



Advantages of the LIFT² Program

Preface to the LIFT² Annual Report for the Massachusetts' Department of Education

LIFT² (Leadership Initiatives for Teaching and Technology) has been in existence for four years, and as the external evaluator, Sun Associates has developed a unique perspective of the project. The evaluators have watched LIFT² evolve and mature as three cohorts of teachers have actively participated in sequential implementations of the program. The project director has created a successful program of professional development for secondary school (grades 6-12) science, technology, engineering and math (STEM) teachers based on a unique collaboration of industry, higher education and K-12 schools. LIFT² has been recognized by the State Educational Technology Directors Association (SETDA) as one of eight programs nationally to be "on a critical pathway to meeting NCLB goals through effective technology use".

From its inception the program managers focused on ensuring that regional implementations of LIFT² could be brought to scale and could be replicated across multiple regions. The four critical design factors are:

- Refine and standardize the externship model and procedures to engage businesses as sponsors/mentors
- Package the academic program and develop delivery models (online plus face-to-face) with higher education partners that can make delivery consistent and provide high quality instruction
- Develop relationships with district leaders to engage their reinforcing support for teachers
- Contain the program operating costs to levels that are sustainable through corporate sponsorship of teacher externships and modest academic and administrative funding support.

In reflection upon three years of collected program data and observations, the evaluators feel that the LIFT² model is suitable for statewide replication.

At the present time, four key stakeholder groups have benefited from the LIFT² program: the participating teacher cohorts, the administrators of the teachers' school districts, the local businesses that have sponsored teacher externships, and the higher education institutions. These four groups have been engaged to deliver a focused program of professional development courses to emphasize technology integration in STEM

curriculum, project-based classroom learning and 21st century skills. The benefits to each group are discussed below:

Participating Teachers

The evaluators have monitored teachers participating in professional development activities, interviewed them during their externship experiences, and observed them in their classrooms as they implemented the lessons plans they developed while in the LIFT² program. It is clear that the teachers have found LIFT² to be a valuable experience that has impacted the way they teach STEM-based courses.

As shown in the following quotes, the importance of authentic externships to the professional development experience cannot be overstated:

- Science - I personally believe that the externship is invaluable to the goal that the program is trying to meet (that is, to get more students interested in STEM related jobs in America). Without the teachers actually experiencing it for themselves, I believe it makes it a bit more difficult for them to be able to get their students interested and excited about it. With the externship, I will be able to bring back stories, pictures, and answer questions they may have (and they will probably have a lot of them after seeing me in the “bunny suit”).
- Math – Students need to know that the effort necessary to be successful in STEM courses is worth it because of the kinds of jobs they can get
- Physics – Externships exposed me to Excel and PowerPoint in industry, tools that are used constantly, and all students need to have these skills and not be afraid to use the technology.

The opportunity to learn how to integrate technology into STEM curriculum instruction is a cornerstone of the LIFT² program.

- A math teacher in the third cohort commented on a lesson plan developed during an online course in the program.
 - The unit I developed incorporates more use of technology (than she has used previously) and I have developed more ongoing assessments that provide students with incentives to pay greater attention to course materials. I also improved my methods of having students understand the big picture standards that the unit addresses.
 - Another said: “LIFT² has improved my ability to develop curriculum that is based on student understanding and to enhance that understanding through the use of technology.
- Physics - (Teachers are) now able to use the tool effectively because we are comfortable with the technology...(I can) see a real difference (in) students’ use of technology because of their comfort level

- Math - (Students) used spread sheets when they work with formulas – something she used in her externship
- Speaking about her experiences in LIFT² both as an extern, and as an online student, one math teacher said:
 - At the very least, I should model the current technology, so the school can “catch” up with what the working world does on a daily basis.

Exposing teachers to 21st Century skills – communication, collaboration, critical thinking, problem solving and more are a function of both the industry externship and the academic program design:

- A math teacher who collaborated on Instructor’s Manuals for mathematics texts with editors from a publishing firm said:
 - I have gained a great understanding of the publishing industry, the corporate world, and what skills are needed in a publishing career. I have learned a lot about the critical thinking skills and advanced communication that is necessary to make this company run...I believe I can help my students to better understand the critical thinking that is needed in the “real world” and the necessity to be able to communicate clearly and professionally.
- Another teacher discussed the benefits of working with her peers in the LIFT² academic program:
 - Teaching is so isolating and we don’t have time to collaborate sometimes...this has been really good to have some down time.... it’s been really neat to be able to talk to our neighbors...I feel more energized right now than normally [after school has ended]...because I’ve been talking to people. That’s somebody else now that I can turn around and say, OK, what lesson plans do you have that are really great? That’s another person that we can turn to outside of our district
- A math and science teacher commented:
 - Students need to learn ways to organize and graph data...her students created a survey, collected data in small groups, decided how to graph the data and presented results to the class...Used math graphing skills in science classes, first by hand then using Excel

School Administrators

The project director is working to establish formal leadership teams within participating schools, including superintendents, principals and department heads. These leadership teams will focus on supporting their LIFT² teachers by acknowledging their accomplishments, and promoting the program within their schools. Many administrators

have already seen benefits from the LIFT² program, and would like to see the program expanded in their schools. In discussions with local school administrators, it is clear that many want to concentrate on a successful STEM-focused program/model for long-term improvement of instruction in their schools. One principal said:

- Instead of starting a new initiative each year, we should continue to support a project like LIFT² for several years

Administrators value the LIFT² teachers as resources in their districts.

- One asked a math teacher to present to the High School math and science departments about the LIFT² program and this helped (the math teacher) to make personal connections with them, and to have her involvement recognized by her peers.

Another benefit for school administrators has been the cross-fertilization that has occurred between school districts as the cohorts of teachers have worked together in their professional development activities. Thus teachers can share lesson plans and even resources between districts.

- One cohort two teacher said:
 - I have created working relationships within the district and across districts – I shared my curriculum unit with colleagues in my dept and with teachers I've met in LIFT² (from other districts).

When asked “How do we take what you've learned in this project and leverage it for others – both academic experience and in your classroom – to pass it on?”.

- Several teachers responded:
 - Math - Not yet able to track students (for effects of the program) but relationships at Marlborough middle school have been created through LIFT²
 - Science – (I) have created working relationships within (my) district and across districts – (she) shared her cu (curriculum unit) with colleagues in her dept and with teachers she's met in LIFT²
 - Science - (As) a minority, (and a) woman in science (her) work in the robotics lab at Northeastern brings real-world experience into her classes. The LIFT² program helped (her) to use technology in the classroom, i.e. in her unit on heat, she brought ibooks into her classes and found setting due dates was difficult, so when she was on the tech committee she could address some of the issues of using tech in her classroom. (I) presented to the High School math and science depts. about the LIFT² program and feel administrators need to be supportive of the needs of science teachers to help students obtain the skills they need.

Finally, administrators have promoted the LIFT² program at their school committees: a Waltham teacher demonstrated her LIFT² curriculum unit to the Waltham School

Committee with two of her students; and a Marlborough teacher with the program director made a presentation about LIFT² to the Marlborough School Committee.

Local Industries

When an area business agrees to host an extern for the summer, they assign an employee to serve as mentor for the extern. During interviews with the evaluator, each mentor expressed the opinion that the externship was a valuable experience. Several noted that a *longer* externship would have been even more valuable. Some felt that a longer externship would have allowed the teacher to experience more facets of the company's work.

All mentors the evaluators interviewed felt that the teachers were a positive – although very temporary – addition to their staffs, and all agreed that they would consider hosting an externship again in future years. Most also expressed the wish that the extern would “not be a stranger” or actually return to the company at a future date. As one mentor said:

- I highly support Biogen Idec's participation in the program next summer and in fact, I would welcome [teacher] back to our lab if he wanted to return...Thanks for allowing us to participate in the program and we would be happy to host a teacher again next summer. My only critique of the program is that 5 weeks is too short for an internship. It was fortunate that [teacher] came into our lab with previous bench science experience which allowed him to hit the ground running. I suggest that the program next year be expanded to at least 7 weeks

While the benefits of the program are having a direct impact on the teachers and their schools, the local companies that have sponsored externs perceive their participation as having advantages in future recruitment of well-trained employees. When asked why his company sponsored an extern, the Manager of Operations Engineering for KeySpan said:

- KeySpan is a strong supporter of community programs and the Engineering Department is dependent on new recruits with technical backgrounds.

However, the company benefits are not just for the long-term - teacher/externs do meaningful and productive work at their companies during their externships. When a communications manager from Intel was asked if the externship was beneficial to the company, she replied:

- Absolutely. We wanted to get some help to implement some projects and were able to meet expectations. In addition, Intel wants to get science and technology in the classrooms so this enabled that.

The company representatives did indicate that they would like the externships to be established early in the school year for the next summer. They felt that they could provide a better experience for the teachers if a confirmed commitment had been made in the fall to sponsor a teacher. The Senior Director of Analytical and Chemical R&D for EPIX Pharmaceuticals said:

- Companies should be approached sooner. This will allow them more time to develop an effective program for the teacher.

Higher Education Partners

Over the course of the LIFT² project, the area that has seen the most change has been the design, implementation and delivery of the professional development courses for the participating teachers. From the start, Lesley University has provided overarching leadership for the development and evolution of the LIFT² academic program. The delivery of professional development courses has evolved into a blended model of online and face-to-face instruction which meets the needs of adult learners for any-time, any-place instruction, while reinforcing the opportunity for community building through periodic group sessions.

Lesley University, the WIDE World Professional Development Program (Harvard University) and more recently, Framingham State College have all made important contributions to the evolution of the LIFT² academic program. There are three core elements of this program:

- Technology integration in STEM curriculum
- Project/Inquiry based instruction
- 21st century skills development.

As a result of formal assessments and informal feedback from the teachers, it became clear that the academic program must address the differentiated instructional needs of teachers. In-service teachers come to this program with a wide range of experience, needs and interests related to the core academic elements of the LIFT² program. To meet such a diverse range of needs, interests and abilities, the academic program must be flexible yet cost effective while offering consistently high quality courses.

To position the program for scale and replication while addressing the requirements of differentiated instruction, the program director has initiated a relationship with Framingham State College to deliver the core elements of the LIFT² academic program. In collaboration with LIFT² academic leadership staff, Framingham State College will deliver two online courses designed to complement the sixteen-month face-to-face seminar course delivered by LIFT² instructors and consultants. In the future, the program director envisions the possibility of offering a selection of courses from a variety of higher-education institution that are centered on the goals of technology integration in STEM, Project/Inquiry instruction and 21st century skills development.

Summary

The evaluators find that in only four years, the LIFT² program has benefited all of its major stakeholders: participating teachers, school district administrators, local businesses, and institutions of higher education. Sun Associates has evaluated numerous 170 grants, and we feel that the LIFT² program represents a substantial differentiation from other grants, not only in terms of the complexity and scope of the project, but also, and most importantly, in the intent from inception that this program be designed for scale and replication. It is the evaluators' opinion that this successful program should be replicated and that organizations that choose to do so must approach the program development in a multi-faceted fashion, developing externships with local businesses, providing participants quality professional development graduate credit courses, and fostering relationships with local school administrators.

In addition, this project offers the potential for significant additional learning about its impact over time from a longitudinal evaluation of students who have been taught by LIFT² teachers. These longitudinal evaluations should explicitly look at improvements in awareness, interest and motivation of students related to STEM careers after participation in LIFT² curriculum units.

The substantial success of the LIFT² program clearly indicates that it identified the need for schools to develop curriculum units that will encourage students to persist in STEM related courses and ultimately choose careers in STEM related industries. This is not just a local or state need; therefore, the program has the potential for national replication.