

Lehigh University
Launch-IT (Information Technology)
Annual Report
June 30, 2009

Participants

NOTE: Information has been updated 6/25/09

What people have worked on your project? *PI/Co-PI*

Dr. Glenn Blank
Dr. Henry Odi
Dr. H. Lynn Columba

Launch-IT Program Director: Ms. Colleen E. Solomon

Teachers

Jennifer Walz, Harrison-Morton Middle School

Jane Carr, Broughal Middle School
Chad Neff, Dieruff High School
Mia Husovsky, Paxinosa Elementary School

Summer Program

Thomas Derhammer, Louis E. Dieruff High School
Jane Carr, Broughal Middle School
Chad Neff, Dieruff High School

Graduate IT Assistants

Isaac Rieksts
Mike Sands
James Evans

Summer Program

James Evans
Chris Janneck
Nick Moukhine
Isaac Rieksts
Mike Sands

Undergraduate IT Assistants

Gregory Martin
Safiya Nieves
Cieola NeSmith
Chelsea Gotch
Carolina Velasquez
Edward Wong
Nicholas Anshant
Ana-lulia Alexandrescu
Gregory Brander
Michael Williams
Matthew Prestifilippo

Summer Program

Zahir Carrington
LaToya Josephs
Luis Adames
Elizabeth Roth
Natalie Green

Saifya Nieves
Darrell Ray
Krista Coville
Leah Brooks Nash

What other organizations have been involved as partners?

Casa Guadalupe, the Boys and Girls Club of Allentown, Easton, and Bethlehem, TechGyrls, KidsPeace and the Southside Initiative of Bethlehem, PA, all helped to recruit participants for Launch-IT, as well as school administrators and teachers in local school districts and charter schools.

Have you had other collaborators or contacts, including with other NSF funded Projects?

LV STEM Project

Much of the curriculums offered were developed through the STEM program.

Several local corporations under the leadership of Alvin Butz Company for the construction for of the Mission Control Center that will advance Information Technology curricula at Harrison-Morton Middle School in the Allentown School District. The construction is now underway, starting fall 2009, the new Mission Control Center will be operational and linked to the Martian Landscape previously constructed in the basement of this inner city middle school. The project will cost over \$150,000. The Launch-IT program plans to use the Mission Control Center during the upcoming academic year program.

Activities

1. Describe the major research and education activities of your project.

Brief overview of project

The vision of the Launch-IT program is to launch at risk students in the Lehigh Valley towards college and careers in Information Technology (IT). Launch-IT participants are 6th through 12th grade students who are academically and socio-economically at-risk (as determined by their school advisors), especially girls and underrepresented minorities, who need a boost to succeed in school and go to college in IT related fields. The Launch-IT Program has hosted sessions in spring 2007, summer 2007, the academic year 2007-2008, summer 2008, and the academic year 2008-2009. The 2008-2009 Launch-IT program consists of monthly Saturday meetings throughout the academic year and a three-week summer program.

Launch-IT provides a year-round program where students are exposed to a diverse range of IT inspired projects & activities to inspire and challenge young minds. Students work with college professors, certified and motivated teachers from middle and high schools in the Lehigh Valley, IT professionals, and undergraduate & graduate students from colleges in the Lehigh Valley area.

In order to promote and support academic achievement in the classroom, Launch-IT students have tutoring sessions every Launch-IT Saturday with college students & teachers. To empower students to strive to be college-bound, Launch-IT students are exposed to information about college through guest

presentations about the admissions process, financial aid and career paths. With continued parental involvement, support from local middle & high schools, and the enthusiasm & work ethic of our Launch-IT teaching teams, we seek to launch students into their academic futures with confidence & curiosity.

Launch-IT Student Participation

2008-09 Academic Year

Number of Students Enrolled	-	94	
Returning Students	-	44	
New Students	-	50	
Males	-	35	
Females	-		58
Hispanic/Latino	-	55	
African American/Black	-	18	
Caucasian	-	16	
Asian	-	2	
Other	-	3	

Summer 2008

Number of Students Enrolled	-	71	
Returning Students	-	16	
New Students	-	55	
Males	-	47	
Females	-		24
Hispanic/Latino	-	32	
African American/Black	-	15	
Caucasian	-	21	
Asian	-	3	
Other	-	n/a	

A Description of Key Activities:

Summer 2008

During the three week 2008 summer Launch-IT sessions, the Launch-IT students received eight one-hour sessions dedicated to a computer hardware workshop. The students learned about the ports, motherboard, expansion cards, processor, hard disk drive, memory, and power supply. Virtual videos were shown to the students to help explain the role of each piece of hardware and how they work inside a PC. With guided instruction, students were then able to disassemble and reassemble PC hardware components by using computers that were donated by Lehigh

University. Students learned the proper procedures for removing and installing each piece of hardware. After the computers were reassembled, Lehigh donated them to Dieruff High School where IT Academy students could use them for learning.

The robotics team students learned how to control high levels of robots with ER1 mobile robots. To ground their understanding the kids learned some science behind the robots. The students also learned a great deal about web design, as this was their final project. They were also able to learn how to make an LED flashlight, which they were able to take home.

The Fuego Flash team students worked primarily with Macromedia Flash. Those new to Last summer The Fuego Flash Team used Flash to create podcasts. Each student brainstormed a topic that reflected their interest, then created storyboards for their podcast and followed the storyboards as they used Flash to complete all graphics and ActionScript in their podcast. Those with more Flash experience in Launch-IT developed a more advanced hangman game, which required that they learn more skills in ActionScript, the programming language for Flash. Students also made web pages using Dreamweaver to showcase their Flash projects. Daily outside activity involved collecting data and creating spreadsheets and graphs from the data. For example, students used a hula hoop and measured how far they could toss it and how long they could hula hoop. On the computer they recorded the data and created a bar graph that visually showed the information. Some students presented this information in front of the group and practiced their presentation skills.

The Java team also split into novice and experienced groups. The novice group began learning object-oriented programming in Java by following our design-first curriculum, with the help of multimedia from *The Universal Computer* and the DrJava programming environment, until they were able to create a simple movie ticket machine, adventure game, or graphics program. The advanced group learned more Java constructs that enabled them each to create a web site wizard to allow people without HTML knowledge to create web pages quickly. After asking the user questions, such as colors, fonts, links etc, it would generate the HTML

Fall/Spring 2008 – 2009

After an orientation meeting in October 2009, in November 2008 Launch-IT featured a guest speaker for 8th-12th grade students, while 6th and 7th grade students were part of a research team project. The research team, which consisted of Lehigh University faculty, had devised MyRulerMaker: an instructional game aimed at helping change middle-school students' perceptions about computer science. It provides a simple interface where students can create strategies to beat a real-time strategy game and displays sample pseudo-code encoding these strategies. MyRulerMaker allows learners to experience iterative design. Learners try a strategy, see how this strategy performs in the game, and make adjustments to it in the next iteration. Most, if not all of the 6th and 7th grade students were intrigued by this game. The guest speaker for the rest of the teams was Dr's. Warren and Robin Heydenberk, who have much experience working with at-risk youth. The students were tasked with creating a plan to solve a major problem facing society, and each group came up with interesting and diverse ideas. They students were engaged and interested in this activity, and enjoyed sharing their ideas with one another.

In December, for the morning session we had guest speaker, Dr. Gary DeLeo, who is a professor of physics at Lehigh. His program title was: "The Exploration of Space." He used images, videos, and spacecraft models to describe some of the more notable space adventures - human and robotic - as well as more recent missions. He described how we got to the moon, and how we might go there again, and how we might travel to Mars. He also presented descriptions of on-going missions, and how the Launch-It students can learn more by going to NASA websites. Dr. DeLeo was very effective in capturing the students' interests and attention; we even had some parents come out for this great presentation.

Launch-IT Competition

In January the students started a competition that brought in many different aspects of team work. The goal of the competition was to get the students to not only learn how to work in groups, but learn how to work well with their peers. Every session was a different group assignment. Each winning team was given points, and at the end the team with the most points would win the overall competition.

During the morning session in January, the students were split into 15 teams of 5 or 6 students with the goal of creating their team name and logo. These groups would remain the same throughout April; the end of the competition. At the end of the competition the winning team would get their own t-shirt with their logo on it. The students enjoyed the first activity, but some were annoyed that they had to be separated from their friends. The goal of the diverse teams was to allow them to meet others outside of their friends at Launch-IT. Starting out, the students did have some trouble opening up with each other, but by the end of the competition they were working well together and communicating with each other.

The morning session for February was the second part of the competition; the egg drop. The students were instructed to work in their same groups from the last session to create egg landers that would support their eggs. The students came up with amazing ideas, given the supplies they were allowed to use:

- a paper lunch bag or a plastic shopping bag
- 2 - 3 balloons
- two paper clips
- toothpicks
- three 8 1/2 x 11 inch sheets of paper
- masking tape
- bubble wrap
- drinking straws
- rubber bands
- markers



There were several groups whose eggs did not break; therefore the students were awarded points based on their team work and creativity.

For the March competition the students were instructed work with their teams to build a bridge out of popsicle sticks and glue. The objective of the project was to make a bridge that would sustain a substantial amount of weight. The students were shown a sample bridge built by Nick Anshant; an IT Assistant, so they would know what was expected of them.

In April; the end of the competition, the teams finished up their bridges, and they were tested to see how much weight they could hold. The group whose bridge held the most weight won the points.

In May, the winning team was awarded with their own t-shirt. The students were thrilled with having what they designed on their own shirt.

Daily Activities

After each morning session the students broke out into their team assignments based on grade level. Each team had their own curriculum and IT projects.

During each Launch-IT session students had tutoring time to receive help from undergraduate and graduate students on their school subjects and homework assignments. Lehigh was not the only college to support Launch-IT tutoring with undergraduate volunteers, as Cedar Crest College and their community service organization arranged for undergraduate student volunteers to travel to Lehigh University to work with Launch-IT students during their tutoring time. Those students that were having difficulty in a subject received additional support while other students were working ahead in subjects, and some students utilized online tutorial programs such as Math 24 and PSAT prep programs for high school students.

Launch-IT is fortunate to have graduate teaching fellows whose research and studies explore the issues facing our at-risk Launch-IT students concerning their involvement in the information technology. We are proud that in addition to working with at-risk students our graduate teaching fellows are developing and exploring solutions to the recruitment and retention of students interested in studying information technology.

College Plans for Launch-IT Seniors

A good number of our graduating seniors are going on to college to pursue the information technology field, and have stated specifically that Launch-IT has helped them realize how important this field is. One of the parents has said: "His (Daniel Coronel) self esteem was boosted when he realized how easy it was for him to learn and comprehend all the hardware and software programming and robotics being taught during this three week period. Daniel is more confident in knowing that computer science and robotics is what he truly wants to do in life." Some of the graduating seniors and their college majors are:

1. Kyle Afflerbach: Lincoln Technical School to study Computer Science
2. Carlos Chevere: Northampton Community College to study Computer Science
3. Rafael Perez: Capitol College to study Computer Science
4. Angel Vasquez: Northampton Community College as a general studies student, with plans to go to law school eventually.
5. Harpreet Sembhi: University of Pittsburg to study Bio-engineering

6. Daniel Coronel: Penn State University to study Computer Engineering

Luis Adames, as mentioned from last year will be entering his sophomore year at the Rochester Institute of Technology to continue his degree in Computer Science. Both Luis and Harpreet (mentioned above) will be working as IT Assistants for the summer 2009 Launch-IT program. They both have been with the program since the beginning, and will be a great asset to have working with the incoming Launch-IT students.

Processes used and materials developed including field-testing and acceptance by target communities (e.g., Informal institutions, school districts)

PI Glenn D. Blank and the Launch-IT Graduate Fellows organized the second chapter meeting of the Lehigh Valley Computer Science Teachers Association on June 4th, 2009. However, due to a weak response from the teachers to our RSVP, this meeting was canceled. Many teachers then responded requesting that the meeting be rescheduled, and we have plans to do so in September. Launch-IT fellows will present new initiatives and promising results, including to the improved Mars Rovers simulator, the Fractions Tutor, Debugging Tutor, our web site and for disseminating and evaluating novel curricula.

Impact information on students, teachers, parents, staff/faculty, communities, and institutions, including numbers (i.e., include information on how students, teachers, parents, staff/faculty, communities, and institutions have changed and how many of each were impacted).

Please refer to evaluation by external evaluator, Jean Russo, for student impact data, in a separate attachment.

Processes used for participant (Youth-based) recruitment and retention (include parental involvement, if appropriate).

Launch-IT made an effort to establish and maintain parental investment in the program by creating an Opening Ceremony orientation and question and answer for parents and guardians. Throughout the year parents were invited to attend college preparation presentations by representatives from the Admissions Office and Diversity Recruitment Office and the Office of Financial Aid. The Closing Explosion is the end of the year student presentation and reception for parents to experience a taste of what their children have accomplished during the program. At the Closing Explosion each team had a chance to share all of their IT projects completed during the year. The team presentations are fun way to get other students interested in the projects of the other teams, reinforcing the benefits of remaining in the program and graduating to the next team.

Student Recruitment for summer and academic year sessions was conducted in April, August and September 2009.

Student recruitment is an essential aspect of the Launch-IT program and provides certain challenges as in comparison to other established youth programs as Launch-IT is only in our third year of carnation. Colleen E. Solomon; the program director, was able to visit about 25 schools each twice during the recruitment process. This allowed the Launch-IT materials and information to be personally delivered,

and teachers and guidance counselors were better informed about Launch-IT. By personally delivering the material, this ensures that the students will have a better chance to learn about Launch-IT, and hopefully apply.

In addition to visiting local high schools, the Launch-IT Program Director visited middle schools and elementary schools Allentown, Bethlehem and Easton areas. It is important to include elementary schools whose students go up to 5th grade. Those schools that were familiar with the Launch-IT program from recruitment from last year received updated Launch-IT promotional materials and Launch-IT applications. Guidance counselors across the board were eager to encourage their students to attend the Launch-IT program due to the free admission into the program and free transportation provided for students to and from the Launch-IT.

In addition to reaching out to local schools for student recruitment throughout the Lehigh Valley, connections were made with local service organizations and after-school programs. Launch-IT promotional materials were sent to the Boys and Girls Clubs of Allentown, Bethlehem, and Easton. Other organizations included Casa Guadalupe in Allentown, Kidspace in Bethlehem, Techgyrls in Bethlehem, and the Southside Initiative in Bethlehem, PA.

Cost Sharing sources and amounts (per award letter) if this is applicable.

The Rossin College of Engineering and Applied Science has awarded a Dean's Assistantship to a new Launch-IT graduate student in 2008-2009, James Evans, as well as another new student for 2009-2010, Gregory Fedynyshn, matching the stipend support from NSF ITEST,

Additional support from sources other than NSF (e.g., industry, academic, government)

Academic Outreach at Lehigh University

Project goals for the year and short overview

- Recruited over 90 students to participate in a full year of Launch-IT programming
- Launch-IT students, grades six through twelve, were recruited from throughout the Lehigh Valley Area including five districts Easton Area, Wilson Area, Bethlehem Area, Allentown Area and Salisbury Township.

Recruited undergraduate and professional IT assistants

- During the academic year there were ten IT assistants hired to assist teachers in the classroom and serve as role models to the Launch-IT students. One IT assistant was returning from the 2008 summer session and one IT assistant was a local IT professional working with the Java team.

Assistant Training Session, July and October 2008

- Launch-IT volunteers and IT assistants attended a workshop to learn the program expectations and their specific responsibilities as teaching assistants, tutors, and mentors. All members of the Launch-IT support staff signed commitment letters explaining their job responsibilities and Launch-IT program expectations.

Recruited Volunteers from local colleges

- Launch-IT partnered with The Community Service Organization at Cedar Crest College in Allentown, Pennsylvania. Cedar Crest provided an enthusiastic, experienced group of volunteers

during the academic year to tutor in the classrooms helping students with science, reading and math.

College exposure and preparation for Launch-IT students and parents

- Representatives from Lehigh University's Financial Aid Office and the Office of Admissions and Diversity Recruitment presented pertinent information to the Launch-IT students and parents. The events were scheduled to start to get our Launch-IT students thinking and planning for their college bound futures. Parents were invited so they could continue or begin to engage their children in the planning of applying to college and finding financial aid opportunities.

Closing Explosion

- Students, parents, guidance counselors, school administration, and Launch-IT teaching teams celebrated the end of the Launch-IT academic year with presentations from Launch-IT students. Each team had the opportunity to present their collection of IT projects; the presentations included a Java coded word game, jukeboxes, Flash animated public service announcements, WebPages, Power point presentations, and robots that the 6th and 7th grade teams built.

Staff Recruitment

The PIs recruited a new program manager, Colleen Solomon, after the summer 2009 program. Ms. Solomon is committed to remain with the program through its completion and has done an excellent job expanding our recruitment of Launch-IT students from across the Lehigh Valley.

In terms of Launch-IT staff, we expanded the number of college students involved and recruited nine undergraduate information technology assistants, with various college backgrounds. In addition to having staff members with IT background, it was important to have a multifaceted group of college students involved providing different role models and success examples for the Launch-IT students.

In addition to having undergraduate representation on the staff, Launch-IT had five graduate students who had been recruited as LV STEM (GK-12) graduate fellow participate in Launch-IT for a week, as part of their orientation for their LV STEM appointment. These graduate students served as a valuable asset to the classrooms, as they added to the diversity of our teaching staff in terms of their educational background and career aspirations.

Volunteer Recruitment

For the 2008-09 Academic year Launch-IT was able to attain 10 volunteers between Cedar Crest and Lehigh University, which is the most the program has had. Because of this, more students were able to get the attention they deserved and the help they needed to succeed in school. All Launch-IT volunteers and IT assistants attended a training session before beginning to work for the Launch-IT program. The workshop reviewed all expectations and responsibilities and provided staff a chance to meet and greet.

Creative Activity Time

In addition to exposing at-risk students to the field of information technology and college opportunities, Launch-IT incorporated an additional educational feature to stimulate students. Students were exposed to a creative activity time that focused on teamwork and communication skills,

self-expression, and games intended to exercise the imagination. These activity sessions were designed to increase self-confidence, generate appreciation and respect for one's peers, enhance public speaking abilities, and broaden their imagination. Students responded positively to the creative activity time as it provided a great balance to the educationally rigorous program and allowed students to continue their personal development socially & artistically.

Publications and Products:

Blank, G. (2008). Launch-IT, *Society for Technology Education (SITE 2008) Conference*, March, Las Vegas.

Columba, L. (2008). Enhancing mathematics and science concepts through children's literature. *Pennsylvania Council of Teachers of Mathematics Magazine*, 46(2), 10-13.

Ganesh, T., Thielen, J., Malyn-Smith, J., Na'im, A., Ebenezer, J., Blank, G. D. (2009). Implementing Innovative Technologies to Enhance STEM Education in K-12 Settings: What do youth know about and what can they do with technology? *Society for Information Technology and Teach Education (SITE)*, Charleston, SC.

Moritz, S. and Blank, G. (2008). Generating and Evaluating Object-Oriented Designs for Instructors and Novice Students, 9th International Conference on Intelligent Tutoring Systems, Workshop on Ill-Formed Domains, June, Montreal.

Parvez, S. and Blank, G. (2008). Individualizing Tutoring with Learning Style Based Feedback, 9th International Conference on Intelligent Tutoring Systems, June, Montreal, pp. 221-231.

Rolón, A., & Columba, L. (2008). Constructing bridges, constructing knowledge. *Mathematics Teaching-Research Journal (MTRJ)*, 2(3), 62-73.

Contributions:

PI Glenn Blank supervised the development of a prototype Fractions Tutor, an intelligent tutoring system which helps students who struggle to perform operations on fractions. Throughout the academic year, James Evans; Graduate Assistant for the Fuego Flash team, had been working on an Intelligent Tutoring System focusing on fractions. The system mimics how a teacher would teach the subject of fraction mathematics. This is done through an Expert Module, a Pedagogical Module, a Student Module, and the Interface. When the Expert Module finds a student's answer to be incorrect, the Pedagogical Module will look at the student's proficiency in various concepts needed to solve fractions, and will provide lessons and drills to bolster weak areas of understanding. Through testing, we found statistically significant results showing with 95% certainty that use of the tutor over a period of 25 minutes would improve a 6th grade class' ability to answer 2.21 to 4.46 more questions correctly, when used in between an identical 20-question pre-test and post-test. Running the same evaluation on a group of 7th graders showed statistically significant improvements on average ranging from 0.23 to 1.56 more questions answered, again with 95% certainty. Based on student performance and survey responses to the last round of fractions tutor evaluation, lessons and drills will be added or improved, with a planned testing session during the summer Launch-IT program. Results will be submitted to educational technology and mathematics teaching conferences.

PI Glenn Blank also supervised the development of a Debugging Tutor, an intelligent tutoring system which helps students learn how to diagnose and correct bugs in Java programs. Debugging is a crucial problem solving skill for successful computer science students and software developers and a potential stumbling block for novices. Debugging is difficult to teach in a classroom setting, since it is primarily learned through practice. The Debugging Tutor presents students with snippets of Java code, which students can edit and compile (within the tutor). They can also request hints from the tutor, which it gives in increasing levels of detail upon request. The tutor monitors each student's progress in a dynamic student model, selecting problems based on the success students have had thus far with problems covering a range of concepts. Launch-IT graduate fellow Mike Sands continued developing the Debugging Tutor and performed preliminary evaluation in a local high school, which have been promising. Further evaluations are continued in this summer program of Launch-IT, leading to publications in a computer science education conference.

Addendum

Dr. M. Jean Russo's evaluation report is a separate addendum.