



LaTech's STEM-Discovery Motivates Educators and Students

Nothing engages student creativity and learning more than giving them real world challenges and the tools to investigate, design and build a prototype with their own hands.

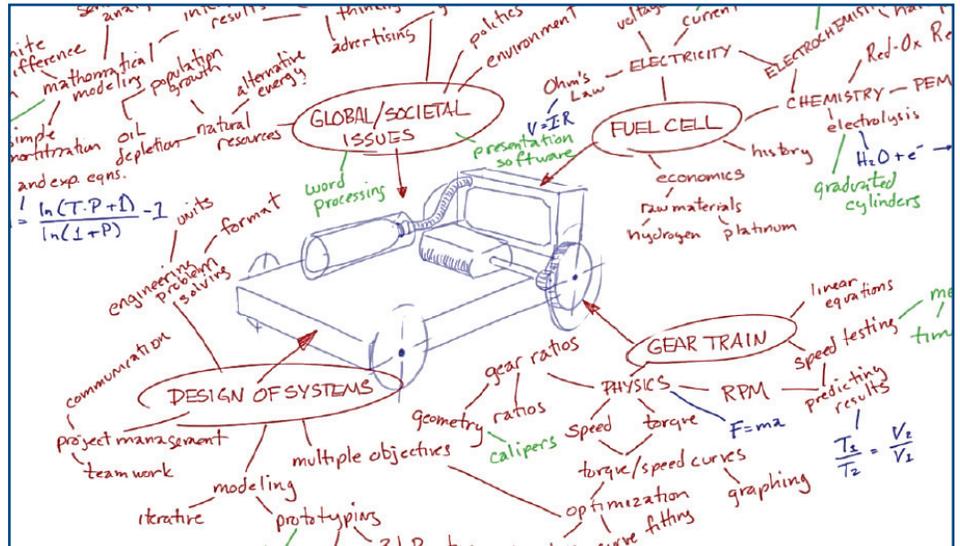
This hands-on approach will be key to STEM-Discovery, a new program led by Louisiana Tech University which aims to directly engage high school teachers and students across Louisiana and to spark their interest in science, technology, engineering and mathematics (STEM) fields.

The primary objective is to provide a foundation for research in effective teaching and learning through the creation of virtual modules centered on a project-driven STEM core. A major focus of the program will be to broaden the participation of underrepresented minority students.

The program is being developed with a \$749,000 "Building Diverse Communities" Research Infrastructure Improvement Track 3 grant recently awarded by the National Science Foundation's EPSCoR Program.

The principal investigators include three Louisiana Tech Associate Professors of Mechanical Engineering: Dr. Heath Tims, Endowed Cajun Contractors Professor; Dr. Kelly Crittenden, Director of the Integrated STEM Education Research Center (ISERC); and Dr. David Hall, Interim Academic Director of Civil Engineering, Construction Engineering Technology, and Mechanical Engineering.

Louisiana Tech has a strong founda-



Mind Map of a fuel cell project utilized in the LaTechSTEP program, which will be drawn upon heavily for development of the STEM-Discovery program. The fuel cell project engaged teams of teachers to be better prepared to motivate their students to explore and connect the relevance of their high school math and science courses to the real world.

tion of successful K-12 educational initiatives to build the STEM-Discovery program from, including: The ISERC, which researches how to best deliver STEM educational content to students; LaTechSTEP, an academic year program that brings context to high school math and science content; Cyber Discovery, an intense week-long summer camp experience for rising high school sophomores and their teachers; NASA-Threads, a hands-on context-based approach to math, science and professional development; and Living With the Lab, Louisiana Tech's signature innovative engineering curriculum.

Over the next five years, the STEM-Discovery team will develop a sustainable, innovative and effective program to deliver STEM content that can be expanded and adopted

throughout the State and the nation. The resulting program will equip high school teachers with the motivation and knowledge required to effectively incorporate STEM topics into their courses. To accomplish this, virtual teaching modules paired with STEM-Discovery camps and design competitions will be developed to facilitate the development of strong analytical skills, creativity and a "can-do" spirit in students.

The STEM-Discovery projects will motivate students' understanding of fundamental STEM topics within the context of interesting real-world design challenges.

During this process, students will be trained in the use of modern prototyping equipment and tools, like 3D printers and engineering design

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A team of students competes in a weight challenge in the Science Olympiad Louisiana Region III. Photo: National Integrated Cyber Education Research Center.

software. Students will also develop their oral and written communications skills as they will be required to work in teams, give presentations and write reports.

The program will be developed in phases, starting with the development of a pilot STEM-Discovery camp and competition for six participating high schools. Professional workshops and virtual learning venues will guide teachers through the engineering design process, and equip them with a context for the science and math they teach.

The pilot camp and competition will be held at Louisiana Tech and will provide critical feedback on the new

curricula materials. The modified program will lay the groundwork for a sustainable STEM-Discovery program.

The next phase will consist of hosting teacher and student weekend workshops. High school teams will work with university faculty and student mentors to compete in a design competition. This phase will lead to the development and launch of virtual modules that will be remotely delivered to help guide teams in the design competition when it expands to include additional high schools across Louisiana.

STEM-Discovery will also serve as a professional development experi-

ence for high school teachers. The workshops and competitions will provide the participating teachers opportunities to network with university faculty and other regional teachers. Workshops will also demonstrate effective use of project-driven curricula to the participants as a direct recruiting tool for high school students.

Experience has shown that one of the primary ways to increase college enrollment in any academic area is close collaboration with high school teachers. Data from the previous programs at Louisiana Tech show an increase of over 35% in STEM enrollment at Louisiana Tech from high schools participating in similar programs.

Replicating such an enormous success across the State can significantly improve Louisiana's STEM pipeline and strengthen participation from diverse communities.

Upon completion of the STEM-Discovery funding period, the materials created as part of the program will be made available to other institutions for use regionally and nationally.

To aid in dissemination of the materials, the team will develop a web site and host additional workshops.