A new pedagogical model to enhance science and mathematic learning using mobile video captures

INTRODUCTION

Twenty-first learning materials are no longer restricted to traditional classroom settings and books, instead, educators draw on an infinite variety of resources online. At the Graduate School of Education, we find that video can function as a bridge, connecting learning events across different settings (including school and home) and generating discussion across different fields such as mathematics, science, and engineering. These conversations provide opportunities for students to ask questions, share perspectives, and develop explanations about real world events and phenomena. Here, we ask, can we build bridges and enhance learning across formal and informal settings through the use of learner-generated video capture of real world events and phenomena in STEM areas (Science, Technology, Engineering, Mathematics)? Such a model could encourage learners to think like real scientists, working and interacting with their peer group and teachers to research a topic.

AIM

The study employs mobile video capture, sharing, and web-based knowledge building tools to teach learners how to "see" scientific and mathematical aspects of real world phenomena and encourage them to raise questions that foster engagement in inquiries on STEM topics.

PILOT STUDY

The pilot study was conducted with 21 6th Grade students (ages 11-12)

Day 1

Introduce students to the use of technology, filming terminologies, and safe use of iPads.

Day 2

Provide ground rules of videography, practice filming, and creating video clips with students in classroom setting.

Day 3

Revise guidelines and instruct students to film 30 second videos about questions related to mathematics, emphasizing opportunity for learning beyond the classroom curriculum.

Day 4

Demonstrate trial filming, uploading, and commenting practices with students, with assistance from teachers and researchers.

Day 5

Students begin filming, uploading, and commenting on videos on the topic, ratios and proportional relationships.

Day 6

Debrief with students, conduct focus group interviews, and administer questionnaires with students and teachers.

FINDINGS

The activity allows students to apply ratios and fractions to real world settings. Many students reported that the activity helped them to understand that ratios can be found in everyday sites and objects outside the classroom.

The portable feature allows them to control what they want to capture and observe based on their own interests.

The project enabled them to work collaboratively and take control of their learning materials.

The students were more engaged and interested in the topic when there was a device in their hands.

Many previously low-performing students involved in this project demonstrated creativity and initiative.

The teacher reported that the method equipped her with creative resources and showed the students more practical material to which they could relate than is typically available in textbooks.

The teacher found that the activity allowed her students to be more focused on problem-solving in a creative way.

The process of commenting online about the videos was a challenge for many students as the teacher mentioned that ‘many of the students only managed to tackle the task on the surface level rather than demonstrating deep mathematical thinking.’

The students sometimes found it difficult to pose questions or comment on their classmates’ video clips after an answer had been supplied.

CURRENT STUDY

In our current study, we are teaching students in science classrooms and expanding the sample size to include two groups of students:

Group A (n=32)
This group will use tablets both in class and at home

Group B (n=30)
This group will tackle assigned tasks in class.

The two groups of students will be learning about science.

Methods:
Video data analysis • Stimulated-recall interview • Survey

We seek to create a new pedagogical model that brings learner and teacher videos of the world outside school, along with their scientific and mathematical questions about these videos, into classroom conversation and associated online forums. These joint engagements with media about STEM topics will serve as an anchor for collaborative inquiry learning. The approach allows for active participation and critical thinking through media capture, annotation, and thereby increasing the potential of video as a pedagogical tool to promote learning for the 21st century.