



Small TLEF Project – Final Report

*To be completed for Small Projects upon completion of the project.
Please limit this report to a maximum of 2 pages.*

Project Title:

Providing personalized course video viewing experiences through student and instructor viewing analysis

Report Submission Date:

2016/04/30

Principal Investigator:

Sidney Fels

Project Initiation Date:

2015/04/01

Report Submitted By:

Sidney Fels

Project Completion Date:

2015/04/01

Summary of Work Accomplished

Describe if and how the project has significantly contributed to the enhancement of teaching and learning, as well as if and how the project outcomes constitute sustainable benefits to students.

The goal of our small TLEF was to identify how we could more effectively present video in a learning environment to engage students. We first assembled a number of video interface components we had previously designed for general video (personalized playlists, a personal history of previously viewed video, emphasized intervals based on view count, etc.), and designed a new interface to test it within an educational video context. We conducted interviews with 26 students selected randomly, with the condition that they had taken at least one course that used video content. We had them use interface elements while performing simple tasks. Our main discovery was that studying using video is challenging, and the currently available tools are not effective e.g. having to manually search through a linear timeline to find video, or writing down timecodes to go back to them later. We had the students rank our interface elements; the results were, beginning with the most liked: personal history, interval playlists, visitation heatmaps and a rewatched interval visualization.

We followed up this study with a focus group of 7 students from PHIL 102 who had used video for the course. We provided them with the same interface as before, using the PHIL 102 videos, and asked more targeted questions to identify the most effective designs and the problems with the interface. We discovered the visitation heatmap was useful, but would sometimes show regions that the student did not want to revisit (since they'd seen it so often already). The personal history was difficult to navigate, due to the high visual similarity of content (i.e. power point slides that don't change much) and the large quantity of data. The filmstrip had similar issues with navigation of similar content. Playlists were deemed extremely useful as a mechanism to construct personalized studying.

Based on this feedback, we designed a new application with a core design idea that learning from video should contain components that are conceptually similar to learning from a textbook. A transcript viewer was included to visualize the speech/audio and help students search for content when the visuals are similar. A 2D filmstrip (multiple rows of thumbnail previews) was designed to help navigate visual content. A highly detailed visitation heatmap was overlaid on the filmstrip to visualize which parts of the



video they'd previously seen. Finally, the playlists were transformed into "highlights", much like a textbook highlighting method, to allow students to construct their own playlists while also annotating the content of the video for later navigation. Further, aggregate visitation heatmaps and highlight heatmaps across all views of the video were included in the interface, allowing students to view the popularity of sections of the video.

To test our application, videos for three courses were prepared, with full transcripts and course integration. The application was instrumented with data logging to see how the students use it. It was then deployed to three courses at UBC (6 sections containing over 1200 students) where the students had the option of trying it (300 chose to do so). We then ran an end of course survey to gather qualitative feedback directly from the students. From this data, we were able to distinguish and specify five different patterns for highlighting video, and five different patterns for searching through video. We also were able to look at viewing patterns exhibited by the students, focusing on rewatching, seeking, and pausing behavior. Finally, through the survey, we found that the students had generally positive reactions towards the interface.

The project and its results led to a large TLEF, as well as exposure of the interface in the university with over 300 students having used the interface.

Evaluation of Project Outcomes

Describe the outcome-based criteria used to evaluate the project's success or performance.

Our primary outcome was that students preferred the video interface over PDF notes which leads to the promise of adoption of a new video interface tailored to student video watching needs.

Our second observation is that student use of the interface was varied indicating that there are multiple approaches to effective use of video that need to be addressed in any video interface targeting student learning. More specifically, our outcomes can be summarized by:

Engagement – When students were asked to search for content in the videos, the transcript and the filmstrip were much faster than using a generic video player (i.e. YouTube like interfaces). These two interface elements themselves prove to be better than the typical seekbar offered on YouTube for search. The highlighting itself also proved to be a useful in aiding search.

Interactive – Highlighting was given to the users to allow them to mark certain parts of the video. Students found this useful for marking things that were important and for reviewing them. Again, highlighting aided users in recalling and searching for content, making search distinctly quicker.

Connectivity – Students were given aggregate viewing statistics of other students. They stated that it would be useful in determining what parts of the video to watch and review.

Perceptions – When supplied with the video interface and the slides in PDF form, the students preferred to use the video interface. Most of the students that used the interface from the beginning continued to use it throughout the term. Indeed, some students would review slides by using the video interface rather than paging through the same slides in a PDF document.

Learning – We did not run learning tests, instead we asked students if they liked using it. (each part of



the interface was liked and found useful for studying by around half the students)