Explorer At Large Pilot Implementation Study

Overview

In this study, we will research and evaluate the Explorer at Large (XAL) pilot program. Through freely distributed videos and associated instructional materials (study and teacher guides), hands-on in-class and outdoor activities, field trips to relevant local settings, and parent-student engagements, XAL aims to enable a selection of students in the Central Ohio region to experience and practice scientific thinking skills that prepare them for advanced education and career success within a pedagogical approach that taps into children's natural curiosity and playfulness. A holistic eco-system of curriculum-driven content invite students on journeys in the field and in the lab, together with experts in pursuit of knowledge and discovery, and provide corresponding resources and support for teachers and other educators. Explorer At Large's goal is to engage students with elements of authenticity, real-world exploration, and live-action adventure and to deliver meaningful science content while preparing them for future learning and success in life.

We will implement a research and evaluation study as a proof-of-concept exercise to demonstrate that the materials can be implemented by teachers successfully and in a way that leads to outcomes for students. The Pilot will target approximately 800-900 students from across 8 schools in the Central Ohio region. The study will include approximately 35-40 classrooms total, including K, 3rd, & 5th grade. The research and evaluation study will be led by Drs. Riedinger and Storksdieck.

Scope of Work

While videos are commonly used in classrooms to support STEAM instruction, they tend to be either highly didactic in nature (e.g., instructional videos) or developed for different purposes (e.g., clips from NOVA), and often fail to achieve their full potential as educational tools. The XAL approach aims at basing the use of video as instructional tool in classrooms on a completely different concept: *Video as a means for encouraging discovery, experimentation, questioning, and curiosity.* Such an approach would be unusual for teachers and students. Consequently, the program's associated study will address the following research questions:

a) Will grade K, 3, and 5 elementary school teachers be able to successfully include instructional units of varying length based on one or multiple XAL videos of about 5 minutes in length each in their classrooms, given that the videos aim at instilling curiosity, discovery, experimentation, or questioning?
   - Do teachers consider the XAL instructional units valuable for their students' engagement, learning and growth?
   - Are the XAL instructional units easy to use for teachers?

b) Will grade K, 3, and 5 elementary school teachers who experience these instructional units show growth on fundamental measures of affective and cognitive learning associated with discovery-based instruction?

c) Will grades K, 3, and 5 elementary school students who experience these instructional units show growth on fundamental measures of affective and cognitive learning associated with discovery-based instruction?
    - Will the units be interesting, satisfying, and thus, engaging for children?
    - Will the units achieve certain desired outcomes, including content and process learning (as an embedded part of the instructional units themselves), STEM learner identity; STEM capital or STEM Affinity (which includes measures of STEM salience in students' lives); growth mindset; self-assessed persistence; self-assessed curiosity?

d) Will the inclusion of XAL family moments create awareness in parents of the value of curiosity, discovery, exploration, and questioning in their child(ren)?

The "field test" and study component of the pilot will advance research that suggests targeted use of video for enhancing the learner experience can be transformational if videos are designed with a core educational theory of change in mind and are fully embedded into Instructional Units. We will further test the argument, strongly supported in the revised National Academies report on *How People Learn* (NRC 2000), that affective and cognitive aspects of learning are inseparable and mutually reinforcing, particularly if combined with exercising so-called "21st Century" skills.

The XAL implementation initiative will develop Instructional Units around short videos in which host Josh Bernstein will take viewers on a journey of discovery and exploration, following a model of "hosting" that engages viewers and directly speaks to them. We will field-test the robustness of the combined video/instructional materials unit as pedagogical tools inside and outside of classrooms—establishing the degree to which teachers can implement the approach successfully with little external support. The implementation study will further assess the impact of the Instructional Units on students around a set of connected learning outcomes, aligned with the research questions.

Broader Impacts

The project will have benefits for the science education field as well as for participating teachers, students, and their parents/caregivers. The research and evaluation study will help to improve science teaching and learning and associated instructional materials as well as elucidate how these materials result in positive outcomes for students (e.g., increased curiosity, improved questioning and investigation skills, and fostering positive science learner identities). This project will also serve as a roadmap for long-term and successful implementation of XAL programming with both project partners and educators who serve as end-users. Direct communication with these groups through Pilot dissemination activities will give the XAL team the opportunity to further understand the unique challenges XAL pedagogy can help educators overcome, as well as goals XAL can help them realize within their teaching.