

## Developing Partnerships for STEM Internships

*Providing students with a “deeper dive” STEM experience*

by Lon M. Stettler

STEM education is at an interesting place in its development as it transitions into the next phase of its journey: partnerships. Currently, partnerships have helped advance research in STEM learning and assessment, teacher training, and funding for student competitions. According to a new study by the research firm Millennial Branding, high school internships are not only for college students. There is a new trend in business partnerships that provide high school students with relevant, real-world internship experiences including STEM fields (Schawbel, 2014).

This emphasis on partnerships is appearing at the national level. In 2015, ITEEA’s theme was *Building Technology and Engineering STEM Partnerships*, and at the regional and state level, the University of Cincinnati’s STEM Conference theme for 2015 was *Expanding STEM Resources: Connecting Classroom to Community and Career*.

### The Notion of an Internship

School districts across the country are working to prepare all their students for the future. This means giving students the skills they need to be college-, career-, and innovation-ready. In the STEM fields, solid preparation means giving students deeper, richer, and more relevant learning experiences through internships that complement rigorous coursework. There is a call for action in ITEEA’s *Standards for Technological Literacy* for business and industry leaders to persuade professionals within their companies to provide relevant, hands-on experiences for students (ITEA/ITEEA, 2000/2002/2007).

The idea of an “internship” is usually associated with a university-level experience for upper-level college students, but this idea is changing. One Ohio school district just north of Cincinnati, Lakota Local Schools, has witnessed how valuable STEM internships can be for students as early as their junior and senior years in high school. The school district has established partnerships with area businesses and organizations to provide a different notion of an internship at its two high schools.

Lakota uses the term “internship” to mean a “deeper dive” field experience consisting of rotations or sessions to expose students to a variety of possible careers ([www.lakotaonline.com/internships/](http://www.lakotaonline.com/internships/)). Some rotations occur in small groups while others may be one-to-one. Each internship generally lasts anywhere from several weeks to a semester and may or may not include financial compensation.

Lakota’s notion of internship goes much deeper than job shadowing which oftentimes is a short-term experience in which a student follows or “shadows” an employee as he or she performs normal work activities. Typically, job shadowing is a half-day or a full-day field experience or a tour of a business or organization. Job shadowing is necessary and very beneficial, but not always sufficient for a high school student to discover the most desirable career path.

High school student internships represent a unique, innovative, nontraditional educational approach based on the research of experiential learning. Internships combine classroom and

real-world experiential learning. Research has shown a direct correlation between the internships in which students have participated and the ultimate career paths which they select (Student Internships, 2008).

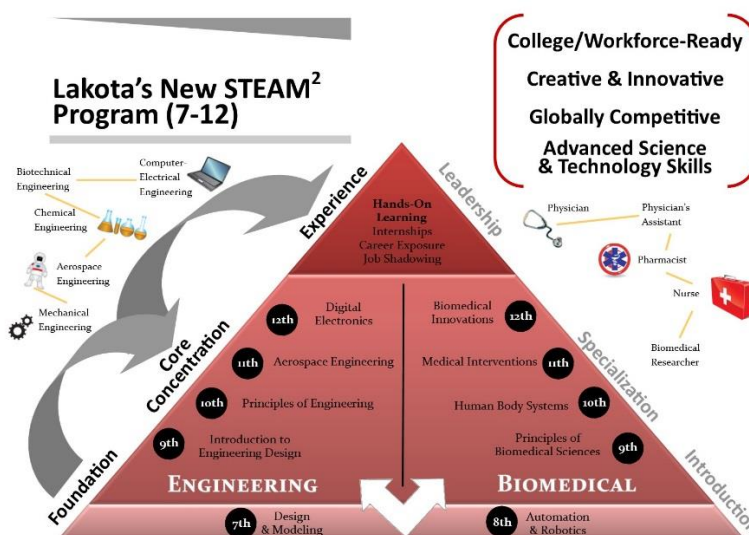
For employers, high school internships now represent more than the typical form of corporate community service. Internships are a method of attracting and accessing workforce talent to add to their talent pipelines in high-demand career areas to remain competitive (Schawbel, 2014). For students, interning can increase maturity levels and improve their self-confidence and self-concepts as they explore various career opportunities (Student Internships, 2008).

### Student Internships: A Two-Pronged Approach

Lakota took a two-pronged approach: 1) Develop the STEM curriculum pathways extending from grades 7-12 and 2) Develop a “deeper dive” internship program to complement that secondary curriculum. Lakota added two new pathways to the traditional STEM framework, naming it STEAM<sup>2</sup>, for science, technology, engineering, arts/design, mathematics and medical (www.lakotaonline.com/STEAM<sup>2</sup>). The program was built to strengthen both workforce development and college readiness. STEAM<sup>2</sup> establishes two foundational pathways: Engineering and Biomedical. At the high school level, each pathway consists of four rigorous courses culminating with a local internship (see Figure 1).

School district leaders believed that relevant field experiences in the form of a “deeper dive” internship program should be created to complement the STEM curriculum in engineering and biomedical sciences. Internships could extend the rigor, effectiveness, and impact of its academic and STEM courses.

Figure 1 Lakota’s 7-12 STEAM<sup>2</sup> Program



Early input from students indicated that they had a general idea of their career interests, but little exposure to what professions in that field do on a daily basis. One student said she was interested in engineering, but didn’t know the difference between a chemical engineer, a

mechanical engineer, or an aerospace engineer. If she could spend some time with a variety of engineers, then she would have a much better idea of the field of engineering about which she might be passionate. Lakota understood that a good internship program would help students discover a career they are most interested in as much as what they are not interested in pursuing.

After talking with area business leaders, the school district found that employers in highly technical and specialized professions such as the engineering and biomedical fields traditionally recruit college-level students, but that they believed the recruiting process began too late. These employers desired to begin their recruitment efforts as early as high school by offering students internship experiences to attract them to the technical and specialized professions. The school district started partnering with local businesses specializing in the engineering and biomedical fields, and then expanded to other fields.

### **Two Models of Internships**

Through the internship partnerships with businesses, two different internship models have emerged: a district-managed internship model and an employer-managed one. Lakota currently has ten business partners who offer twelve different internship programs. Seven of the internship programs are in STEM serving about 75 students.

#### **District-Managed Internship Model**

Six of Lakota's internship programs in STEM are district-managed programs serving about 65 students.

In this model, a key teacher is selected at each high school to serve as the point person for students. The teacher informs students of the internship experience (through the high school's website and daily announcements), receives student applications, and participates on the district team to interview and select students for the program. Documents on the website include a promotional brochure, the program description (timelines, schedule to rotations or sessions), and the student application form.

Students at least age 17 apply directly to the school district (rather than the business or organization) by submitting their completed application and transcript to the key teacher. The key teacher screens student applications to determine the students who will be interviewed.

Once the interviews are completed, selected students and their parents participate in an evening informational meeting at the business facility. The purpose of the meeting is to ensure that there is a mutual understanding of expectations and requirements (i.e., attendance, confidentiality, dress code, requirements for high school credit) of the internship. The student sign a *Student Internship Agreement Form* and the parent signs a *Parent Consent Form* with the school district. The business may also require the student and parent to sign a *Confidentiality Agreement* or *Liability Waiver*.

Students participate in and complete an on-site orientation prior to or at the beginning of the actual rotations. Students provide their own transportation to and from the internship site to participate and complete each rotation or session. On a rotation, students observe the professional in action, interview the professional to learn of the career path that he or she has

taken and the skills needed for the position, and sometimes participate in simulated work experiences – all to see how their academic courses are applied in a real-world setting.

Students complete each rotation or session, writing a reflective journal for each rotation/session connecting their internship learning with their high school courses. Students submit the completed reflective journals to the key teacher. Once student's reflective journals are accepted, students are awarded elective high school credit (with a grade of pass or fail) for the internship experience. Teachers receive a modest stipend for their time invested beyond the teacher work day in all aspects of the internship program – from recruiting students, to interviewing students, to evaluating reflective journals, to assigning high school credit.

### Engineering District-Managed Internship in Action

*“So, you think you want to be an engineer?”*

One successful engineering partnership that Lakota created was with Procter & Gamble at its Engineering Technology Center in West Chester, Ohio. Selected high school juniors and seniors from the district's two high schools participate in six, four-hour rotations. The rotations include modeling, simulation, and analysis engineering; mechanical engineering; electrical (control systems) engineering; cost engineering; materials and welding engineering; and process engineering.

Students provide their own transportation to and from Procter and Gamble. To minimize missed class time, students attend the rotations during the state graduation testing week (for sophomores) and spring break week.

*Student Selection.* The district developed a promotional brochure and an application that is distributed through the high school science departments to high school juniors and seniors who are at least age 17. Interested students complete the brief application, which includes the students' transcripts and statements about how the internship furthers their career goals. The science department chairs work with their departments to review the applications and identify finalists who are typically students who have completed or are currently enrolled in Honors Chemistry, AP Chemistry, and CP or AP Physics, and have completed an engineering course. These students participate in a short interview led by a team of district and high school administrators, science department chairpersons, and engineering teachers at the district office.

Students are informed about the decision for the internship within 24 hours. Selected students are given two required agreement forms to complete: a student internship agreement and a parent consent agreement for the internship experience and permission to drive to/from the company. Procter and Gamble also requires the student and parent to sign a confidentiality and liability waiver agreement. Each student is provided with a syllabus that describes the internship experience and each rotation.

Selected students and their parent(s) participate in a required information meeting one evening at Procter and Gamble, which is conducted by a Procter and Gamble engineer and a school district administrator. The purpose of the meeting is to ensure that there is a mutual understanding of expectations and requirements of the internship (i.e., attendance, confidentiality, dress code, requirements for high school credit). A parent and the student must sign a confidentiality agreement form with Procter and Gamble to participate in the experience.



Examples of the “deeper dive” learning experiences that students have in engineering include observing how modeling and simulation experts use physics and math in their daily work; seeing how modeling processes are used in Procter and Gamble; learning of how high performance machines are developed for production of consumer goods; seeing a demonstration of new mechanical equipment being constructed and tested; solving a real engineering development problem; learning how robotic technology is used in manufacturing; hearing about the best programming methods for material feed systems; learning about proper materials for construction of machines and products and the role of corrosion; and understanding how ingredients behave in complex fluids and granular materials.

Each student is required to complete a reflective journal for each of the 6 rotations. Once the internship experience is completed, students submit their reflective journals and are awarded one-fourth unit of elective high school credit, entitled “Engineering Internship” for the 25-hour internship experience.

A partnership agreement was drawn up to clarify expectations and commitments, as well as to protect the student, the school district, and the company. This guarantees the experience is mutually beneficial for all involved. The student receives a relevant learning experience and validation of his or her interest in the engineering field. The school district is able to expand its educational program to include a real-world, hands-on learning experience for its students. Procter and Gamble benefits by attracting potential employees into not only the engineering profession, but possibly its organization as well.

### **Employer-Managed Internship Model**

Two of Lakota’s internship programs in STEM are employer-managed programs serving about 10 students.

In this model, students apply directly to the business partner rather than the school district to be considered for the internship experience. The syllabus for the internship is developed by the business partner or organization. The length of the internship is determined by the student and the business or organization, and students must be at least 17 years old to apply.

The business partner conducts an informational session at each high school to make students aware of the internship experience. In addition, the business partner point person receives the

student applications, screens and interviews students, and makes the final selection of the students for participation.

Selected students and their parents are asked to participate in an informational meeting at the business facility to ensure that there is a mutual understanding of expectations and requirements of the internship (i.e., attendance, confidentiality, dress code, and any monetary compensation). The school district and the business partner sign a *Student Referral Agreement*. The parent and student sign a *Parent Consent Form* with the school district. The business partner requires the student and parent to sign a *Liability Waiver Form*.

Students are asked to participate in and complete an on-site orientation prior to the start of the actual rotations. Students provide their own transportation to and from the internship site for all sessions. During the sessions, students observe the professional in action, interview the professional to learn of the career path that he or she has taken and the skills needed for the position, and develop technical skills and competencies over a period of time (a semester or school year).

Students may apply for high school credit for the internship through the school district's Credit Flexibility process. Students are awarded elective high school credit for the internship experience based on the student's approved Credit Flex Plan. Pay/compensation for the internship is at the discretion of the business partner.

The employer-managed internship program is modeled after the internship program developed by the National Academy Foundation (NAF). The NAF internship model is referred to as "the gold standard for high school internships" (College and Career Ready, 2015).

The school district does not prefer one internship model over the other, as each model serves the needs of both students and business partners.

#### Engineering Employer-Managed Engineering Internship in Action

A successful partnership for employer-managed internships is with Kinetic Vision, a global, full-service engineering and design firm in Cincinnati, Ohio. This program is for students interested in mechanical engineering, biomedical engineering, aerospace engineering, software development, computer engineering, or graphic/digital design.

Rather than participating in rotations, students must drive to Kinetic Vision three afternoons each week after-school for sessions across the duration of the internship (one semester or full year).

The design and engineering syllabus for this internship include these topics:

- Computer skills, including leading-edge design and CAE (computer-aided engineering) software products; and

- Experience with these processes:
  - Finite Element Analysis
  - Product Design and Engineering
  - Inspection Engineering
  - Custom Software Development
  - Concept Ideation
  - Industrial Design
  - Prototype Development
  - Product Visual Communication



*Student Selection.* A representative from Kinetic Vision comes to the two high schools and present the opportunity to interested students. Students apply directly to the engineering firm which then screens, interviews, and selects the students for the internship.

*Credit.* Under this model students are paid for their work at an hourly rate. While students can receive high school credit, they must do so by applying through the district's Credit Flexibility process.

*Learning Outcomes.* The engineering firm, rather than the school district, takes the lead on providing the students with a syllabus of the learning experiences.

*Duration of Internship Experience.* Rather than participating in rotations, students must drive to Kinetic Vision three afternoons each week after school for the duration of the internship. The length of the internship is decided on between Kinetic Vision and the student, ranging from one semester to the full school year. Obviously, the full-year experience gives students a deeper dive into the topics on the syllabus. Students are evaluated by the business partner point person in the form of a sit-down meeting with the student.

*Student Response.* One of the program's first student participants wrote a letter following the completion of the internship program. In his letter, the student attests to the unparalleled power of getting a hands-on field experience as early as high school. He worked alongside the company's full-time engineers and college-level interns. "It was an eye-opening experience that gave me an inside look at the field of engineering," the student wrote. "In ten weeks, it reaffirmed my aspiration to become an engineer and to learn more in the field of biomedical engineering. Going into college this fall, I already know I have a leg up on other students."

This student credits his experience with teaching him how to use a wide range of engineering programs, work collaboratively in a group, and solve problems in the workplace.

### **Getting Started: Making Internships Work for You**

To get started, it is critical to create a shared internal vision for the internship programs by both school leaders and business partners. That vision should focus on helping students explore and find in-demand careers (especially in STEM careers) that they may be passionate about. One of

the obstacles that Lakota faced initially was that the potential business partners did not see the need to offer an internship program to high school students to recruit students into high-demand career fields. Three years later, we are finding more potential business partners willing and interested in providing such experiences to high school students to attract talented into their business.

Second, do the legal research with the school district's attorney on the legal agreements for the partnership agreement between business and school district, the student agreement form, and the parent consent form. A second obstacle that Lakota faced with potential business partners was with the issue of risk exposure including confidentiality and safety of students at their business sites. Lakota and its business partners have addressed the issue of risk through the partnership agreement between the business and the school district (through mutual hold-harmless language) as well as in the student internship agreement between the student and the school district.

Third, select or appoint an internal educator to serve as the point person for developing relationships with local businesses and managing all internship programs. Fourth, scan the community or region for opportunities for internships and career shadowing and begin making contacts.

Fifth, work with business partners and agree on the internship program objectives and learning objectives of each rotation that students will experience. Agree upon the timeline and schedule of all activities related to the internship, including application deadline, interview dates, parent/student evening meetings, and dates and times of all rotations, any credit options, and any assignments. In addition, agree on how the internship program will be promoted and advertised to students (i.e., through teachers only, business representative visit the high school for a brief presentation to interested students, etc.). Invite a representative from the business or organization to come to the high school to conduct a brief informational session for interested students (if business partner is willing). In collaboration with the business, create an individualized rotation schedule for each student if the model has students dispersed across departments for their rotations.

Sixth, agree upon the amount of elective high school credit for the internship experience. For a district-managed internship, the amount of credit is determined by the district. Agree upon the process of how the teacher receives and evaluates the completed reflective journals submitted by students for each rotation, assigns a pass/fail grade, and assigns elective credit for the completed internship experience. For an employer-managed internship, the student will apply for the amount of credit through the Credit Flexibility process.

Begin small (1 or 2 business partnerships), implement well, and grow the program.

### **Conclusion**

STEM education is poised to expand its reach through “deeper dive” student internships. These experiences really do expand and extend the STEM curriculum by giving students’ first-hand experiences with what professionals in a specific field do on a daily basis. As a result, more students get broader exposure to high-demand STEM careers, see the connection between their coursework and workplace requirements, and may discover a career they are passionate about – sooner rather than later.



### References

*College and Career Ready*. (March, 2015). National Academy Foundation. Retrieved from NAF website <http://workbasedlearning.naf.org/college-and-career-readiness>

International Technology Education Association (ITEA/ITEEA). (2000/2002/2007). *Standards for Technological Literacy: Content for the Study of Technology* 3<sup>rd</sup>. Ed. Reston, VA; Author

Schawbel, D. (February, 2014). *The High School Careers Study*. Millennial Branding. Retrieved from Millennial Branding website <http://millennialbranding.com/2014/high-school-careers-study/>

Stettler, L. (2015). *Internships*. Retrieved May 29, 2015 from Lakota Local Schools website: <http://www.lakotaonline.com/internships>

Stettler, L. (2015). *STEAM<sup>2</sup>: Your Pathway to the Future*. Retrieved May 29, 2015 from Lakota Local Schools website: <http://www.lakotaonline.com/STEAM>

*Student Internships*. (2008). EBSCO Publishing Inc. Retrieved from EBSCO website <https://www.edscost.com/uploads/imported/thisTopic-dbTopic-1072.pdf>

#### Brief Biography

Lon M. Stettler (Ph.D) is Executive Director for Program Development and Strategic Partnerships for the Lakota Local School District (Ohio). He has been a high school teacher and administrator, serving as a gifted coordinator for nine years and assistant superintendent for 11 years. Dr. Stettler has made presentations on partnerships for student internships at the ITEEA Conference and the University of Cincinnati's STEM Conference. He is published in *Gifted Child Today Magazine* and *Electronic School*. He earned his doctorate from Miami University and he has served as an adjunct instructor at the graduate level for several universities.

