

Utah STEM Initiative AmeriCorps Narrative

1. Program Design

a. Community Need and Program Basics

Compelling Community Need

The Utah STEM Initiative AmeriCorps program will address the need to provide STEM (Science, Technology, Engineering, Mathematics) education to economically disadvantaged school-aged students in Utah. This need was chosen due to the low engagement of students in STEM-related subjects in school. It was also chosen due to the high number of well-paying STEM-based jobs in Utah. According to the Utah State Office of Education Fingertip Facts for 2014 only 73% of Utah's students passed the Core CRT Mathematics Testing. Economically disadvantaged kids were further behind with 63% of students passing. Furthermore, a random sampling of 27 Utah schools from the Utah State Office of Education CRT Report for 2015 found that only 61% of students in Utah were proficient in science. Local data is backed by nation-wide data that shows that middle school and high school students are performing poorly on international tests when compared to their peers in other developed nations. In addition, few undergraduates are choosing to major in science or engineering (15% in the United States, as compared to 47% in France, 50% in China, and 67% in Singapore) (Augustine, 2005). Moreover, students report low levels of interest in science classes in middle and high school (Zachariah & Calabrese-Barton, 2003)

This data is significant as students are not engaged in science and math classes in school and are shying away from well-paying jobs in STEM related fields. There are now more than 5,700 IT companies in Utah. Information services showed high job growth of 41% in 2010 (Utah Technology Council, 2012). Currently, IM Flash and other technology industries have to recruit up to 70% of their workers from out of state (Utah Technology Council, 2012). With the high demand for tech-related jobs in Utah it is essential that Utah's students

prepare to meet the demands of the workforce by receiving support in STEM education. In fact, the need for STEM education is so important that Governor Herbert identified this need as one of his three education objectives: to "align educational training to meet the workforce demands of the marketplace." The Utah STEM Initiative will provide STEM education and training to Utah's students with a focus on economically disadvantaged youth. The economically disadvantaged student population of Utah was chosen as the target population for this program because they are most in need of academic assistance and most in need of access to education that will enable them to break cycles of poverty and secure well-paying jobs. In the first three years of operation the program will focus on providing training along the Wasatch front with future expansion potential throughout the state. The Wasatch front was chosen as the starting location for this program as it is a relatively small geographical area (approximately 8% of Utah's land) yet over 80% of Utah's residents reside in this region.

Program Overview: Theory of Change

The theory of change behind the Utah STEM AmeriCorps program is that by offering informal STEM activities students will increase attitudes, awareness, engagement, behaviors, and skills associated with STEM. The theory of change implicit in this work is that increase engagement will translate to improved academics, which in turn will translate to increased likelihood of selecting a college degree and career in the STEM field. Various studies support this theory. Hidi & Renninger (2006) have described how curiosity and enjoyment are not only critical first steps, but integral to increased and continued engagement with STEM. The National Research Council (2009) describes how engagement and interest progress to a science identity. Dabney et al. (2011) concluded that a strong correlation exists between participation in informal STEM programming and career interest in STEM fields. This is especially true for young girls (Tan et al, 2013).

1) AmeriCorps members will be placed in Title 1 schools along the Wasatch front and will carry out the following activities:

- Deliver informal STEM based activities/curriculum to students in hour-long breakout sessions throughout the school day and afterschool hours, with a special focus on students from economically disadvantaged circumstances.
- Engage volunteers from STEM based businesses to provide one-time or on-going STEM activities to youth at schools.

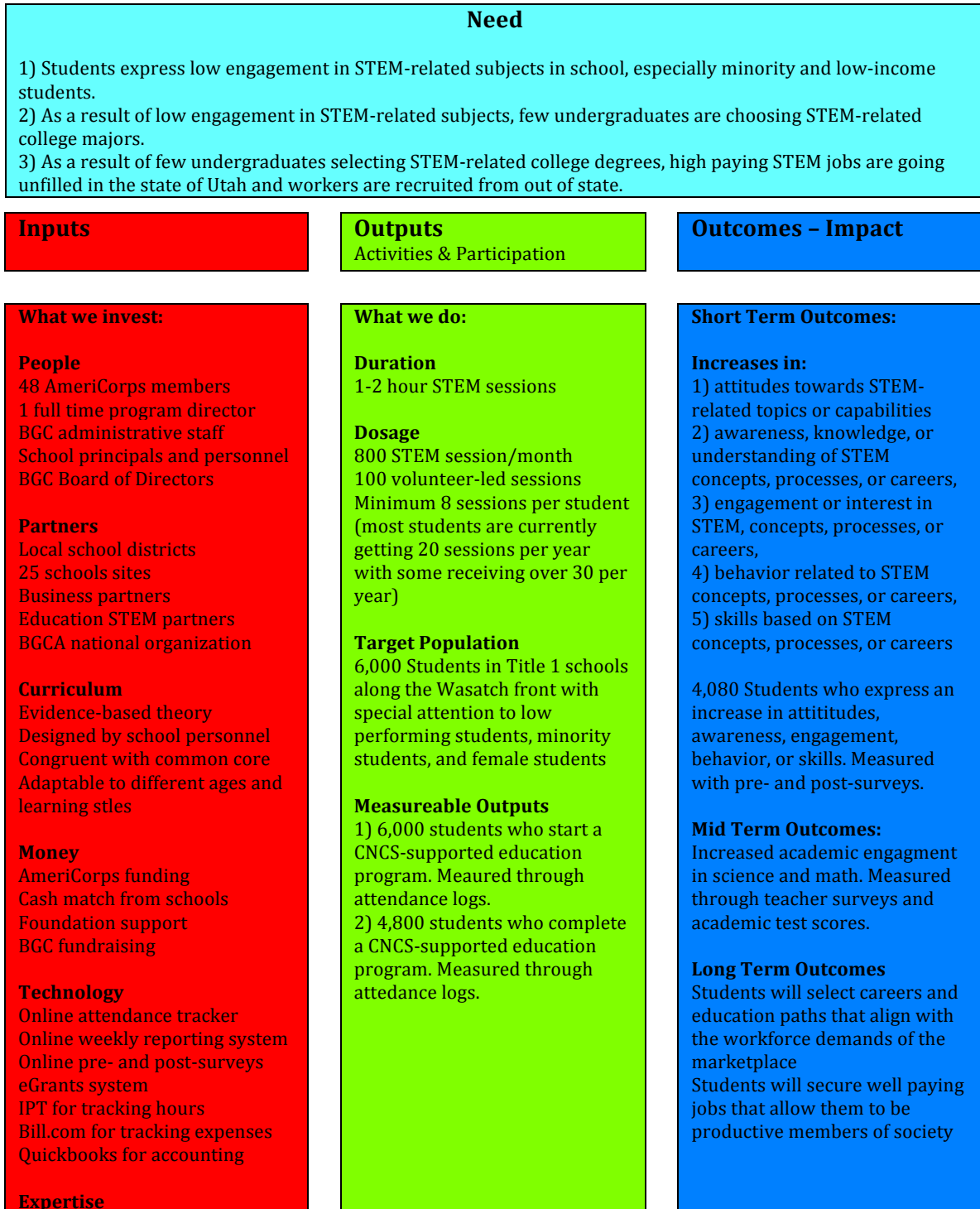
2) Research suggests a very strong likelihood that the proposed intervention will lead to the outcomes identified in the theory of change. Participation in informal science programs has been correlated with increased likelihood of selecting science-related college majors (Schwartz & Noam, 2007). The data also indicates that informal science programs can improve students' attitudes towards science; increase their scientific knowledge and skills; raise grades, test scores, and college attendance (Schwartz & Noam, 2007).

3) Rigorous scientific data is congruent with internal outcome results from the past 2 years of running this program. Survey results show meaningful progress in addressing the community need. When surveyed, 95% of youth expressed an increase in enjoyment and interest in STEM because of this program. 81% increased awareness and or re-affirmation and expansion of STEM knowledge. 83% increased skills associated with STEM and 83% of students expressed an increase in behaviors relating to STEM. These results reflect a strong likelihood that the proposed interventions will continue to lead to identified outcomes.

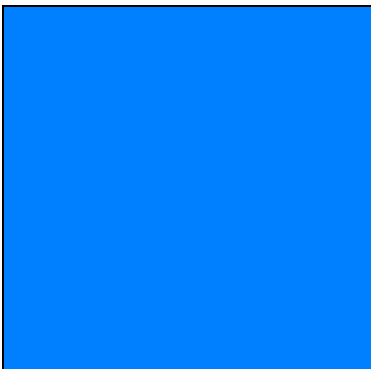
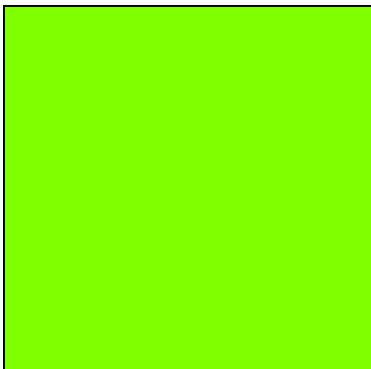
AmeriCorps members are particularly well suited to deliver these interventions as they can provide the communication, passion, and organization that this program will require to be successful. Boots on the ground are needed to coordinate volunteers and to deliver the curriculum of the Utah STEM Initiative AmeriCorps program. Without AmeriCorps members

to perform this task, overburdened teachers and school principals would be left to squeeze the program into their already busy schedules.

Logic Model



BGC experience with managing federal grants
 Strong presence and partnerships with schools



This program logic model is aligned with best practices for implementing and evaluating STEM programs. A recent report from the National Science Foundation (Friedman, 2008) provides a framework for evaluating the impact of informal science education. Specifically, this consensus report outlines five domains in which informal science education can have an impact on participants:

- attitudes towards STEM-related topics or capabilities
- awareness, knowledge, or understanding of STEM concepts, processes, or careers,
- engagement or interest in STEM, concepts, processes, or careers,
- behavior related to STEM concepts, processes, or careers, and
- skills based on STEM concepts, processes, or careers

Using the five domains of the National Science Foundation as a framework for our outcomes, it is expected that the Utah STEM Initiative will produce positive results in each of the outcomes listed below:

ATTITUDE
Belief that science/math is sensible, useful and worthwhile
Belief in one's ability to understand the engage in science and math
Reduced anxiety around STEM
AWARENESS
Knowledge and/or re-affirmation and expansion of what one already knows
Ability to use basic instruments (i.e, graphing calculator, microscope)
Development of fundamental skills (i.e, measuring)
Knowledge about STEM career options
Knowledge of pathways to STEM careers (i.e. pre-requisite classes, internships etc.

ENGAGEMENT/INTEREST
Interest in STEM-related activities and issues
Enjoyment in STEM activities
Desire to pursue a science related career
BEHAVIOR
Pro-social / adaptive learning behaviors in relation to STEM
Positive scientific / math identity
SKILLS
Ability to formulate strategies and to investigate scientific / mathematical problems
Capacity to think logically, reflect, explain and justify one's strategies and solutions
Knowledge of and the ability to apply principles of scientific inquiry

b. Program Impact

Evidence-Based

The interventions that the AmeriCorps members and volunteers will be engaged in are evidence-based in that they are built on the National Science Foundation framework and best practices from throughout the nation. Although the focus on STEM education is relatively new, data suggests that informal science education programs, like the proposed Utah STEM AmeriCorps program, can improve students' attitudes towards science; increase their scientific knowledge and skills; and, raise grades, test scores, and college attendance (Schwartz & Noam, 2007). Attitudes, knowledge, and academic performance are all easily tracked through surveys and will create measurable community impact.

Outcome: Performance Measures

By the end of the three-year grant cycle it is expected that the program will serve over 6,000 youth along the Wasatch from. The program will create both quantitative and qualitative results. Students will have increased awareness, attitudes, interest and skills relating to STEM. Additionally, students will show increased academic engagement, particularly in science and math. Impact will be measured through student and teacher pre- and post-surveys using the National Science Foundation framework as a source for survey questions. Findings from survey data will be reported to the AmeriCorps offices and to other stakeholders on an annual basis in the form of Utah STEM Initiative AmeriCorps program