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Interdisciplinary Summer Institute Offering STEAM Activities for At-Risk Middle School Students

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Abstract

A one-week long summer institute was designed for at-risk middle school students with two goals in mind: increasing interest in scientific inquiry through the use of artistic venues and exposing students to a higher education setting to motivate future goals of post-secondary education. Students were brought to the Iona College campus and were led through STEAM activities by a multi-disciplinary team of educators, who were assisted by a group of motivated undergraduate and graduate students. The summer institute culminated in a dramatic performance prepared and delivered by each of the students.

Keywords

STEAM, interdisciplinary, middle school students, performance

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STEAM activities have been correlated with an increase in student self-efficacy and interest in science education (Kong, Sun-Chen & Hui-Ju, 2014). The need for STEAM activities is supported by data indicating that only 4.4% of American undergraduates are enrolled in STEM programs (Land, 2013). STEM education must become more appealing if we are to remain competitive in a global market. Kim and Park (2012) also note that STEM education is rigidly focused on scientific content, while lacking opportunity for creativity and self-expression. As a result, educational professionals have been designing learning activities that incorporate the arts into their STEM education (Hero & Quigley, 2016).

We developed and implemented STEAM activities during a week-long summer institute at Iona College with eighteen high-needs middle school students (entering grades 6, 7, and 8). Students were classified as high-needs if they were at risk of educational failure, living in poverty, attending high minority schools, far below grade level or were English language learners (U.S. Department of Education). We had two goals for the students who participated in the STEAM summer institute: 1. to increase interest in scientific inquiry by participating in interdisciplinary, arts based activities and 2. to motivate students to pursue post-secondary education. We provided a bus to bring students to the Iona College campus and hired an interdisciplinary team of educators, including motivated undergraduate and graduate college students, to lead various STEAM activities. Our team of educators included social studies, math, and art teachers charged with helping students explore the significance of their chosen figures/events in socio-cultural, artistic,

and scientific domains. The summer institute culminated in a dramatic performance prepared and delivered by each student.

Initially students participated in activities and conducted research related to scientific discoveries, beginning with early civilization and ending in modern times. Important scientific figures such as Marie Curie, Rosalind Franklin, and Albert Einstein were covered, as were scientific events such as space exploration. With the assistance of math and social studies teachers, the students researched their own interests and chose a particular scientific figure or event and learned how to use various library resources, including electronic databases, to gather and record information needed for their project. Once figures/events were chosen, our teachers assisted students in considering the significance of these individuals from a variety of perspectives. For instance, the scientific contributions of Marie Curie were considered as was her socio-cultural impact as a female scientist in the early 1900s.

The final project was a dramatic performance, to be written and delivered by the students on the last day of the summer institute. An art teacher assisted the students in developing all props needed. Some examples of figures chosen by the students included Marie Curie, Alexander Graham Bell, Mae C. Jemison, and Nicola Tesla. Examples of props created included a model of the solar system, a space helmet, and an old telephone. Students wrote their script, developed their props and practiced their dramatic performances over the course of the week. It should be noted that students also toured various parts of the college campus and interacted closely with undergraduate and graduate college students, who served as mentors and role models. The campus tours and college mentors were included to create a positive, supportive experience for the middle school students with the hope of increasing motivation and interest in attending college in the future.

On the final day of the institute, students delivered their performances.   Parents were invited to attend.   Each performance was approximately five to ten minutes and was extremely well received by parents. Students shared the following reflections after their performance.

"It [the summer institute] gave me ideas that college/learning could be fun."

"My favorite part of the summer institute was coming up with a presentation."

"It [the summer institute] help me and motivate me to go to a college like this one."

This past summer we planned three one-week STEAM summer institutes in order to reach more high-needs students and systematically study the influence this program has on students' interest and confidence with STEAM subjects as well as with their motivation to pursue post-secondary education.

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