Multimedia Immersion Inspires STEM Learning

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Research Design
Participating teachers are currently implementing the multimedia curricula in a high school course Spring 2018 and they will teach again in Fall 2018 and/or Winter 2019. Both teacher and student data will be collected each year.

Teachers were asked to complete a 10 min. background survey at the beginning of the summer institute (2017). During the pilot curricular implementation, they are asked to: (a) provide weekly feedback on implementation challenges and successes and (b) participate in a weekly on-line debrief with project staff. Weekly on-line debriefs will be recorded and transcribed for analysis.

Students will be asked to complete a 10 min. web survey (beliefs, attitudes) before and after the course during which they experience the multimedia curricula. In addition, we will collect student design logs to explore their usefulness as a measure of student understanding of the design process and the relevant physics concepts taught as part of the curricula.

Data Collection
All teachers are being visited at least 6 times during the 9 week curricular implementation. Project staff are observing the class with particular attention to one or more groups of students for evidence of: (a) understanding of the assigned task, (b) level of participation of each of the group members, (c) documentation in design logs. Students may be asked to explain some of their design decisions either as a group or individually.

Both qualitative (teacher feedback, site visit/observation, student design logs) and quantitative (teacher and student survey) data is being collected and analyzed to address the research questions.

Research Questions
1. Does participation in MI result in pre-post changes in student perceptions of themselves and science and engineering disciplines?
2. Does participation in MI result in pre-post changes in student understanding of relevant science and engineering content and practices?
3. What is the relationship between teacher characteristics (e.g., self-efficacy, years teaching, certification) and student interest and beliefs?
4. What are the successes and challenges for teachers who implement the curriculum?

Analysis Methods
• Background Survey: Teachers were asked to complete a background survey to gather demographic information and information on education, years teaching, and level of comfort/confidence teaching STEM and multimedia production. Questions will be adapted from existing surveys.
• Curricular Feedback: Teachers were asked to provide written feedback on a weekly basis during the curricular implementation. For lessons taught that week, teachers have indicated areas that were more or less challenging (Likert Scale) and have provided open ended responses on nature of changes made to curricula during implementation and advice for those who have yet to teach the curriculum.
• Student Beliefs/Opinions Survey: Students will be asked to indicate the extent to which they agree/disagree with various statements about STEM learning and careers. Questions have been adapted from existing surveys.

Table 1: MI Student Performance Report - Demographics 2018-17

<table>
<thead>
<tr>
<th>Category</th>
<th>MI Group</th>
<th>Non-MI Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>45</td>
<td>44</td>
</tr>
<tr>
<td>Years Teaching</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Curricular feedback from Pilot teachers during first time implementation will inform revision of curriculum during summer 2018 for second deployment in the Fall.

Implications of Findings
As the curriculum is currently being implemented, no statistical findings are yet available. Anecdotally, the participating teachers report that students have received the course well and some of those that have not otherwise been engaged in the class have become excited about the process of multimedia creation.