ILLUMINATING EDUCATOR PRACTICES THROUGH EVALUATING OUT-OF-SCHOOL TIME STEM LEARNING

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Out-of-school time (OST) programs provide an important space to engage youth in STEM learning and fields. Evaluation and research in OST learning experiences bring unique challenges that differ from investigations in formal education environments. Ecological validity (Allen & Peterman, 2019) is also important to consider to align methodology with the informal OST space.

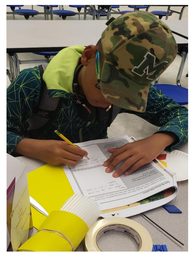
Planetary Learning that Advances the Nexus of Engineering, Technology and Science (PLANETS) is a NASA-funded project that aimed to develop three curricular units and educator supports to engage youth in planetary science and engineering. Through research and evaluation studies of PLANETS, the study teams identified several challenges and strategies, useful for improving evaluation and research efforts in OST STEM environments.

Research

Researchers focused on how four OST educators in different contexts implemented the curricula, what influenced their decision-making, and youth attitudes towards engineering. The study used mixed-methods, including more than 100 hours of activity observations, educator implementation surveys, educator interviews, a retrospective youth engineering attitude survey and youth focus groups. Four educators and fifty youth participated in the study.

Evaluation

Evaluators conducted a field test of the Remote Sensing unit to understand how educators used the materials, their perceptions of the materials, and effects on their teaching and content knowledge. The study also sought to understand how the materials influenced student attitudes toward engineering. The field test involved 11 OST educators and 243 middle school-aged youth at seven sites across the U.S. Methods included an educator implementation survey, an educator knowledge survey, educator interviews and a retrospective youth engineering attitude survey.



Issues

IDENTIFYING APPROPRIATE OUTCOMES & MEASURES

Although funders may want evidence of content learning, such outcomes may not be appropriate in OST, which typically have different goals for youth.

DATA COLLECTION CHALLENGES

Low participant responsiveness to data collection requests, and sensitivity to OST programs' feeling fun for youth and different from formal classroom settings affected types and frequency of data collection

IRREGULAR ATTENDANCE IN VOLUNTARY OST PROGRAM

Concerns over garnering an accurate representation of youth experiences and attitudes emerged during project observations due to the irregular attendance of youth in the voluntary OST program.

AWARENESS OF EVALUATION & RESEARCH STUDIES

OST educators and site staff may have less familiarity with the purpose of evaluation studies. OST youths' families may be in less communication with OST staff.

Strategies

CONDUCT STUDY ORIENTATIONS

We conducted study orientations with opportunities for questions. This helped establish a relationship between the investigators and the participants, and created a space for garnering participant and parental consent. We used everyday language, minimizing jargon.

AFFECTIVE OUTCOMES

Investigators focused on constructs such as attitudes towards engineering in youth rather than on content knowledge. Several instrument repositories are available for STEM OST instruments.

REDUCE DATA COLLECTION BURDEN

Investigators reduced the data collection burden for educators. Youth data collection used a retrospective pretest. Observation was a primary data collection strategy.

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