

## **Filling the Gaps: Building and Sustaining a Scientific Workforce**

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### **ABSTRACT**

Filling gaps in scientific, technology, engineering and mathematical fields (STEM) with experienced employees have become increasingly difficult. The reduced population of skilled and experienced employees is one of the greatest risks faced by employers (Weber, 2011). Unemployment rates are lower for STEM jobs as compared to non-STEM jobs and at the same time, there is a decrease in STEM graduates (US Congress JEC, 2012). As technology diffuses across industries, demand for STEM capable workers will continue to grow. Filling these gaps becomes increasingly critical as employment in STEM-related fields is projected to grow 17% over the next decade. In the midst of this challenge, Aegis Sciences Corporation, ASC, has seen rapid growth in market share and testing volume over the past two years. In order to fill 236 new STEM positions, ASC has responded to this challenge through five key elements:

1. Development of partnerships
2. Establishment of a global reach
3. Development of a rigorous internal training program
4. Development of paths for career progression
5. Establishment of diversity across scientific areas and technologies

Keywords: STEM, partnerships, training

### **INTRODUCTION**

The foundations of science, technology, engineering, and math (STEM) are becoming critical competencies for more and more businesses. Perhaps the most striking difference between efficiency and inefficiency, between innovation and stagnation, is determined by the ability of an organization to build a skilled, talented workforce that can create and deliver exactly what the client values. Emerging technologies and sciences constantly re-define client expectations; as a result, constant change, research, and the development of new products and services are essential to growth and survival. The time of providing large volumes of the same product or service to the same client-base is no longer a viable strategy. Innovation and change, focused on the creation of customer value, define the spirit of competition. So, how does an organization that sales and delivers science as its primary product sustain and grow an experienced STEM workforce?

Filling employment gaps in STEM related fields with experienced, well-qualified employees has become increasingly difficult. While the demand for STEM employees continues to grow, the number of students graduating with four-year degrees in STEM areas is decreasing (US Congress JEC, 2012). At the same time, unemployment rates for STEM jobs are significantly lower than the unemployment rates for non-STEM jobs. According to US Congress' Joint

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Economic Committee, the 2012 unemployment rate for non-STEM jobs peaked at 10% while the unemployment rates for scientific jobs remained below 5.9%. So, businesses face two critical challenges:

1. Recruiting in an environment with a shrinking candidate base, and
2. Developing a culture that allows for the development and growth of existing STEM team members.

ASC has responded to these critical challenges through five key elements:

1. Development of partnerships
2. Development of a rigorous Internal Training Program
3. Establishment of diversity within the sciences and technologies.
4. Establishment of a global reach
5. Development of paths for career progression

#### **RESPONDING TO THE CHALLENGE**

Traditional and non-traditional partnerships with schools and universities, community groups, and scientific communities play an important role in STEM recruitment. The most common traditional partnerships in the STEM fields are student internships. Through effective internships and externships, grade school through college-level students are inspired and given applied knowledge of STEM-related opportunities. They learn the value of science and technology in a business environment. In addition to internships, involvement in STEM classrooms is a large component of a long-term strategy to promote interest in STEM-related fields. Recent surveys indicate that students become interested in science by the age of 11 (Bayer Corp., 2010). In order to support young learners, involvement with local elementary schools is encouraged through onsite, engaging activities, such as laboratory tours and science fairs. An example of such activities is the creation of an elementary rendition of the Periodic Table of Elements, now reproduced on canvas and displayed both at ASC as well as at the participating school. Externships with regional STEM teachers provide bilateral project work and promote interest in cross-disciplinary STEM applications. Internships and externships not only result in positions filled, but they also support the transition of STEM students from a college to a work environment. Additionally, partnerships with members of the STEM community such as research institutions, other laboratories, technology firms, and professional organizations are essential to supporting a rapidly growing STEM workforce. These relationships create and sustain a learning environment. They allow for symposiums and seminars, shared technology, and expert mentoring of young scientists. A formal recruiting effort proves insufficient to meet the growing demand for well-trained and skilled STEM employees. The challenge is to move from formal recruitment to informal referrals by members of the community. So, partnerships must expand beyond the scientific community. “Science in the community” practically means scientists are actively involved with non-STEM community organizations, including theater, symphony, business clubs and non-profit charities. When the community refers, the benefits are wide-reaching.

With an insufficient number of unemployed, experienced STEM candidates, it is essential to be able to hire young STEM graduates and enhance their academic knowledge with workplace

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skills and applied knowledge. Rigorous, hands-on training combined with theory, practice and interpretation of scientific and mathematical methods provides young, inexperienced team members a foundation to be key contributors. Keys to a successful STEM training program are the use of a blended learning approach, including in-class lectures, guided learning activities and scientific mentoring. The mentors are carefully chosen to be able to guide skill development and provide consistent scientific dialogue. Skills and theory are evaluated through paper and competency testing. An effective internal, STEM training model allows for the integration and dissemination of knowledge across the multiple disciplines, including engineering, IT, pharmacology, chemistry, etc. In addition to supporting recruitment, an effective internal training program develops a more flexible, cross-trained workforce. It promotes a culture that values scientific dialogue and shared expertise.

Success at Aegis Sciences Corporation (ASC) has been through the planned and careful execution of these five elements. In order to achieve a growth in a STEM workforce of over 24% per year, ASC has focused heavily on the establishment of a culture that promotes diversity in knowledge, the development of individual skills, new knowledge acquisition, and STEM-based career progression. As STEM employment is expected to grow by 17% over the next 10 years (US Congress, JEC, 2012), ASC is developing a pipeline of knowledgeable and capable STEM graduates from every degree level, with 66.4% of STEM workforce holding bachelor's degrees, 16.4% master's degrees, and 5.3% doctoral degrees. These employees represent a global reach from five different continents. It is only through meeting the ever-growing challenge of filling the STEM employment gaps that ASC is able to continue to grow and develop new scientific services for its clients.

#### REFERENCES

- Bayer Corporation (2010). *Building a Diverse United States STEM Workforce: Perspectives on Creating Successful Business Education Partnerships*. Retrieved from: [http://www.bayerus.com/MSMS/web\\_docs/80104\\_STEM\\_RELEASE1e.pdf](http://www.bayerus.com/MSMS/web_docs/80104_STEM_RELEASE1e.pdf)
- US Congress Joint Economic Committee (2012, April). "STEM Education: Preparing for the Jobs of the Future." Retrieved from: [http://www.jec.senate.gov/public/index.cfm?p=Reports1&ContentRecord\\_id=92c8daf4-47c8-416a-bfa4-984cc8b6525a](http://www.jec.senate.gov/public/index.cfm?p=Reports1&ContentRecord_id=92c8daf4-47c8-416a-bfa4-984cc8b6525a).
- Weber, L. (2011, December 5). "Fine Tuning the Perfect Employee: Companies Take to Training Staff, New Hires to Make up for Low-Skilled Workers." *The Wall Street Journal*. Retrieved from <http://online.wsj.com/article/SB10001424052970204397704577074791844935520.html>.

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