FOR IMMEDIATE RELEASE

August 29, 2014

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**GUITAR-BUILDING INSTITUTE TURNING TEACHERS AND STUDENTS INTO   
STEM ROCK STARS IN THE CLASSROOM**

The National STEM Guitar Project, in partnership with NSF Advanced Technological Education (ATE) Centers with funding provided through a grant from The National Science Foundation (#1304405), hosts innovative Guitar Building Institutes around the United States. The 5-day institutes, combined with additional instructional activities comprising 80 hours, provide faculty training on science, technology, engineering and math (STEM) for middle, high school, and post-secondary faculty. The institutes present and teach participants hands-on, applied learning techniques to help engage students and spark excitement for learning STEM subject matter.

The national STEM Guitar Project has completed four Guitar Building Institute around the United States in 2014. Locations for these events were:

June 9-13, 2014 Sinclair Community College, Ohio

June 23-27, 2014 Edmonds Community College, Washington

July 14-18, 2014 Central Connecticut State University

August 4-8, 2014 Hillsborough Community College, Florida

STEM educators take part in an intense five day electric guitar design/build project. Each faculty member will build his/her own custom electric guitar and will engage in student centered learning activities that relate the guitar design to specific math, science and engineering topics. Participants leave this weeklong experience with their custom-made guitars, curriculum modules with short term assessments that can be immediately integrated into the faculty team school curriculum.

Through the NSF grant, educators who applied and were selected received free tuition and stipend to participate in the Guitar Building Institutes. Over the initial 4 year NSF grant period, the STEM Guitar Project has over delivered its objectives by recruiting 235 STEM faculty members to participate in Guitar Building Workshops around the country with an additional 335 faculty impacted via national education conferences. Thus far, this effort is impacting over 6000 students nationally as a result of faculty members adopting or adapting the curriculum developed through the project. At this rate, the project goal of reaching over 19,000 students by 2016 is highly realistic.

Nationwide, there are increasing concerns from businesses about the supply of science, technology, engineering, and mathematics trained workers. Science and math test scores in the U.S. are among the lowest around the world.

The Office of Science and Technology Policy with the White House reports “The development of world-class talent in science, technology, engineering, and mathematics (STEM) is critical to America’s global leadership.” The Obama Administration understands that fostering an open and diverse scientific community that draws from an array of unique experiences and viewpoints is a necessary step to realizing this goal.

United States Commerce Secretary Gary Locke recently pointed to a new report that reaffirms, “STEM workers/educators are helping America win the future by generating new ideas, new companies and new industries.” The report also showed sustained growth in STEM jobs and greater job stability for STEM workers.

Principal Investigator with STEM Guitar Project NSF ATE Center partner at Edmonds Community College in Washington State indicates, “This faculty workshop is one way we are helping rebuild the nation’s STEM workforce — beginning with teachers.” Cossette continues, “we need more science teaching stars.”

The goal and objective of the STEM Guitar Building Institutes is to showcase a new way to present learning for students with applied methods. “A workshop like this fulfills the state’s Office of Superintendent clock hour requirements for participating educators, but we really want to provide teachers an opportunity to gain new competencies for teaching STEM. By the end of this week, when our teachers have their guitars in their hands, they’ll be equipped to pass on energy, interest and new concepts to their students further motivating their students to learn more about the STEM behind the music, technology, and design.”

In five days, teachers at the workshop will design and build electric guitars and learn how different materials can be used to create various sounds and looks. They will also learn ways to integrate these concepts into their classrooms. The last day of the Guitar Building Institute is called “Rock Star Friday”, a guitar-driven event where the newly built, customized guitars will be showcased and the educators are celebrated. Prominent musicians have joined in the “Rock Star Friday” celebration to help fine tune and test the new guitars built by the participants. Past Guitar Building Institutes have included special guest builders and performers such as Rock n Roll Hall of Fame inductees, Don Wilson of The Ventures, Roger Fisher from Heart, world renown guitarist Randy Hansen along with executives with Boeing, EMP Museum and the Office of State Superintendent. “Rock Star Friday” will be free to the public to attend.

“The Guitar Building Institutes are designed to be sustainable as teachers who participate in the workshop will be tapped to help teach future workshops as a strategy to expand and offer the STEM training to more teachers and students in their communities.”

“You don’t have to know how to play the guitar to take the workshop, but in bringing these groups together, I have met a number of people who by day are engineers, teachers and other professionals and by night they follow their passion by playing in a band. We want to heighten interest and knowledge of STEM through music. It’s fun to offer it in a way that combines all of these interests.”

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**LEAD GUITARS / STEM Guitar Building Project | www.guitarbuilding.org**

IMAGES and VIDEOS:

https://www.flickr.com/photos/100085444@N08/sets/72157645142565610/

http://www.youtube.com/user/4ClassicmarketingG?feature=mhee

http://www.youtube.com/watch?v=kW5s\_0glxTw

http://galleries.tartanphotographic.com/guitarworkshop

The project is exploring the design and manufacturing of guitars to better engage students that otherwise may not be connected to STEM oriented subject matter. It uses the context of building an electric guitar to explore difficult theoretical concepts and advance STEM learning. Working with their peers and professional development institute facilitators, educators are studying the STEM principles associated with building guitars and developing applied STEM learning activities that are aligned with core curriculum national standards. Faculty are being recruited from underserved populations and are preparing a website to enable high school students to experiment with the physics, mathematics, and engineering design/manufacturing concepts that are associated with the project. The project's website offers educators widespread access to an exciting STEM learning community, allowing them to keep in contact with other professionals who are engaged in the curriculum implementation and professional development activities.

PARTICIPATING INSTITUTIONS:

Sinclair Community College - Thomas Singer thomas.singer@sinclair.edu (Principal Investigator)

Butler Community College - Mike Aikens (Co-Principal Investigator)

Purdue University - Richard French (Co-Principal Investigator)

Douglas Hunt (Co-Principal Investigator)

Debbie French (Co-Principal Investigator)

The STEM Guitar Project met its objectives of recruiting 235 STEM faculty members from high school, middle school and community college, providing multiple simultaneous faculty PDs for collaborative production and analysis of solid-body electric guitars. The project faculty team conducted a total of 18 collaborative five-day professional development STEM Guitar building workshops and served a total of 235 community college and high school teachers, 64 more teachers than the target of 156 teachers. Participants came from suburban (46%), rural (29%), and urban (25%) settings within 17 different states across the United States. An estimated 30% of the participants of the STEM Guitar building workshops were female, a historically non-traditional participant of projects of this nature.

STEM Jobs Help America Win the Future

http://1.usa.gov/orVufd

• In 2010, there were 7.6 million STEM workers in the United States, representing about 1 in 18 workers.

• STEM occupations are projected to grow by 17 percent from 2008 to 2018, compared to 9.8 percent growth for non-STEM occupations.

• STEM workers command higher wages, earning 26 percent more than their non-STEM counterparts.

• More than two-thirds of STEM workers have at least a college degree, compared to less than one-third of non-STEM workers.