

Using Controllable Partial Subtitles and Interactive Features in Educational Videos

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Abstract—When using videos for foreign language learning, it has been suggested that learners should use not only their vocabulary capability but also their listening skills to comprehend the videos. Other than that, interactive features added to video learning activities are confirmed to improve the efficiency for foreign language learning and teaching. Subtitles, in the long term, however, are suspected to become an obstacle to learning foreign languages because they lead learners to pay much more attention to the text. The purpose of this preliminary study is to understand the efficacy of controllable partial subtitle in videos on learning foreign languages. The partial subtitle that makes easy sentences from the original subtitles hidden, and let the learners focus on the difficult ones. An interactive player is designed to play videos with partial and full subtitles, and can be controlled to show hidden sentences of the subtitles by the learners. Experiments were conducted to examine the effectiveness of the study. As the data collected on vocabulary capability and reading comprehension shows that learners in the experimental group, who watch videos with controllable partial subtitles, can perform better or no worse than those in the control group, who watch videos with full subtitles. System logs show that learners in the experiment group have higher interaction rates than learners in the control group on retrieving appeared subtitles; they try harder to understand the speeches that are more difficult.

Index Terms—video learning, interactivity, multimedia learning, learning effectiveness.

I. INTRODUCTION

Currently, from the aspects of business, communication, culture, and media, English is considered one of the most dominant and influential languages in the world. Therefore, in many non-English-speaking countries, using English is recognized as a necessary skill. For people who learn English as a Foreign Language (EFL), there are various ways to learn English, and one of them is video learning. By watching videos in language learning activities, learners can learn foreign languages, including idioms and colloquial expressions, as well as understand different cultures and customs [1]-[4]. Furthermore, learners watching such videos can use the visual information to improve comprehension by observing, for example, the gestures, facial expressions, and other aspects of body language that accompany speech [5].

EFL students in Taiwan often have opportunities to watch

English videos in English classes or in their daily lives. Generally, English videos are subtitled in Mandarin, and the subtitles are synchronized with the original speech audio. This type of combination is anathema to developing listening comprehension [5]. For videos with either English or Mandarin subtitles, when receiving both aural and visual inputs simultaneously, people tend to choose the easier input according to cognitive load theory. Because subtitles generally appear before the sound, learners are inclined to a greater degree to receive the visual rather than the aural information.

In language writing systems, the characters of semanto-phonetic systems are graphic symbols, with every character of the system having a particular meaning, whereas most words of alphabetic systems are representations of sound. In comparing English and Mandarin subtitles, reading Mandarin characters (of the semanto-phonetic system) is faster than reading English words (of the alphabetic system)[6]. Moreover, in videos with bilingual subtitles, because the positions of English and Mandarin subtitles are relatively close, EFL students tend to read the Mandarin subtitles before reading the English subtitles. In most countries with languages that adopt the alphabetic system, the videos are not subtitled. Therefore, improving learners' listening abilities without the help of subtitles is necessary, especially for learners whose native languages use the semanto-phonetic writing system.

Because watching a video without subtitles is difficult for EFL students, finding a way to provide EFL students with appropriate subtitles is worthwhile. Recent studies have attempted to revise subtitles to help learners comprehend videos[1], [4].

Hsu and Chang designed a video learning system with subtitles hidden automatically [4]. In this system, learners have the choice of pausing the videos while watching them. When learners pause the videos, the easy words are hidden and the difficult words are shown with the translation, which helps learners understand the meaning of the passage quickly. Hsu and Chang determined that learning achievement exhibits no significant difference between learners who watch the videos with automatic difficult words assistant and those who watch the videos by looking words up in a dictionary. Yang et al. proposed a video-based computer-assisted language learning system [1] to understand how learners with different English listening abilities comprehend videos by reading different subtitles, such as noun subtitles or verb subtitles. The results showed that verb subtitles cannot provide learners with sufficient information to comprehend videos. Conversely, noun subtitles can offer learners as much help as original subtitles can.

Although these studies have found that new subtitle formats assist EFL students and promote learning efficiency,

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such formats still present problems that must be solved. For example, even with the dictionary help, learners may rely on subtitles when watching the videos with subtitles, and the verb subtitles cannot provide sufficient information to help learners comprehend the videos. Additional verbs or other terms are necessary to provide clues for learners.

To help learners learn the target language progressively and more efficiently through video learning without subtitles, this study proposes a video-based interactive learning player. In this player, partial subtitles are provided, with easy passages removed to allow learners to focus on the sounds; the difficult passages remain to help learners recognize the words and speech simultaneously. In addition, a learner control function is provided to facilitate the learning process; learners can look up relevant words and read each passage's translation while watching the videos.

II. EXPERIMENT

A. Research Question

By examining language learners in an interactive learning environment, this study investigated whether viewing videos with controllable partial subtitles results in a clearer comprehension of video content and more effective learning of vocabulary than viewing fully captioned videos.

B. Participants

A total of 20 volunteers participated in the experiment. The participants were engineering students at National Cheng Kung University, Taiwan. All participants were native Mandarin speakers and were randomly distributed into two groups: an experimental group and a control group. The experimental group was asked to watch a video with partial subtitles, and the control group was asked to watch a video with full subtitles. The Vocabulary Knowledge Scale (VKS) pretest showed that the experimental group's average VKS score is 1.88, and the control group's average VKS score is 2.12. Statistical analysis indicated no significant differences between the experimental group and the control group ($p=0.322$). The results showed that the two groups were unfamiliar with the words before watching the video.

C. Video

The video is *Twitter in Plain English*, 145 seconds in length, which is from the website, common craft show (<http://www.commoncraft.com/>).

D. Subtitles

All the subtitles are in English. The full subtitle is the original subtitle without modified. Other than the full subtitles, the partial subtitle was modified by an English teacher who decided whether sentences were difficult or not and only included the difficult passages in the partial text.

E. Interactivity Player

It is crucial to provide learners with an interactive function in a computer-assisted learning environment. To

make learners learn actively when watching, this player offers some interactive functions. Other than the basic playback features (play, pause, and replay), the functions of looking up vocabulary and the passage's translation are provided. And in order to avoid the learners to skip the videos, the fast-ward function is forbidden.

F. Learning Achievement tests

There were two learning achievement tests for the participants: the VKS test and the reading comprehension test. The idea of the VKS test is to understand how the participant knows the word before and after watching the video. The VKS test has five items in this study. For each item, the learners were asked to respond to the following scale:

1. I don't remember having seen this word before.
2. I have seen this word before, but I don't know what it means.
3. I have seen this word before, and I think it means (synonym or translation)
4. I know this word. It means ... (synonym or translation)
5. I can write the sentence.

There was a reading comprehension test after the video watching. The test included multiple-choice questions in English on the video's main points.

III. RESULT

A. Vocabulary Knowledge Scale Test Scores

The VKS test results showed that the experimental group's average VKS score was 2.62, and the control group's score was 3.16. There was no significant difference between the experimental group and the control group ($p=0.086$). The data revealed that viewing the video with English subtitles could help both groups improve their vocabulary knowledge. In addition, the results indicated that the effect on vocabulary learning was nearly the same, regardless of whether the learners watched the video with full subtitles or with partial subtitles.

B. Reading Comprehension Scores

The reading comprehension test results showed that the experimental group's average score is 77.5 and the average score of the control group is 65. There was no significant difference between the experimental group and the control group ($p=0.21$). The data suggested that both groups could achieve a similar level of performance in reading comprehension.

C. System Logs

From the temporal time perspective, the experimental group took 87.18 seconds on average to interact with the video, for

example, to look up words in the dictionary when seeing the subtitles, whereas the control group took 111.5s. The results showed that viewing the videos with partial subtitles could reduce the time that the learners interacted with the subtitles, compared to viewing the videos with full subtitles. Furthermore, the experimental group did not require additional time to interact with the video because of the hidden subtitles.

From the interaction perspective, the experimental group performed 18.8 interactions on average in the video such as reading the passage translation and looking up words in the dictionary, whereas the control group performed 13.6. The results revealed that viewing the partial subtitles could motivate the learners in the experimental group to exhibit high interactions rates. In summary, compared to the control group, learners in the experimental group could understand the meanings within short periods when interacting with the video.

IV. CONCLUSIONS

This study proposes a video-based interactive learning player with partial subtitles, expecting to help learners gradually reduce their dependency on subtitles and learn new vocabulary effectively. In the video-based learning player, learners can look up new and unfamiliar words, or read the passage's subtitle translation when watching the videos.

To examine the efficacy of viewing partial subtitles, participants were randomly distributed into two groups. The experimental group was asked to watch a video with partial subtitles, and the control group was asked to watch a video with full subtitles. The data revealed that the experimental group achieved a level of performance in English vocabulary learning and reading comprehension that was similar to that of the comparison group. In addition, the

experimental group had higher interaction rates than did the comparison group. The results showed that even when the learners watched the video with partial subtitles, they could still achieve a level of performance similar to that of the learners who watched the video with full subtitles.

In summary, reading partial subtitles is a feasible way to enhance video learning activities. Hiding easy passages can assist learners in using their listening abilities. Moreover, this type of change will not result in any substantial difference in interaction behavior among the participants.

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