

Course Description

The focus of this 9-week course is the study of technology incorporated in the science of sound recording and computer generated animation and how it relates to STEM disciplines. Students are engaged in the design process as part of the workflow in the production cycle on group project based work. The curriculum incorporates the physics of sound and light waves, computer sciences processing and procedures for data manipulation in the arts. Specifically related disciplines include; waves and their applications in technologies for information transfer, transduction of energy transfer from analog to digital formats, and motion and stability: forces and interactions explored through computer generated animation. All topics are delivered to the students in an age/grade appropriate manner.

Free Digital Tools Used For Project Creation



Pro Tools First
Media Composer First



Maya

- Hardware Provided to Each Classroom
- Zoom H4N Pro Stereo Portable Recording System with case and accessories.
 - 8 Pairs of Sennheiser Headphones
 - 1 Behringer Headphone Distribution Amplifier
 - 2 Behringer Active B2030 Studio Monitors
 - M-Audio 49 key MIDI controller
 - 1 500 GB External hard drive for media storage
 - 1 Tabletop equipment rack with locking drawer
 - All necessary cabling for interconnections



- Hardware Not Provided but Required For Curricular Implementation
- Laptop Computers with appropriate Operating System for software requirements. All software being used is cross platform and available for both Apple and Windows based computers.

Multimedia Immersion Inspires STEM Learning

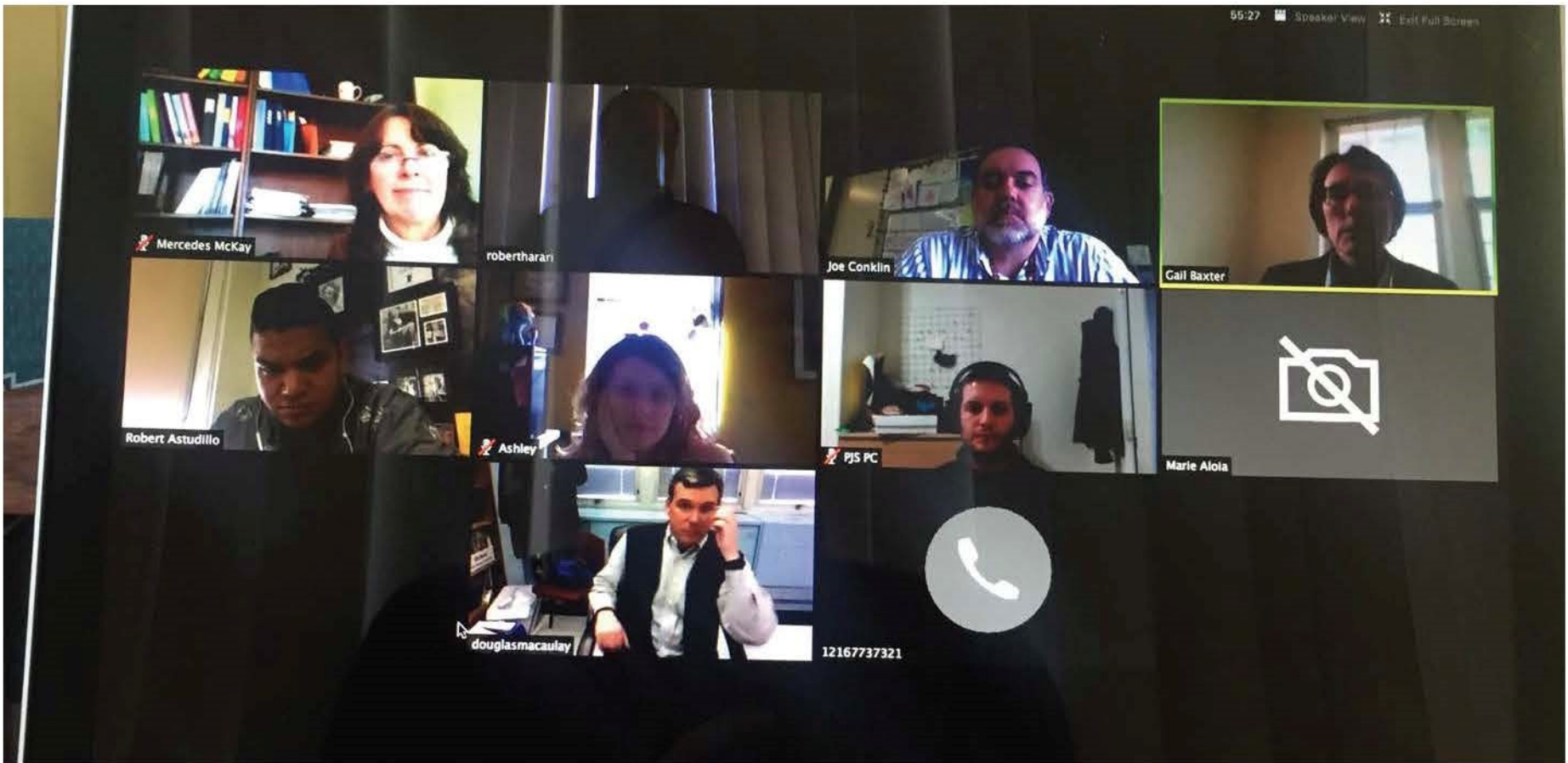


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Research Design

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.



Weekly Web Chat for Collaborative Updates

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 3. NJ School Performance Report – Demographics 2016-17

High School Name (Grade Levels)	# Students	Gender		Race/Ethnicity					% Economically Disadvantaged
		%Male	%Female	%Black	%Hispanic	%White	%Asian	%Other	
Hoboken									
Hoboken High School (9-12)	411	54.0	46.0	23.6	62.5	13.1	0.5	0.2	70.0
Weehawken									
Weehawken High School (7-12)	554	51.0	49.0	4.5	68.4	20.6	5.1	1.4	46.0
Union City									
Union City High School (9-12)	2877	53.0	47.0	0.9	96.3	1.5	1.3	0.0	86.0
Bayonne									
Bayonne High School (9-12)	2365	48.0	52.0	9.8	37.4	42.1	8.9	1.8	56.0
Jersey City									
Hudson Catholic Regional High School (9-12)	495	63.0	37.0	16.6	36.2	19.2	11.3	16.8	Not Available
Note: data for 2015-16 School Year (Not available for 2016-17)									

Course Objective

Students will complete this course with a basic comprehension of the science and engineering used in the creation of digital media. Students are currently engaged in exercises that incorporate the capture and re-creation of audio through digital processes, creation of animation including creation of a narrative and through storyboarding and animatics, rigging, lighting, material networks, character development, and editing for final completion. By working in teams, creative decisions through group participation develop an understanding and appreciation of the collaborative creative process in media creation. Students also do the individualized work that is a necessity to making the tools transparent in the artistic process.

Pilot Teacher Summer Institute 2017



Teachers' brainstorming session to create the narrative.



Teachers recording script elements for their narrative.



Teachers creating animation assets for their final video.

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.