALL evaluation. Assessing learner strategies using computers: new insights and limitations.	20 EFL college students divided into effective and ineffective group	Self-paced interactive video unit (IVD)	Eight help functions displayed on request Chinese script English script gist background information idiom search (dictionary) word search (dictionary) repetition (current sentence) repetition (previous sentence) video control (pause and rewind)	video controller rewind English script Chinese script Ineffective group: rewind English script Chinese script Effective group: 1. English script 2. rewind 3. Chinese script		pause 85%[a] backward 85% English script 80% glossary 80% repetition of previous sentence 80% repetition 70% Chinese script 55%

Note. Out of 100%

APPENDIX Continued

Author year	Title	Participants	Materials	Help options used	Frequency of help option use	Patterns described	Usefulness (self-reported)
Pujola, 2002	CALLing for help: researching language learning strategies using help facilities in a web-based multimedia program.	22 Spanish adult EFL students divided into four groups of decoders: Higher Average Lower Poorer	Web-based multimedia program (imPRESSions)	Seven help facilities 1. dictionary 2. cultural notes 3. transcript 4. subtitles 5. video controls 6. feedback 7. exerts module			
Hegelheimer & Tower, 2004	Using CALL in the classroom: Analyzing student interactions in an authentic classroom.	91 beginner EFL students	CD program New Dynamic English	Three options available on request ABC button (repetition of aural input accompanied by displayed text) repeat button (aural repetition) glossary	Repeat ABC Glossary High performance group Repeat ABC Low performance group ABC Repeat		

NOTES

1. In this study, subtitles are English captions of the English video soundtrack.

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REFERENCES

Borras, I., & Lafayette, R. (1994). Effects of multimedia courseware subtitling on the speaking performance of college students of French. *The Modern Language Journal*, 78 (1), 61-75.

Brett, P. (1996). Using multimedia: An investigation of learners' attitudes. *Computer Assisted Language Learning*, 9 (2-3), 191-212.

Brett, P. (1997). A comparative study of the effects of the use of multimedia on listening comprehension. *System*, 25 (1), 39-53.

Camtasia Recorder (Version 2.0.5) [Computer software], 2004. Okemos, MI: TechSmith Corporation.

Chapelle, C. A. (1998). Multimedia CALL: lessons to be learned from research on instructed SLA. *Language Learning and Technology*, 2 (1), 22-34.

Chapelle, C. A. (2003). *English language learning and technology: Lectures on applied linguistics in the age of information and communication technology*. Amsterdam: John Benjamins.

Chun, D. M., & Plass, J. L. (1997). Research on text comprehension in multimedia environments. *Language Learning & Technology*, 1 (1), 1-35.

Desmarais, L., Duquette, L., Renie, D., & Laurier, M. (1998). Evaluating learning interactions in a multimedia environment. *Computers and the Humanities*, 22, 1-23.

Desmarais, L., Laurier, M., & Renie, D. (1998). The analysis of navigation patterns in CALL. *Computer Assisted Language Learning*, 11 (3), 309-315.

Garza, T. (1991). Evaluating the use of captioned video materials in advanced foreign language learning. *Foreign Language Annals,* 24 (3), 239-258.

Grgurović, M. (2005). Research into the use of help options in a multimedia listening unit. Unpublished MA thesis, Department of English, Iowa State University, Ames, IA.

Guillory, H.G. (1999). The effect of keyword captions to authentic French video on learner comprehension. *CALICO Journal*, 15(1-3), 89-108.

Hegelheimer, V., & Tower, D. (2004). Using CALL in the classroom: Analyzing student interactions in an authentic classroom. *System*, 32, 185-205.

Hsu, J. (1994). Computer assisted language learning (CALL): The effect of ESL students' use of interactional modifications on listening comprehension. Unpublished doctoral dissertation, Department of Curriculum and Instruction, College of Education, Iowa State University, Ames, IA.

Hubbard, P. (2004). Learner training for effective use of CALL. In S. Fotos, & C. M. Browne, (Eds.), *New Perspectives on CALL for Second Language Classrooms,* (pp. 45-67). Mahawah, New Jersey: Lawrence Erlbaum Associates.

Kon, C. K. (2002). The influence on outcomes of ESL students' performance strategies on a CALL listening comprehension activity. Unpublished MA thesis, Department of English, Iowa State University, Ames, IA.

Liou, H.C. (1997). Research on on-line help as learner strategies for multimedia CALL evaluation. *CALICO Journal,* 14 (2-4), 81-96.

Liou, H.C. (2000). Assessing learner strategies using computers: new insights and limitations. *Computer Assisted Language Learning*, 13 (1), 65-78.

Long, M. H. (1996). The role of linguistic environment in second language acquisition. In W. C. Ritchie, & T. K. Bhatia, (Eds.), *Handbook of second language acquisition* (pp. 413-468). San Diego: Academic Press.

Pica, T. (1994). Research on negotiation: What does it reveal about second-language learning conditions, processes, and outcomes? *Language Learning*, 44(3), 493-527.

Plass, J.L., Chun, D. M., Mayer, R. E., & Leutner, D. (1998). Supporting visual and verbal learning preferences in a second language multimedia learning environment. *Journal of Educational Psychology,* 90 (1), 25-36.

Pujolà, J.-T. (2002). CALLing for help: Researching language learning strategies using help facilities in a web-based multimedia program. *ReCALL*, 14 (2), 235-262.

Rubin, J., Quinn, J., & Enos, J. (1988). Improving foreign language listening comprehension. *Report on Project 017AH70028*, (Sept.) Washington, DC: International Research and Studies Program, U.S. Department of Education.

Thompson, I., & Rubin, J. (1993). Improving listening comprehension in Russian. *Report on Project 017A00032.* International Research and Studies Program, U.S. Department of Education.

Vanderplank, R. (1988). The value of teletext sub-titles in language learning. *ELT Journal, 4*2 (4), 272-281.

Vanderplank, R. (1990). Paying attention to the words: practical and theoretical problems in watching television programmes with uni-lingual (CEEFAX) sub-titles. *System,* 18 (2), 221-234.