

## **Minority Male Maker Program: Encouraging STEM Interest and Creativity in Middle School Boys**

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African-American and Hispanic males are significantly underrepresented in STEM. While youth start narrowing their career choices in middle school, National Maker programs rarely target this demographic. The Minority Male Makers (MMM) Program, directed by Morgan State University, in Baltimore has established a Maker community in Northeast Baltimore City that allows middle school students and their teachers to develop science, technology, engineering, and mathematics skills while expressing their creativity. The long-term goal of this project is for participants to 1) create products using 3-D modeling software and 3-D printers, 2) develop software and embedded applications, 3) enhance computational thinking skills, and 4) pursue related entrepreneurial ventures. This effort is a partnership between the School of Engineering and School of Education. Middle school teacher and student participants were selected based on recommendations from their school, and they could also self-advocate.

In order to achieve the project objectives, nine teachers from eight schools were introduced to 3D modeling. In addition, 38 middle school boys from 10 schools were provided with instruction or programming in five areas during the Summer of 2015: 1) Solid Modeling, 2) Mobile Application Development, 3) Mathematics, 4) Entrepreneurship and 5) Minority Mentorship and role models. Instruction was provided by college faculty at Morgan State University. Participants were introduced to designing 3-D models and developing software applications for Android devices using age appropriate computer aided design software that is freely available (Tinkercad and MIT App Inventor). Since concepts of algebra and geometry are the foundation for solid modeling and application development, participants reviewed these and other mathematical concepts. They were also introduced to the idea that their designs and software can lead to wealth creation in their communities. The participants interacted with local technology entrepreneurs and corporate leaders, minority inventors, college student mentors and other speakers, to encourage self-efficacy.

Initial results have been very encouraging. The teachers developed four transdisciplinary lesson plans based on 3D modeling that could be integrated in middle school classes in at least two of the following areas: science, mathematics, engineering and technology. In addition to instructor-guided design, students developed their own 3D designs including key chains, a chess set, game controllers and 3D models of their artwork. The students were also able to develop mobile applications that included images, sound, and Internet links. To link instruction in CAD, programming, and entrepreneurship, teams of students pitched an idea for a new business that integrated all the skills they had learned. Further analysis of pre- and post- surveys of student participants will assess interest in STEM careers.

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