

# ViDeX: A Platform for Personalizing Educational Videos

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## ABSTRACT

As video-based learning is increasingly used in all sectors of education, there is a need for video players that support *active viewing* practices. We introduce a video player that allows students to mark up video with highlights, tags, and notes in order to personalize their video-based learning experience.

## CCS CONCEPTS

• **Information systems** → **Video search**; • **Applied computing** → **Interactive learning environments**; **Annotation**;

## KEYWORDS

active viewing, annotation, personalization, video-based learning

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## 1 INTRODUCTION

Video has become a popular medium for learning, especially as digital libraries [e.g., 4] and online learning platforms, such as edX, continue to grow their video collections. There are many advantages of video. For example, video allows students to control the pace of their learning by adjusting the playback speed and replaying the content as necessary. Video is now used in all sectors of education; however, video players usually encourage one-way interaction between students and content. How can digital libraries better support learning from video?

To support *active viewing* practices, we created ViDeX, a video player that allows students to personalize video with highlights, tags, and notes. By active viewing, we refer to the interactions between students and video that may suggest greater levels of learning than passively watching video from start to end. Providing students with a set of video annotation tools could better support students' different learning styles.

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## 2 PREVIOUS WORK

While there has been work on creating video players to support learning from video [e.g., 2, 3, 8], most do not allow students to add their own content to videos. In other media, students can easily personalize their learning materials. When reading a textbook, for example, many students highlight and take notes. The practice of annotating is considered a part of active reading and is associated with increases in learning outcomes [1]. While annotating is a popular and effective reading practice, most video players do not allow students to highlight, tag, or take notes within the video. By providing students with a set of tools for annotating video, ViDeX may be able to support more active viewing practices.

## 3 VIDEX

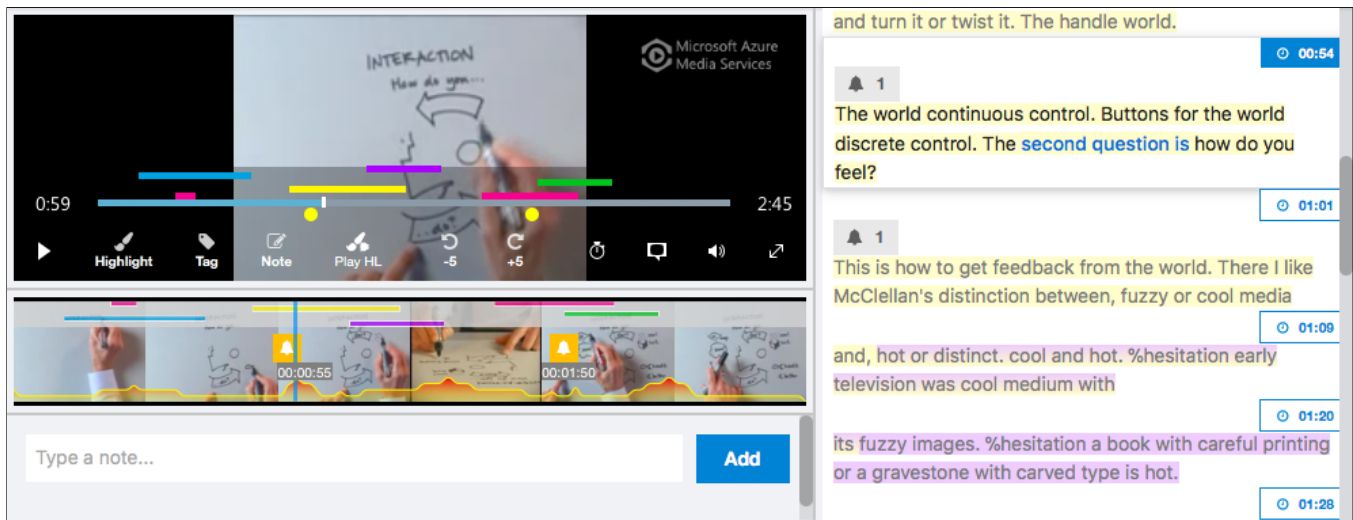
ViDeX is a video player designed for video-based learning. Students can annotate video in a way that is similar to marking up text using a digital reading environment, such as the Amazon Kindle platform. ViDeX is comprised of three elements: the Player, the Filmstrip, and the Transcript. In addition to these, ViDeX has a note taking area below the Filmstrip. Students can write a note that is timestamped to the current video time. Notes are organized by video time.

### 3.1 Player

The Player is similar to other video players in that it has a toolbar that allows students to play, navigate forwards and backwards, and adjust playback speed, closed captioning, and volume. The Player is unique in its support for creating and (re)playing video annotations. The Player toolbar also allows the student to tag, highlight, take notes, and play previously highlighted content. Clicking the “Play Highlights” button allows students to replay previously highlighted content. When this button is clicked, the playhead jumps from one highlight to the next until all highlights of a specified color have been played. The Player also displays the highlights and tags that have been created in the video to give the student a visual overview of their personalized video.

### 3.2 Filmstrip

The Filmstrip provides a visual overview of the video. The Filmstrip is made of thumbnails, where each thumbnail represents a part of the video. By moving their cursor across the Filmstrip, students can preview the frame corresponding to the part of the video the cursor is on. Students can click on the Filmstrip to navigate to that part of the video. Students can also select content by clicking and dragging their mouse across the thumbnails. When students make a selection, the annotation widget appears allowing them to add a highlight or



**Figure 1: A screenshot of ViDeX with highlights and tags visible. The Player is displayed at the top left, the Filmstrip at the middle left, the commenting area at the bottom left, and the Transcript at the right.**

tag to the specified content. Like the Player, the Filmstrip shows the highlights and tags students have added to the video. At the bottom of the Filmstrip, a graph displays the amount of times a student has watched specific parts of the video.

### 3.3 Transcript

A record of the spoken content of the video is provided by the Transcript. The content of the Transcript is synced with the video playback, allowing students to click content in the Transcript to navigate to that part of the video. The currently spoken word is displayed in a different color than the rest of the Transcript, acting as a text-based playhead. Students can skim the video by scrolling up and down the Transcript. Because each word in the Transcript is mapped to a time in the video, highlighting, tagging, and note taking is synced between the Player, Transcript, and Filmstrip. Students can highlight and tag by clicking and dragging across the text and using the annotation widget.

### 3.4 Personalization

Personalization allows students to enhance video with their own content. The video annotation tools made available to students through ViDeX may be beneficial to their video-based learning. Video annotations may support the same functions of text annotations identified by Marshall [5]. Highlighting and tagging could be used for bookmarking content to be (re)viewed, while notes may provide students with an *in situ* area to collect their thoughts and reflections when and where they occur. By providing these tools for video annotation, video players could support students as they engage in more active viewing practices.

## 4 FUTURE WORK

Testing ViDeX with students is needed to evaluate the usefulness and usability of video annotation and its effects on active viewing. This semester, we have deployed ViDeX in multiple undergraduate

classes in multiple faculties. The analysis of log data and follow-up questionnaires and interviews will be used to identify how and why students use ViDeX. In addition to testing the latest version of ViDeX, we are working towards supporting social interactions within video by i) allowing students to share their annotations with peers and teachers and ii) the identification of consensus annotations using the “wisdom of the crowds” [7]. The former is supported by constructivist learning theory and the latter has been used for text annotations [5, 6].

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