

## **The Northern New York Robotics Institute: A Robotics-based Curriculum Development Workshop for G5-8 Teachers in Mathematics and Science (Central Region)**

The proposed grant is designed to use robotics technology to improve the professional content knowledge and pedagogy of grade 5-8 mathematics and science teachers located in the Saint Lawrence-Lewis BOCES district. This effort will be accomplished via a week long workshop conducted by the Northern New York Robotics Institute: a STEM outreach partnership formed between Saint Lawrence University, Clarkson University, SUNY Potsdam and regional BOCES districts be held at the Clarkson University from July 28-August 1, 2008.

The proposed “Level 2” curriculum development workshop is intended for those teachers who have had prior training in Lego or Vex robotics as a result of having participated in a “Level 1” coaches training workshop offered by the Robotics Institute or having equivalent professional experience. New workshop concepts will be introduced and discussed in a natural progression: (1) the Rigor/Relevance Framework, (2) the engineering design process, including the importance of brainstorming and keeping a journal, (3) using embedded computers to perform real-time data logging and associated off-line data analysis and visualization, (4) how sensors are used in real-world applications, and (5) the development of “Gold Seal” lesson plans.

Workshop participants will be exposed to an Inquiry-based Learning Cycle, where they initially follow guided inquiry procedures, i.e., basic concept demonstrations that have a low level of rigor and relevance associated with each new programming, analysis or sensor concept. This activity is followed by an instructor facilitated group discussion of the participant findings before new concepts are formally introduced in detail. Participants then return to the laboratory to apply what they have learned to an open-ended, hands-on activity called the Rigor/Relevance Challenge that engages them in peer centered-groups to reinforce the new concepts learned with a high level of rigor and relevance.

Each unit in the proposed workshop builds upon knowledge gained in previous units, and the workshop culminates in the development of “Gold Seal” lesson plans that will be peer reviewed and made available to the public on the STEM Partnership web site. A goal is to have the participants run their lesson plans, including pre and post lesson student assessments, in the classroom during the 2008-09 school year. The participants will document their efforts in a design journal that will permit review and reflection of their experiences, as well as being used for assessment purposes, i.e., to help evaluate content knowledge gained. Sufficient time will be provided throughout the workshop for the participants to reflect, process, and discuss how the content and materials can be implemented in their classrooms.

As a result of the proposed workshop, teachers will learn first-hand how to use the power and excitement of modern robotics technology to demonstrate the application of various math and science concepts that they are already required to teach student at the elementary and middle school levels using high levels of rigor and relevance. The robotics kits, software and notebook PCs used by the workshop participants will be retained by the Robotics Institute once the workshop has ended and used to create two mobile classrooms. These setups will be loaned out to the participants on a scheduled, short term basis throughout the 2008-9 school year, to ensure that they can run their workshop developed lessons in their classrooms.