THE DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
STATE OF HAWAII

YEARLY ACTIVITY PLAN (YAP) - FY '09 – FY11

Division/Attached Agency:	**SMSD**
Program Name:	**Robotics**
Program ID:	

I. PROGRAM PLANNING

Problem, issue or opportunity statement: Describe the problem, issue and/or opportunity your program is attempting to respond to.

Hawaii does not have a sufficient number of living wage jobs and qualified workers for such jobs, but these issues can be addressed by providing support for P-12 education and creating interest in STEM (science, technology, engineering, and math) education and careers through contextual learning programs such as robotics.

A collaborative study and profiling of industries in the technology study by DBEDT, Hawaii Science & Technology Institute (HSTI), the Hawaii Science & Technology Council (HSTC) and the Council for Community & Economic Research (CCER) found the following: Hawaii's tech sector has had an annual growth rate of 3.3% compared to the state's 2.5% growth rate; employs over 31,000 people or 3.6% of the state's employment; has 77% of all tech jobs in the private sector; has 1964 science and technology companies in the state; and enjoys a high employment rate which is predicted to grow 50% faster than the rest of Hawaii's economy over the next decade. It was also pointed out that the tech worker makes on average of $63,623 annually, compared to an overall average of $45,963 for Hawaii. Growth in this sector has far-reaching implications and impacts training and skill development for the workforce. It also emphasizes the need to provide STEM education and training for incumbent workers.

This issue is not limited to the tech sector, but is spread among many sectors in the economy, as most all industries require employees that are well–versed in problem solving, teamwork, and STEM; all disciplines covered in scholastic robotics programs.

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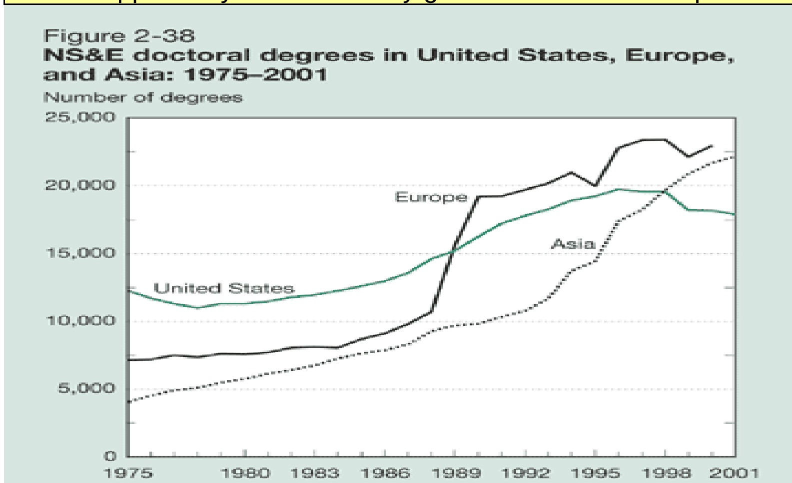
Need and partners: Provide quantitative evidence to show the scope and nature of the problem or opportunity you are working on. Identify partners you will be working with to address the problem, issue and/or opportunity. Describe why government should be part of the solution.



SOURCE: *Science and Engineering Indicators,* National Science Board, Figure 2-38, (2004).

From the chart on the left, it is clear that the United States lags Europe and Asia in producing advanced degrees. This diminishes the competitiveness of the United States and is a direct result of diminished interest in STEM.

In order to provide support for P-12 education and creating interest in STEM education and careers, the government must implement policies and programs that would lead to students, teachers, mentors, universities, and private sectors support. For example, the legislature could provide funding for scholarships (TANF funds) that would allow the students and teams to apply the scholarships to registration fees for scholastics robotics competitions, robotics kits, and stipends for teachers engaged in scholastic robotics programs. The University could provide scholarships (may also be provided by the private sectors) to encourage enrollment to increase the pool of graduates in STEM-focused disciplines that would also simultaneously increase the pool of qualified workers and mentors available. The private sector could assist in ensuring the sustainability of Hawaii's scholastic robotics programs by joining forces and creating an endowment fund specifically for that purpose.

However, just having an increase in the pool of graduates in STEM-focused disciplines would not be sufficient as the performance of these students must also steadily increase. One way for this to be accomplished is for the University to have sufficient funding to hire the number and level of instructors necessary to facilitate the desired result.

Desired results (outputs, outcomes and impacts): What will success look like? Describe what you expect to achieve in the short-term (0-2 years) and long-term (2-6 years).

According to a study by Brandeis University comparing students who are engaged in contextual learning programs such as robotics to a group of comparable backgrounds and achievement in high-school math and science, the students who are engaged in contextual learning programs such as robotics are:

- Significantly more likely to attend college
- Twice as likely to major in science and engineering
- 10 times more likely to have had an apprenticeship, internship, or co-op in their college freshman year.
- More than twice as likely to expect to have a science or technology-related career after college.

As such, in the short-term, we can expect increased university enrollment, particularly in STEM focused disciplines. In the long-term, we can expect an increased pool of workers qualified for jobs that pay a living wage and an increase in the number of jobs that pay a living wage as these workers may evolve into owners of high-technology businesses (with assistance from Act 215/221). We should also expect that these students steadily perform better given the University is sufficiently staffed with the number and level of instructors required for these results to happen.

Assuming these graduates of STEM focused disciplines taught at the University remain in Hawaii, we should also expect an increase in R & D spending, number of patents, amount of venture capital, size and growth of the creative sector, percentage of STEM occupations in the economy, and average earnings in STEM occupations.

Influential Factors: List the factors you believe will support or hinder your ability to impact the problem or opportunity.

Factors that will deliver a high rate of success are:

- Parental support.
- Universities that offer scholarships and mentors.
- Sufficient support to the University.
- A government that establishes policies and programs that encourage students, teachers, mentors, universities, and private sectors support.
- A private sector that provides volunteers, mentors, internships, and financial support.

Barriers to success are:

- Parents that do not understand the implications of having their children involved in contextual learning programs such as robotics.
- Universities that are unable to support prospective STEM-focused students and unable to provide mentors.
- A government unable to encourage students, teachers, mentors, universities, and private sectors support.
- A private sector that is unable / willing to provide volunteers, mentors, internships, and financial support for contextual learning programs such as robotics.

Strategies: List the "best practices" that have helped other programs achieve the kind of results your program promises.

Create a menu of contextual learning programs that allows for a continuum and demand for STEM-related education and careers. For example, FIRST offers 4 different programs targeting 4 different age groups that create a continuum of student demand and interest from K-12. These programs have been proven to deliver the results we are looking for.

Assumptions: State the assumptions behind *how* and *why* the change strategies you have identified will work. Use 'If - then" statements, i.e. "if ______then______ happens."

There are no assumptions as this practice has been proven to be effective, as stated above.

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II. PROGRAM IMPLEMENTATION

Resources: Describe the resources available to support your program.

- PowerPoint Presentation template provided by FIRST
- Funding for scholarships to supplement expenses related to scholastic robotics competitions provided by government
- Funding for scholarships to supplement expenses related to STEM focused fields of study provided by universities
- Incremental increase in the pool of graduates in STEM-focused disciplines that would also simultaneously increase the pool of qualified workers and mentors available.
- Incremental increase in the number and level of instructors at the University.

Activities: Describe each of the activities you plan to conduct within your program.

- Presentation to potential sponsors, mentors, employers, teams (schools), etc.
- Submission of applications for scholarships from prospective teams to pay for registration fees, robotics kits, and teacher stipends.
- Submission of applications for scholarships from prospective students to pay for tuition and education related expenses.

Outputs: For each program activity, identify what outputs you aim to produce.

- Education and awareness of programs for an increased pool of potential sponsors, mentors, employers, teams, etc.
- Incentives to encourage participation of rookie teams and continuation of veteran teams.
- Incentives to encourage students to enter STEM focused fields of study.
- An endowment fund created within the next three years that will generate enough financial support to sustain Hawaii’s scholastics robotics programs.
- An increase in:
  - Proportion and performance of students in STEM programs
  - College readiness, college-going and completion rates
  - Entrepreneurial training and activity
  - University, government and private industry R&D spending per $1000 of GDP
  - Patents issued per 100 workers
  - Venture capital invested per $1000 GDP
  - Percent degrees earned in STEM majors at UH
  - Part-time enrollment in post-graduate education as percent of 25 - 44 year olds
  - Technology sector growth and proportion of jobs
  - Proportion of STEM jobs outside technology sector
  - Growth in R&D jobs
  - Size and growth of the creative sector
  - Percentage of STEM occupations in the economy
  - Average earnings in STEM occupations

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Outcomes: Identify the short-term (0-2 years) and long-term (2-6 years) outcomes you expect to achieve.

- Incremental sponsors, mentors, employers, teams, etc.
- Incremental teams engaged in scholastic robotics competitions.
- Incremental increase in the pool of graduates in STEM-focused disciplines that would also simultaneously increase the pool of qualified workers and mentors available.
- Sufficient funding for sustained operations of scholastic robotics competitions.
- An increase in:
  - Proportion and performance of students in STEM programs
  - College readiness, college-going and completion rates
  - Entrepreneurial training and activity
  - University, government and private industry R&D spending per $1000 of GDP
  - Patents issued per 100 workers
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Impact: Describe the lasting impact you anticipate.

- An increased percentage of high school students attending college, majoring in science and engineering, having apprenticeships, internships, co-ops; resulting in an increased percentage of workforce in science or technology-related careers.
- An increased pool of workers qualified for jobs that pay a living wage and an increase in the number of jobs that pay a living wage as these workers may evolve into owners of high-technology businesses (with assistance from Act 215/221).
- An increase in:
  - Proportion and performance of students in STEM programs
  - College readiness, college-going and completion rates
  - Entrepreneurial training and activity
  - University, government and private industry R&D spending per $1000 of GDP
  - Patents issued per 100 workers
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III. PROGRAM EVALUATION

Indicators: Describe what SMART ('specific; measurable; action-oriented; realistic; and timed') indicators can be collected that would convey the status of your program.

There should be student tracking metrics such as:

- Number of students continuing on to next stages of scholastic robotics programs.
- Comparing students who are engaged in contextual learning programs such as robotics to a group of comparable backgrounds and achievement in high-school math and science, the percentage increase of students who are engaged in contextual learning programs that:
  - End up attending college
  - Major in science and engineering
  - Have had an apprenticeship, internship, or co-op in their college freshman year.
  - Have a science or technology-related career after college
- Proportion and performance of students in STEM programs
- College readiness, college-going and completion rates
- Entrepreneurial training and activity
- University, government and private industry R&D spending per $1000 of GDP
- Patents issued per 100 workers
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IV. ALIGNMENT

Is your program linked to DBEDT's nine strategic objectives?		
1.		Hawaii Five Point Economic Plan
2.		Hawai'i Clean Energy Initiative
3.	**X**	Hawai'i Innovation Initiative
4.	**X**	Global Links
5.		Economic research and data analysis

Note: This form was created using the *W. K. Kellogg Foundation Logic Model Development Guide*, *January 2004*.

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6.		Hawaii Open for Business
7.		Workforce Housing
8.		Planning and Land Use
9.		World Class Infrastructure

Emerging Industries: Does your program impact Hawaiʻi’s emerging industries?	**Yes** ☐	**No** ☐

V. APPROVALS

a. Submitted by - Print Name ______ Submitted by - Signature ______ Date ______

b. ☐ APPROVED ☐ DISAPPROVED ______ Division/Agency Head - Signature ______ Date

c. ☐ APPROVED ☐ DISAPPROVED ______ Director - Signature ______ Date

Note: This form was created using the *W. K. Kellogg Foundation Logic Model Development Guide*, *January 2004*.