Co-designing Tools and Routines with Teachers to Support Middle School Students’ Motivation in NGSS Classrooms

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Summary

The promise of the Next Generation Science Standards (NGSS Lead States, 2013) rests on teachers creating instructional experiences where students are highly engaged and active in their learning. This collaborative project pursues co-design as a strategy to develop a professional learning approach with resources to assist middle school teachers in supporting students’ motivation and engagement in the context of NGSS instruction. The project brings together motivation experts, science education researchers, and middle school science teachers. The team is using a design-based research methodology to iteratively design and study the intervention and its features.

Overview

M-PLANS (Motivation - Planning Lessons to Activate engagement in Science) refers to a suite of professional learning tools to facilitate middle school science teachers’ modification, creation, and implementation of instruction that supports students’ motivation and engagement along with the science and engineering practices, crossing concepts and disciplinary core ideas specified in the NGSS Framework (NGSS, 2013) and NGSS. M-PLANS is being developed in collaboration with experienced science teachers and school district science coordinators through a cyclical co-design process (see Co-Design Process Figure).

The project aims to co-develop a professional learning experience that enhances teachers’ pedagogical content knowledge about a variety of motivational competencies that are explicit in the framework and NGSS and to equip them to support student motivation using the theoretically- and empirically-based Motivational Design Principles (MDPs; Linnenbrink-Garcia, Patel, & Pekrun, 2014). Primary research questions focus on providing formative feedback on M-PLANS: (1) How do teachers respond to M-PLANS? and (2) How do teachers respond to instruction developed by their teachers through M-PLANS?

Motivation Design Principles for Science Instruction

M-PLANS Toolkits: Suite of materials (print and web-based) for teachers to plan and enact motivatingly-supportive NGSS lessons.
- Each MDP section includes: Overview, Link-Plans, Planning Tools, Activity, Talk Time, Paraphrase
- Also includes sections on (1) Equity, (2) establishing a Positive Classroom Climate, (3) Connections between NGSS and the MDPs, (4) re-imagining Planning Tools
- Co-design process shaped the content and focus of the PL:
  - Added more concrete examples, talk moves, role-play examples
  - Refined MDP terms and approach to instruction to address misconceptions

Co-Design Process

Co-design Teacher PL
Summer 2020: 4-8 Day PL with co-design teachers, science coordinators, and research team
Fall 2020–Winter 2021: M-PLANS PLANS teams co-design teacher-implemented re-designed unit in their classroom with M-PLANS design teachers and research team throughout implementation cycle

Co-design Teacher Implementation
Fall 2020–Winter 2021: M-PLANS tools with feedback from co-design teachers and science coordinators

Tool Revision
Spring 2021: De-sign teachers and improvement team evaluated and made recommendations to improve design of M-PLANS tools

Rollout PL
Senior Personnel: Pei Pei Liu, David McKinney, Gary Weiser, Katy Nilsen
Planned Summer 2021—Fall 2021: Roll-out of revised PL (including science unit implementation) with new group of middle school science teachers

Visit our website – https://m-plans.org/