Designing Middle School Science Storylines
Integrating Sensor Technologies and Data - Driven Science in the Context of a Research - Practice Partnership

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Project Goals

Professional learning model to support science teachers to implement CT-Integrated middle School science lessons

NGSS+CT (Storyline) curricula and activities for teachers and students

Sensor technologies for data-driven scientific investigations about school and community

Broadening Participation in Computational Activities through Place-Based Investigations in Mainstream Science Classes
Professional Learning: CT Integration Cycle

Researchers / teachers reflect on implementation and refine for the next design cycle.

Co-Design

Reflect

Implement

Researchers / teachers learn about computation and co-design Storylines+C lessons.

Teachers implement the Storylines+C using sensor technologies.

Research - Practice Partnership
Project Data Sources

Related to supporting teacher learning, participation, and agency:

- Video:
  - Professional Development
  - Classroom Implementation
- Classroom Observations
- Teacher Interviews
- Teacher Perception Surveys

Related to supporting student learning:

- Student Experience Exit Tickets (SEETs) (Penuel et al., 2016)
- Student Generated Artifacts
  - (e.g. student developed models & phenomena explanations)
Overarching Findings related to teachers and students

- Storylines are a useful approach to integrate CT, sensor technology, and science in a complimentary way.

- CT integrated science approach helps teachers see value of adding programmable sensor systems to their curriculum and can help students see sensor systems as tools for scientific inquiry.

- Place based investigations of scientific phenomena as well as sensor usage and programming can play a large role to engage students.

- A versatile sensor system supports students’ engagement in CT and Science Practices.
SEETs: What are they?

- Student Experience Exit Tickets: Questions used to gauge Coherence, Relevance, and Contribution.
- Utilized in other similar research (Penuel et al., 2016)
- Administered digitally and/or paper
- Used to inform teachers’ instruction and gather research data

1. Today in class I felt like a scientist. (Yes/No)

1. Today we used the Driving Question Board (DQB) to review what questions we’ve answered in previous classes. (Yes/No/Not Sure)

1. With the help of our teacher, we used the DQB to guide what we did in class today. (Yes/No/Not Sure)

1. I understand how what we did in class today ties to the bigger picture for what we’re studying in this unit. (Yes/No/Not Sure)

1. I have ideas about what questions we should investigate next. (Yes/No/Not Sure)

1. What we did in class today matters to me because: (circle one option that best describes your feelings)
   A. This material is interesting
   B. What we did today will be useful to me in the future
   C. What we did today is important to my everyday life and/or people I care about
   D. It will help me get a good grade
   E. What we did today doesn’t matter to me

7. What we did in class today matters to people in my city because: (circle the option that best describes your feelings)
   a. This material is important and people should know about it
   b. This material could improve the lives of people in my city
   c. What we did today doesn’t matter to people in my city

7. Did you share any ideas out loud today to the whole class, a small group, or a partner? (Yes/No)

7. If you answered yes to the last question (9a), did any of your ideas influence the class or help others? (Yes/No)

7. Did any other students share ideas out loud today to the whole class, a small group, or a partner? (Yes/No)

7. If you answered yes to the last question (10a), did you learn more in class today because other students shared their ideas or opinions? (Yes/No)
SEETs: Use for Research

Ability to look at student experiences with learning experiences across:

- **Multiple classrooms**
  - (e.g. one teacher multiple sections)
  - (e.g. different teachers same storyline unit)

- **Compare Storyline Units**
  - (e.g. YR1 vs YR2 vs YR3)
  - (e.g. Maglev Unit vs Mold Unit vs Sensor Immersion)

- **Demographics**
  - Disaggregate
    - Gender Identification
    - Ethnicity
    - Home Language
SEETs: Used to Inform Classroom Instruction

Sample SEET Report used during individual and whole group CT-Integrated Storyline Curriculum Implementation Debrief

Thank you!

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