**Student-created YouTube Videos: A Multimedia Assignment to Foster Active Learning in a Large Engineering Classroom**

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**Project Motivation**

Although students are intuitively familiar with the principles of mass and heat transfer in everyday phenomena and demonstrate great comprehension of difficult concepts (the "layman" approach), they often fail to take full advantage of this learning method when confronted with a more deductive teaching style proceeding from the general principles to practical applications (the "scientific" approach). One way to address this limitation of traditional classroom assignment learning is through the use of a project-based learning approach, one of several commonly used active learning strategies. Given the current generation’s technological proclivity, we decided to enhance our ChE 342 Mass and Heat Transfer project by incorporating a YouTube video component, thereby strengthening a project-based learning approach with a digital media platform.

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**Pilot: YouTube Video Project**

The YouTube Video project was implemented in the 2014 Fall Semester for a large (150 student) junior level mass and heat transfer course (CHE 342). Groups of 4-5 students were tasked with creating a real-life demonstration or simulation of a mass and/or heat transfer concept that was appropriate for a high school level classroom and public audience. Students were limited to a budget of $25 thus encouraging the use of everyday materials that could be easily adapted and used in a high school classroom.

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**Impact on Student Performance**

Under the Identify-Solve-Broadcast model approach, we identified several major contributing factors that we believe led to the overall successfulness of this project. In order to determine the role each contributing factor played as part of the student experience, a group of 10 students from the Fall 2014 class, each from different groups, participated in a post-survey and focus group discussion.

**How does the mode of presentation impact the contributing factors to improved student learning outcomes?**

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**Fall 2016-2018 Projects**

Based on the post-survey and focus group data, we refined our original research question and devised a new format that would allow us to elucidate which contributing factors were more or less significant with each mode of presentation. For the Fall 2016-2018 projects, groups could choose between a live poster presentation or a YouTube video.

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**Poster Feedback**

“I liked the fact that the poster format of the assignment allowed me to practice my soft skills in addition to technical skills.”

“I found that delivering the poster presentation was really helpful in reinforcing both my understanding of the concept as well as the understanding of the people I was teaching, as they could ask questions, and I would have to really think about how I was presenting the information. I feel that feedback is extremely beneficial for both parties.”

“I felt that the poster presentation was a very worthwhile endeavor. It certainly helped me improve my skills and ability to think quickly under pressure. Along with this, sometimes I don’t feel that I have enough opportunity outside what we know as engineering, so this really allowed me to do that.”

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**Video Feedback**

“Personally, I really enjoyed making the video. I had a lot of fun coming up with the idea, writing the script, filming, and editing the video.”

“I thought the video was a great way to display creativity and provided another opportunity to learn more that would have never come along to demonstrate in person.”

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**Impact Score**

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- **Teamwork**
  - **F16 Poster**
  - **F16 Video**
  - **F17 Poster**
  - **F17 Video**
  - **F18 Poster**
  - **F18 Video**

**Impact of Student Performance**

Student performance was assessed in years with Fall (2014) and without Fall (2013) the YouTube video component as part of the group project. Students in the Fall 2014 class with the YouTube video component performed significantly better on a control transfer concept test and on the final exam as a whole compared to the Fall 2013 students.

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**Survey Results**

- **Post-Survey Results**
  - **F16 Poster**
  - **F16 Video**
  - **F17 Poster**
  - **F17 Video**
  - **F18 Poster**
  - **F18 Video**

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**How does incorporating a video component to a group project impact student learning?**

The YouTube Video project was implemented in the 2014 Fall Semester for a large (150 student) junior level mass and heat transfer course (CHE 342). Groups of 4-5 students were tasked with creating a real-life demonstration or simulation of a mass and/or heat transfer concept that was appropriate for a high school level classroom and public audience. Students were limited to a budget of $25 thus encouraging the use of everyday materials that could be easily adapted and used in a high school classroom.