

IMPACT

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Idaho ROKS: Motivating youth toward science, engineering, & technology careers

The Situation

The goal of the National 4-H Science, Engineering, and Technology (SET) Initiative is to get more kids involved in SET activities, improve youth achievement in SET and ultimately to encourage more youth to pursue SET careers. Research into youth interests indicates that youth, particularly girls, begin to lose interest in science and math in middle school years.¹ Participation in Idaho 4-H demonstrates a similar trend with decreasing enrollments of youth beginning in middle school and diminishing through high school.

Nationally, this is known as the “Pipeline” problem. The “Pipeline” is a metaphor for the educational system providing a “supply” of new scientists and engineers. The problem is that the number of youth pursuing science and engineering education is inadequate to sustain the demand for scientists and engineers. Not enough youth are getting into the “pipeline.” Experts assert that the lack of developing scientists and engineers will severely impact national security, our ability to compete in a global economy, and our standard of living.²

Our Response

Idaho 4-H has taken an engineering approach to the pipeline problem. If we want to increase the output of a pipeline, we need to:

1. Make sure the pipe reaches its destination by providing a cohesive set of programs that span grades K-12 and provide a bridge to post-secondary education;
2. Build a bigger pipe to accommodate greater flow by reaching out to new youth audiences. We need to support the dreams and aspirations of children who see themselves early on as scientists/engineers



The robots, referees, judges, and award winning team at the 2009 Idaho FTC Regional Tournament at the University of Idaho

and we need to reach out to and engage others who do not envision themselves in these roles; and

3. Provide many points of entry and fix the pipe along the way to minimize turbulent flow and to reduce loss due to leaks (e.g., children getting bored with science). The SET Initiative is designed to help children develop motivation from within, which will be the reason they choose to work toward a SET career.

The Idaho Robotics Opportunities for K-12 Students (Idaho ROKS™) exemplifies that approach. Idaho ROKS™ consists of seven interconnected K-12 programs with a deliberate link to higher education. Three of the programs were developed by Idaho ROKS and are specific to Idaho. The other four programs are developed by *FIRST*, a non-profit organization with the mission of inspiring more youth in science and engineering through robotics (www.usfirst.org). Idaho ROKS™ is the Affiliate

Partner with *FIRST* and is responsible for managing the *FIRST* LEGO League (FLL) and *FIRST* Tech Challenge (FTC) programs in Idaho.

In 2007 Idaho ROKS introduced and piloted the *FIRST* LEGO League (FLL) program in Idaho hosting 16 teams.³ This year Idaho ROKS completed the pipeline by introducing the Junior *FIRST* LEGO League for children in grades K-2 and the *FIRST* Tech Challenge for the high school students. Table 1 below provides the names of the individual robotics programs with the respective school grade levels. The programs are progressive so that what children learn in early programs is applicable in and is expanded in the later programs. The programs also grow in terms of expectation and sophistication. Table 1 also shows the increasing numbers of youth enrolled in the programs for the past three years. More importantly, the data in Table 1 show the completion of a K-12 continuum of robotics programs.

Program Outcomes

Table 1. Number of Youth Participating in Idaho ROKS Managed Programs from 2007 to 2009.

Program (Grade)	2007	2008	2009
Jr.FLL (K-2nd)	0	0	50
Idaho TECH (5 th -6 th)	280	270	345
4-H Robotics (2 nd -8 th)	73	324	350
Idaho FLL (5 th -8 th)	80	444	656
Idaho FTC (9 th -12 th)	0	0	73
Vandal Robotics (11 th -12 th)	0	300	100
Idaho FRC (9 th -12 th)	100	153	160
Totals	533	1,091	1,734

Program Highlights for 2009

- Hosted FLL Championship on the UI Campus (656 children plus their families)
 - 3 FLL Teams invited to international events
 - 2 teams to Copenhagen, Denmark
 - 1 team to the U.S. FLL Open
- Hosted first FTC Regional Tournament in Idaho.

Idaho ROKS believes that a contiguous set of programs engaging youth in authentic science and engineering over the long term is critical for sustaining interest and focus in SET fields. Idaho ROKS endeavors to help children build dreams early and work toward those dreams to become scientists and

engineers. We want to help them realize the benefit of putting effort into their K-12 education, to be looking at post-secondary education and potential careers, and to take the courses that will facilitate the pursuit of their dreams.

Idaho ROKS' next steps include expanding the programs and developing coaching and curriculum materials. In addition, we are planning an evaluation system to investigate the impact of Idaho ROKS on short-term indicators of youth interest in SET activities as well as a longitudinal study to see if the Idaho ROKS pipeline has an impact on increasing the numbers of youth matriculating to post-secondary SET education.

¹ Blue, J., & Gann, D. 2008. When do girls lose interest in math and science? *Science Scope* 32 (2): 44-47.

²Committee on Science, Engineering, and Public Policy, National Academy of Sciences (2006). *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*. <http://www.nap.edu/catalog/11463.html>.

³Ewers, T. 2007. 4-H Youth Development Promoting Science and Engineering through LEGO Robotics. University of Idaho Extension Impact Statement, March 7, 2009.

FOR MORE INFORMATION

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