



Corporate Backgrounder

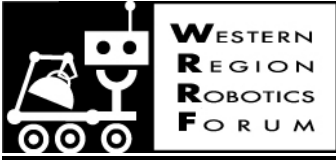
Western Region Robotics Forum, Inc. (WRRF) was formed in 2003 as a California Nonprofit Corporation with IRS 501(c)(3) status. WRRF's goal is to contribute in a meaningful way to the improvement of science, technology, engineering, and mathematics (STEM) education for K-16 students in the United States. In furtherance of this goal, WRRF seeks to:

- Evaluate the effectiveness of Collaborative/Competitive Project-Based Learning (CCPBL) techniques in connection with STEM education
- Promote and expand the adoption and use of STEM-CCPBL programs
- Demonstrate and publicize the recreational value of STEM-CCPBL educational activities for students, teachers, mentors, and the general public
- Engage corporate partners to support STEM-CCPBL participants and activities
- Provide facilities and resources to enable participation in CCPBL activities for groups that would not otherwise have access to such programs
- Increase the utilization of STEM-CCPBL activities by students who have been traditionally underrepresented in those fields of study, such as women, ethnic minorities, and the disabled

Need for WRRF

The scientific and engineering workforce that developed during the 1960s in response to the Cold War and the Space Race is now reaching retirement age. At the same time, fewer high school and college students are pursuing STEM education and careers, leaving fewer young people available to fill the jobs of these retiring scientists and engineers. This problem has been of particular concern to NASA, which now faces the retirement of up to 25% of its workforce within the next five years. The seriousness of NASA's impending "brain drain" crisis has caused Congress to consider legislation to permit greater flexibility in recruiting and retaining its highly skilled workforce.

The report of the National Commission on Mathematics and Science Teaching for the 21st Century (2000) detailed the serious drop in interest for STEM education by students at the K-12 levels during the 1990s. The number of U.S. graduate students pursuing advanced STEM degrees has also declined. Federal legislation enacted in 2001 (known as "No Child Left Behind"), includes a new emphasis on improving K-12 math and science education.



Project-Based Learning

Project-Based Learning engages students in rigorous academic work because they find relevance and meaning in the project and the learning. In the education system, interest in involving students in group projects has been growing for several years. This renewed interest is based on recent research in learning, and a trend toward integration of multiple disciplines in school curriculum.

Of the available Project-Based Learning programs, robotics programs are proving to be extraordinarily successful in motivating students to pursue STEM education and careers. Particularly effective robotics programs include collaborative and competitive aspects that are applied to a project-based learning model. These programs emphasize learning activities that are long-term, interdisciplinary, student-centered, and integrated with real world issues and practices. Such programs make learning relevant to students by establishing connections to life outside of the classroom and by helping them develop lifelong skills. These skills include the ability to cooperate on group work, to make thoughtful decisions, to take initiative, and to solve complex problems. These are the strengths that employers in the technology sector require of potential employees.

Examples of successful STEM-CCPBL programs include the FIRST Robotics Competition, Botball, and the FIRST Lego League. The effectiveness of these programs in encouraging students to pursue STEM education and careers has been dramatic.

WRRF Activities

WRRF is organizing and hosting a number of events to promote Project-Based Learning through demonstration of applied science and technology collaborative team efforts. The best way to raise community and educational awareness of the potential benefits of Project-Based Learning is by showing how it is done and doing it. Through these different venues, many more students, teachers, mentors, parents, industry and community leaders will have the opportunity to experience Collaborative/Competitive Project-Based Learning and teaching first-hand.

Host off-season robotics competitions and events.

Typical robotics competition programs include a design/build period and competition schedule that spans only about four months of the year, limiting the impact of these programs. WRRF extends the time during which students are engaged in these activities by holding off-season competitions and events for participants in these programs. This extended period of engagement results in an educational experience that is tangible to the students and both solidifies and enhances the benefits and lessons of the original programs offered by these organizations. Additionally, off-season competitions held at the beginning of the school year provide an excellent opportunity to acquaint new students with these programs and to reinforce the excitement previously experienced by returning students.



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Conduct educational workshops for students, teachers, and mentors.

Many STEM Project-Based Learning activities require special knowledge or skills that are often not taught at the K-12 level. Workshops and seminars hosted by WRRF educate STEM-CCPBL participants in technology and techniques that are required for success in such activities. Workshops and seminars will be targeted at both the student participants, and the teachers and engineer-mentors who direct the students. Class topics include technical subjects such as drive-train design, animation, electronics, programming, computer-aided design, and machining. Non-technical subjects are also offered in areas including fundraising, team management, group work techniques, problem solving, brainstorming, interpersonal skills, and leadership.

Establish an applied learning facility.

One of the key obstacles to adoption of STEM Project-Based Learning activities is the lack of suitable facilities. Particularly, schools today face the removal or reassignment of space historically devoted to vocational or arts programs. STEM-PBL activities generally require space that can be dedicated to the particular projects for the duration of the project in order for them to be effectively carried out. An applied learning facility managed by WRRF staff will provide a well-equipped machine shop, computer animation and computer aided design (CAD) lab, electronics design and fabrication capability, construction areas, practice areas, and storage for projects in progress -- for use by groups that are participating in a STEM-CCPBL program. Staff and responsible volunteers will supervise the facility at all times.

Promote STEM-CCPBL programs and assist schools in their use.

The purpose of this activity is to assist educators and students in selection of an appropriate SMET-CCPBL program for their school and support groups to engage in. Factors to be considered in the selection process are available facilities, numbers and levels of students participating, ability of the educators and mentors involved to support the activities, and funding sources available to the group. By providing educators and students with a wide range of options and assisting them in evaluating the available programs, we will increase the number of students pursuing STEM education and careers through CCPBL activities.

Facilitate communication between STEM-CCPBL programs.

As the number of STEM-CCPBL programs continues to grow nationally, there is increased potential for overlap and competition for similar resources. These programs have operated largely in isolation from each other. WRRF intends to identify these programs, facilitate communication between them, help them share resources, and provide additional resources that will make their programs more effective. This may take the form of co-sponsored events, and direct or indirect support of these activities by WRRF. WRRF will also compile a directory of such programs for participants, students, and schools.



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Provide grants to groups and teams participating in CCPBL programs.

Financial support is necessary for schools and groups to pursue these valuable programs. Unfortunately, with public education budgets being cut drastically, the costs of these programs are often not funded by the schools. By providing financial support in the form of grants, WRRF will help retain existing teams and expand the program to include many more student teams in these events.

Corporate Officers and Directors

Ken Krieger, WRRF co-founder, President and CEO, has been a mentor for several FIRST Robotics teams over the last five years. Mr. Krieger is an electrical engineer and has worked for employers and clients including Newmagic Entertainment, Tiara Networks, Cisco, Bay Networks. He holds a BS and a MS in Electrical Engineering from Washington University, St. Louis.

Professor James Beck, WRRF Vice-President and Director, is the founder of Engineering Lifelong Learning (ELL), for the College of Engineering at San Jose State University, which offers learning opportunities for Silicon Valley engineering and technical professionals. Prof. Beck has volunteered with the WRRF and FIRST in many capacities and was presented with the Volunteer of the Year Award at the 2002 Silicon Valley Regional FIRST Robotics Competition. A graduate of SJSU with a BA and MA in Industrial Education, he is a tenured Professor in the Department of Aviation and Technology, College of Engineering at San Jose State University.

Sanford Fitch, WRRF Treasurer and Director, is the parent of a FIRST Robotics student. After serving in the US Navy, Mr. Fitch entered the high tech field serving as Chief Financial Officer for companies including Durango Systems, Inc., Komag, Inc., Sandisk Corp., Conceptus, Inc., Cruel World, Inc., and Alvesta Corp. He serves on the Boards of a public medical device company and Financial Executives International. He received his BS in Chemistry and MBA from Stanford University.

Norma Hammes, WRRF Secretary and Director, is the parent of three FIRST students. Ms. Hammes practices law in California, before the 5th, 7th, and 9th US Courts of Appeal, and the US Supreme Court. She is a California Certified Specialist in Personal and Small Business Bankruptcy Law and has represented debtors since 1978. A co-founder of the National Association of Consumer Bankruptcy Attorneys, Ms. Hammes served as its first Treasurer, its second President (1997-2001), and continues to serve as a Director. She has testified before Congress (1998) and has spoken on bankruptcy topics at numerous national seminars and conventions. She received her AB from UC Berkeley and her JD from Santa Clara University.