

Eliminating Confounding Variables to STEM Implementation in a Rural School District Using Mobile 1:1

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ABSTRACT

This paper will trace the history, conditions, rationale, and early experiences of current STEM applications in Greenville Public Schools. Specifically addressed in the project analysis are efforts to identify and isolate two significant variables – time and access. These variables, and the impact of poverty on them, were considered in the design and delivery of instruction using contemporary technology.

HISTORY

A review of efforts to infuse the vision of STEM instructional methodology in Greenville demonstrates a series of strategies that meet the recognized STEM criteria:

1. STEM strategies are and have been implemented in ways that are evidenced in ‘pockets’ across the K-12 service range, though not systemic in nature.
2. STEM strategies are and have been consistent with the philosophical basis for other planned and aligned initiatives.
3. STEM strategies are and have been aligned with organizational goals as established and approved by the governing body, the Greenville Board of Education.
4. STEM strategies are and have been selected for implementation based upon their ability to support progress toward meeting the district’s mission and vision.

The STEM-like initiatives mentioned above have included cyclic events such as Science Fairs, Rocketry Project, Odyssey of the Mind, and Science Olympiad. In addition, longer term initiatives like “Energy Essentials”, a collaborative initiative involving public sector, private sector, and students in a variety of programs addressing energy use, conservation, and renewable energy production, have been implemented. One outcome of the Energy Essentials initiative was construction of Michigan’s largest publicly owned solar photo-voltaic array on the property of Greenville Public Schools. Students played a key role in evaluating the viability and efficacy of the emerging technology, as well as directly participating in the installation and continued monitoring of this technology application.

In the last three school years, new initiatives have included the implementation of a “Mini Medical School” in partnership with Spectrum Health United Hospital and our fifth grade science teachers. This project includes theoretical and practical exploration in human anatomy and careers available to our students. Additional STEM-like events include an “Engineering Night” and “Family Math Nights”. These events engage parents, teachers, and students in

collaborative problem solving; designed to reduce math anxiety and generate interest in cognitive processing of quantitative inquiry.

OVERCOMING BARRIERS

In response to specific barriers to STEM instruction, the Mobile 1:1 initiative was designed and implemented. To our knowledge, the barrier of access has not been previously addressed elsewhere. While a number of public schools across the state and nation have implemented programs providing individual access to technology devices during the school day, Greenville's Mobile 1:1 has explored previously uncharted territory. Mobile 1:1 has allowed for an *integrated* (Hoachlander and Yanofsky, 2011) approach to STEM instruction.

PROJECT DESCRIPTION

Greenville Public Schools serves 3,750 students in a traditional K-12 public school organizational structure with four elementary, one middle school, and one high school. The demographics of the community include a census poverty rate of well over 50% (Montcalm County Fact Book, n.d.). Many families are characterized by other than traditional two-parent, stable homes. Because of the level of poverty, low parent educational attainment (Montcalm County Fact Book, n.d.), and rural nature, access to high-speed Internet is limited to few students in our schools. A survey of students suggested that high speed Internet access is not even available in more than 25% of homes. Approximately 14% of children qualify and receive special education services for a variety of learning differences. As referenced in many individual educational plans, reliance upon constant variables of time and pacing is unrealistic for many of our learners.

The Greenville Public Schools Mobile 1:1 project eliminates the variable of student access and resulting limitations on time and pacing for learning. Unlike other 1:1 technology initiatives which have become relatively common in other school districts, participating students in Greenville are issued devices with unlimited access through purchased cellular data plans. While similar programs provide individual devices, they are typically not used to access filtered content available on the World Wide Web, other than while the student is in school. Greenville students have unique access relying upon Verizon Inc. wireless data plans which are routed through Greenville Public School web filters.

By lifting the limits of time, and providing fully funded Internet access not limited by time or location, Greenville has eliminated the variables of access due to levels of poverty, and learning pace due to constraints of a traditional school day. Teachers have 'flipped' their classrooms allowing students who need more or different time to process learning, to receive that individualized access and support.

ANALYSIS AND CONCLUSIONS:

As this is the second year of implementation, frequent training and collaborative debriefing is providing anecdotal evidence of the impact of this initiative. Expanding access has reduced or

eliminated the time and access barriers as achievement gaps continue to close. Further, an unanticipated result has been increased parent involvement in technology use.

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AUTHORS' INFORMATION

Diane Brissette is the Assistant Superintendent (Curriculum and Instruction) for Greenville Public Schools. She previously served the district as the Middle School Principal from 1993 until 2010. She received both her Bachelors in Education and Masters in Educational Administration from the University of Maine system.

Jim Anderson has been a member of the Greenville Public Schools Board of Education for 17 years. He has undergraduate engineering degrees from the University of Michigan, and graduate degrees from Aquinas College and Western Michigan University. He is active in the Grand Rapids section of ASQ, as is currently serving as Vice-Chair. Jim has worked in the automotive manufacturing sector almost all his career. Jim believes STEM education is critical to our