Justin Reeder ASEE Conference Report

Saturday, 21 June 2008

Goals for attending 2008 ASEE Workshop on K – 12 Engineering Education

1. Obtain ideas for extension activities for either the American Physical Society's 2008 Physics Quest outreach kit or the Society of Physics Students' Outreach Catalyst Kit.
2. Investigate possible methods for applying my major of Engineering Physics in a nontraditional sense in the field of Informal Education.
3. Investigate an organization which has members in fields of design and applied physics.
4. Learn about another organization's methods for informing the public about the activities of its members and the educational outreach programs involved in such endeavors.
5. Compare and contrast ASEE with the member organizations of AIP.
6. Professional networking with various companies and organizations involved in the fields of physics, engineering, and education.

Introduction

About a month before I was to fly to Washington D.C. to begin my second year as an SPS summer intern working on physics policy and educational outreach with SPS National, I came across a conference which really caught my interest. It was called the ASEE Workshop on K – 12 Engineering Education. You see, I am a senior Engineering Physics student attending college at the University of Wisconsin—Platteville. I have a unique interest in getting involved in physics/engineering outreach and wanting to explore a career in informal education.

Last year as part of my internship I attended a summer conference held by AAPT in Greensboro, NC. There I presented on the work I had done that summer on the SPS Outreach Catalyst Kit at a poster session. I then took part in some of the teacher workshops and had the opportunity to talk to many other companies and organizations involved in physics education.

The AAPT conference was a really big aid in my career searching for getting into education as it allowed me to talk to all the people and companies involved in all aspects and levels of physics education. There was information on teaching physics from elementary through collegiate level of academia…Not to mention all the vendors who support teaching with their products: from lab equipment, to textbooks publishers, and curriculum developers. They were all there and indeed it was a wonderful time.

So now you can see that after the success of my attending the last conference with AAPT, my excitement doubled when I saw a conference with ASEE for 'Engineering' education. Last year I was able to explore the possibilities with the 'Physics' part of my major and this year it would be the other half. When the weekend of the 21st rolled around I rented a nice Chevrolet Aveo from Enterprise Rent-a-Car and I headed out for beautiful Pittsburgh, PA where the workshop was to be held at. This workshop was to be a part of a larger conference but since I would be attending another conference later on in my internship I didn't want to take off too much time from my work on finding extension projects for the APS Physics Quest.

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Registration

After a nice continental breakfast at the hotel I stayed at in downtown Pittsburgh, I headed for the convention center which was only a few blocks away. I picked up my name tag and registration info in the lobby and for the first time I had the opportunity to meet one of my contact people for my attendance at the workshop, Kristen Farole, who was the K12 Coordinator and Public Policy Associate for ASEE.

Since I had arrived a bit early, Kristen directed me to where the booths were set up for the exhibitors. She then introduced me to a few of them and then let me explore the area with some of the other attendees. I met a really nice exhibitor, Ms. Susan Powers, from Clarkson University. She explained to me the display she had which was a game for elementary school students to learn about energy usage and conservation techniques. It was a really unique game, but what really caught my attention was when she said that it had been developed in part by two graduate students who were working in engineering education development.

Opening Address

Xavier Fouger, Director
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Dassault Systemes Global Learning & PLM Academy
Website: http://www.3ds.com/education/

After I was done talking to Susan, I glanced at my watch and realized that I had better hurry up to the next room where the opening address was going to start in a few minutes. I grabbed a seat just as the organizers of the event were just sitting down behind the head table. Then, Dr. William Kelly, manager of public affairs, who was another one of my contacts from ASEE, began with a few opening remarks on the days events and then he introduced the guest speaker for the morning address.

Mr. Fouger discussing how engineering requires the integration of several core classroom subjects.

His name is Xavier Fouger, the director of Dassault Systemes Global Learning & PLM Academy. He began his talk by showing us examples of newspaper articles from across the globe showing, showing how companies in the older industrialized nations of the world are beginning to show statistics of declining numbers of students enrolling in engineering programs. One example was an article in the International Harold Tribune on Japan. According to recent statistics by the Education Ministry, Japanese student enrollment in science and engineering majors has dropped by nearly 10% since 1999. Now this came as a bit of a shock to me since I had always known Japan to be one of America's chief competitors in the technological race. If they are beginning to feel the pinch I can only

guess that our country must be facing similar problems in this technological race. Are we falling behind as well?

After this question was implied by the presentation, Mr. Fouger presented us with the beginnings of a solution which has been slowly being developed by various countries for some time. One key aspect in the engineering of new technology is that you have to make technology itself available in the classroom. And today, one major piece to that is the computer, and software which is used to create virtual images of things we dream of building. And that is the beginning for inspiring new engineers. But this technology cannot just be available to colleges and universities but also to high school and middle school programs as well.

So one way that some companies are trying to increase interest in technological fields is to make their products more accessible to K – 12 schools and teachers. Dassault Systemes, along with various other software companies, are now offering more workshops to educators so they can learn how to use their products. The companies then offer reduced licensure deals to the academic institutions if they train their faculty in the use of their software and incorporate the software into classes for the students. An example

However, from listening to Mr. Fouger's presentation, this is only an initial step for one solution to solving a very complex problem. Not only do you have to foster creativity by introducing current technologies into the classroom but we must also teach how technology itself is developed through a process which applies academic knowledge from core classes taught in school. This is where the teaching of the "Engineering Design Process" comes into play. But why should this be something new taught in the classroom and what are the advantages of adding yet another to be taught by overburdened teachers?
The advantage of teaching this process is that it is all inclusive and integrates many core subjects covered in class into one project. Working on a design problem incorporates several subjects including: business, art, physics, chemistry, biology, math, technical education, and several others.

But incorporating this Engineering Design Process into school curriculums will take time and much cooperation between several aspects of the education community. So what is to be done in the mean time? One way is to get students exposed to this engineering process is to encourage student participation in extracurricular design competitions. An example of one such competition is the Formula One Technology Challenge also known as *F1 in Schools*.

This competition is composed of teams of 3 to 6 students who design and build a small CO_2-powered racing car and then they race them at various regional, national, and even international competitions. Now this might not seem too spectacular except for the fact that these students are using state-of-the-art computer programs which use computer aided design (CAD) and computational fluid dynamics (CFD) technology just like real race car designers. Not only do they have to design their racer but then they also have to go through the entire business aspect of it as well from drawing up a business plan, getting sponsors, manufacturing setup, and finally a presentation in front of a panel of judges. All this for just one project but if you take a look a the vast majority of skills needed from the students in order to participate in

All of this is incorporated into one design project for the students. The wide range of skills and content matter that are needed to work on this project is comprehensive. Some of the skills utilized include: communication skills, leadership, science, mathematics, business, and even public speaking to name some. These competitions are growing in popularity and they are one of the ways engineering is getting a new look and getting promoted.

References:

Engineering Design Process
http://en.wikipedia.org/wiki/Engineering_design_process
F1 in Schools
http://www.f1inschools.us/

Session: A

K – 12 Science, Technology, Engineering and Math (STEM)

Sharon Vladutu, Sales Representative
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PCS Edventures
Website: http://edventures.com/imssc/nsimssc/

After the opening session with Mr. Xavier, it was off to my first session. I had chosen this session because of my interest in finding out what solutions companies were coming up with to provide teachers with the tools for educating their students in STEM subjects. PCS Edventures looked to be a good place to start. Plus I was hoping to find a few neat ideas for Physics Quest.

Candy Legos used as an icebreaker.

The session began with our presenter, Sharon Vladutu, handing out edible Lego's candies to everyone in the room. I was surprised when I bit into one and it tasted like Sweet Tart Candies. She explained that she had picked them up just before the conference from an internet order from Debbie's Sweets 'n Treats which is in Cedar Creek, WI. I thought this was the coolest ice breaker ever and I just had to take a picture of them to show my friends back at home. Otherwise they wouldn't believe my story.

Sharon Vladutu giving her presentation on PCS Edventures products.

Once we had a chance to try the Lego candy, Sharon launched into her presentation. She explained to us that PCS Edventures was a company that specializes in designing labs for students in grades K – 12 and in post secondary institutions. On September 27, 2000, an important report was released by the National Commission on Mathematics and Science Teaching for the 21st Century. This report was

called the Glenn Commission Report and it would be the first of many later reports that would begin to initiate a change in how STEM subjects are to be taught.

In this report, K – 12 science and math education is targeted for reformation in order to keep the U.S. competitive in an increasingly technological market. This report saw that in order to raise the quality of instruction in these subjects, the focus of the reform was to be focused on teachers. This focus would rely on more teaching recruiting, teacher preparation, in-service support, and more professional development.

To do this, the report called for achieving three goals:

1. Establish an ongoing system to improve the quality of math & science teaching in grades K – 12.
2. Increase significantly the number of math and science teachers and improve the quality of their education.
3. Improve the working environment and make the teaching profession more attractive for K – 12 math and science teachers.

Now at around the same time this report was released, the International Technology Education Association also put out a set of suggested guidelines for what they recommend students in grades K – 12 should learn about technology. These later became known as the ITEA Standards and have later since gone though a lengthy developmental process including a review by the National Academy of Engineering and the National Research Council. They have since been endorsed by the Council of the National Academy of Engineering. These standards are not intended to be a blue print for stand-alone classes but rather are meant to be integrated into the existing classes of math, science, social studies, language arts, art, music, and other subject area.

In order to meet this increasing demand by our society for knowledge into what has now been coined as STEM Education (Science, Technology, Engineering, and Mathematics), companies and organizations such as PCS Edventures have been evolving and developing products and curricula to meet this growing concern.

PCS Edventures' solution is that they take something that children already do naturally, play with toys, and they turn it into a learning experience. They incorporate science, technology, engineering, math, and other core subjects by working with toy manufacturers, such as Lego, K'Nex, and Fischertechnik, to make specialized toy kits. Then PCS Edventures' team of professionals comes up with activities and curricula to go with these kits to become educational modules available for sale to educators.

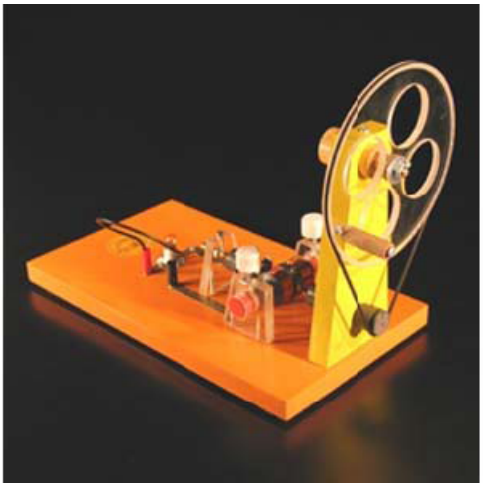
PCS Curriculum developers rely upon the most recent research in *Project Based Learning*. This concept of learning requires teachers to present students with some sort of project or problem which students have to work together to achieve the goal. Along the way students learn how to use what they have learned in class and how it may be applied.

To verify this theory of learning and to test out the proposed products PCS Edventures wished to make, they performed field testing of one of their pilot modules at 12 Peruvian schools with the

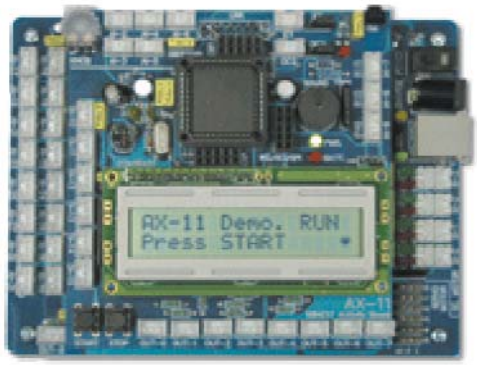
objective of introducing technology into primary grades. After testing this system for a year and getting promising results, the study was extended for another year by the Peruvian Ministry of Education and was expanded to include 130 schools. Results returned showed that the students had improved in testing of their core classes over groups that had not been exposed to the system.

Now the company has expanded its product line of educational modules to cover several STEM topics of study for grades K – 12. Some of these include: *Academy of Engineering, Academy of Robotics, Academy of Electronics, Brick Lab*, and several others. PCS Edventures has also developed modules applicable at the collegiate level for instruction as well.

Brick Lab



Academy of Science



Academy of Electronics

Examples of PCS Edventures learning modules for STEM courses.

After this presentation our presenter then broke us up into two groups and then put a task before us. In front of us was a big box of Legos. Our task was to build the tallest tower we could make which wouldn't tip over in 10 minutes. Totally awesome since only a few months ago I had done a similar project with marshmallows and spaghetti as an ice breaker at the U.W. River Falls Zone Meeting.

Well, the results of the competition ended up that my group placed second. We lost by 10 Legos but we had a lot of fun building that tower. What followed, though, was the really cool part. We began to discuss what principles we had used in working on the project and what we had learned from working together. It was pointed out that both teams had built towers with a wide base and a narrowing top, an engineering concept. How if we wanted to, we could incorporate cost of materials into the project to make it like construction. Other question such as how geographical location might affect construction of the tower and other such questions were discussed. By the time we were done with the activity I was amazed by how many concepts could be pulled out of such a simple activity. Indeed I was impressed.

After the session I stayed to tell Sharon that I thought she had put on an awesome presentation and to talk to her about what her company did and my interests in educational outreach. After

talking to her and exchanging some contact info I left feeling pretty cool that I had just watched the results of someone's job. There was a career in working on thinking up of fun stuff for kids to do and then coming up with the principles behind their fun.

References:

Glenn Commission Report
http://www.aip.org/fyi/2000/fyi00.120.htm
ITEA Standards
http://www.nae.edu/nae/naehome.nsf/weblinks/NAEW-4NHMEQ?OpenDocument
http://en.wikipedia.org/wiki/Project-based_learning
Debbie's Sweets 'n Treats
NostalgicCandy.com

Session: B

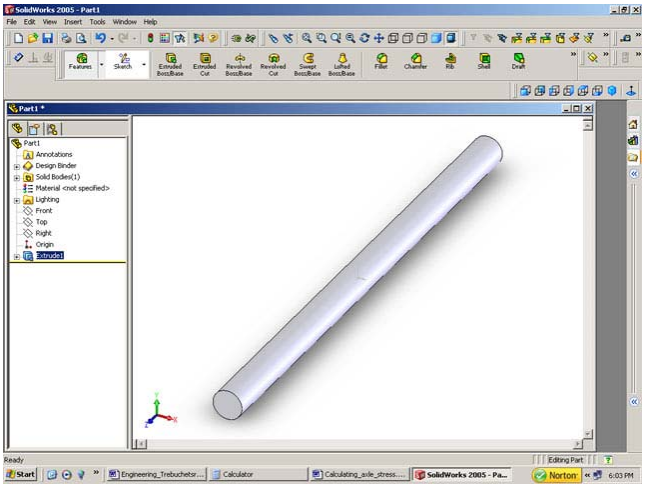
Engineering Design with Solid Works
Marie Planchard
Email: mplanchard@solidworks.com
Dassault Systemes (Solid Works)
Website: http://www.solidworks.com/

Now that I had seen an example of one type new hardware and lab equipment that some companies, such as PCS Edventures, wanted to incorporate into K – 12 schools to promote engineering, I became curious about another aspect of the spectrum. What kinds of computer technology would these students get to go along with these various project based curriculum? Since I am already in an engineering program I have experiences with various different design and analysis programs such as AutoCAD, Engineering Equation Solver (EES), and Wolfram's Mathematica, just to name a few, I was curious what K – 12 students might see in the near future. So for my next session, I decided to let Solid Works Corporation give me their answer to my question with their presentation on Engineering Design with Solid Works.

When I got into this session, the presenter, Marie Planchard, directed me to sit behind one of the laptop computers which were set up on the tables. Once the room was filled up she began her presentation. The first thing she covered was to reiterate one of Mr. Fouger's main points about the need for students to have adequate access to computer design programs. This software type of software plays an important part in the modern engineer's arsenal and to get students exposed to it at an early age promotes creativity in the use of those programs.

So with this in mind she explained to us how Solid Works had partnered up with Gears Educational Systems, LLC to come up with project based learning activities and units which educators could purchase to go along with the Solid Works software. One example of such a unit is called Totally Trebuchet which is a package of self-paced tutorials, teacher-led lessons

and project-based activities. This educational program provides an organized structure in which students and teachers acquire engineering skills and competencies through the design, construction, refinement and competitive use of model trebuchets. The lessons and activities in this kit demonstrate how math, science and engineering skills can be applied to the solution for an engineering problem.



Screen shot of Solid Works being used to design an axle.

A completed model of the Totally Trebuchet project.

Now that we knew about these programs, Marie was going to take us through a quick demonstration on how the software worked. She would talk us through the procedures on making one of the trebuchet's axles in Solid Works. Now with some of my experience with AutoCAD from an engineering graphics course this was going to be really cool. But I was surprised at how nice the interface was since this program used more window based interface versus a command line which AutoCAD preferred. Once we had the part in then she took us through the part of the program which would apply the laws of physics to the part by showing us the expected motion and the stresses that it would encounter in real life.

Indeed after this sectional I could see how much fun and educational this unit could be for older students. The chance to design something using engineering software and then getting to build it for real to see if it does what it did in the virtual world is quite priceless. But how to get these technologies into schools. Right now these companies tend to offer a student version of their programs which are cheaper than the actual program and often offer special deals to educational institutions. Plus they also offer workshops to educators on how the software works.

References:

Totally Trebuchet Program
http://www.aip.org/fyi/2000/fyi00.120.htm
Gears Educational Systems, LLC
http://www.gearseds.com/

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Lunch Presentation

Thinking like an Ad Exec:
Implementing Messages for Improved Public Understanding of Engineering
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University of Colorado at Boulder
Website: http://itll.colorado.edu

Dr. Jacquelyn Sullivan discussing how the appeal of various slogans for engineering varies with gender.

Next on the agenda, and of course one of the utmost important for a busy day, is lunch and I have always found it to be true that when attending professional conferences, they always have them well catered. This would prove to be no exception to my experience. One unique thing about this lunch was that we were to have a guest speaker presenting while we were dining. Her name was Dr. Jacquelyn Sullivan from the University of Colorado at Boulder and she was going to be presenting on how the public currently perceives engineers and how there is a need to fix this public image to better promote the field to the next generation of students.

For starters, she began her presentation by informing us that most adults and teenagers today do not know the various areas of work that today's engineers get involved in. They are seen as people who only design and build machines using a lot of hard math. They are not seen as people who directly help people such as how doctors and nurses do. From recent career surveys, today's youth find a calling for well paying jobs that involve lots of creativity. But most importantly, they want a career that will allow them to make a difference in people's lives.

According to Dr. Sullivan, it is now time to promote the engineering profession in new light. It is time to recast the traditional view of engineering to a new image. Engineering should not be a profession advertised solely for its personal benefits and need for concrete knowledge in mathematics and science. Engineering should also be advertised for its need for discovery and creativity which contributes to the application of knowledge to design things that contribute to our global society. That is making a difference and that is what needs to be conveyed.

She then explained to us that in order to do this we had to take a look at the previous concepts associated with engineers. After doing extensive polling and phone interviews it was found that the concept that "engineers connect science to the real world" was a rather unpopular view, particularly with young women. Other such ideas as "engineers as creative problem solvers,"

"engineers help shape the future," and, "engineers make a world of difference" polled much better.

Now it is our turn as workshop attendees to take a crack at this problem. Dr. Sullivan explained that we were to break up into small groups and think like ad executives who were going to promote engineering as a profession more popular than the ipod. Our task was to come up with a poster and a slogan which would advertise engineering as "making a world of difference" to a specific target group of people. In fact she broke us up into groups according to the audiences our posters were expected to reach. These groups included elementary students, middle school students, high school and guidance councilors, and the general public. My table was assigned the high school group.

Workshop attendee's getting ready for brainstorming for "Thinking like an Ad Executive" workshop.

The first thing we had to do to make our poster was that we had to find out how to connect with our teenage audience and that involved figuring out how they like to interact with each other. One way became rather obvious, technology. Today's student is a product of the technological age we live in and they love it. Such things as the Nintendo Wii, X-Box 360, cell phones, text messaging, social utilities like Facebook and Myspace are a part of everyday life. And that was where we started. We began brainstorming ideas and before long we had come up with an awesome idea for a poster. We wanted to present the engineer as someone who brings the virtual world

We wanted to present to the students that engineering is 'virtually' everywhere and that they are already interacting in the virtual and real engineering world making that difference in people's lives. We chose to represent this by drawing a virtual teenager as a Mii character on a Windows computer screen meeting other teens from different parts of the world. This computer screen also had a taskbar which had Google, Facebook, Second Life, and Youtube which represented the teenagers' abilities to multitask in their complex lives. We then wanted to convey to our audience that with these skills they had they have the ability as an engineer to 'design their own reality' which became our poster's slogan.

My group presenting our poster and slogan idea for engineering's new face.

Once we had this all together within the time we were allotted, we all presented in front of all the other attendees. It was interesting to see the variety of ways that we came up with to convey the field of engineering. Dr. Sullivan then congratulated us on our hard work and she said that some of the ideas we came up with would have to be tested to see how they'll work for the next promotion campaign. Who knows, one of our groups, maybe even mine, might have just come up with the next big slogan for engineering. You just never know.

Session: C

Using Engineering Design to Teach Core Concepts in High School Science Classrooms
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Email: birdy@pitt.edu
University of Pittsburgh
Website: http://www.lrdc.pitt.edu/schunn/

Now that I had seen what some companies were doing to try to assist in the promotion of the engineering field in K – 12 schools, I was curious about what roles universities and colleges play in curriculum development. From my personal experiences with my local SPS chapter in Platteville, we tend to stick with doing physics demo shows and Exploratorium and an occasional workshop based on info from the internet or our SPS Outreach Catalyst Kit. I am curious as to what the next level was for people who design activities and units for teachers and where do they get their lesson plans?

So in this session I would end up getting an answer to my question. Dr. Apedoe and Dr. Reynolds began their presentation by explaining that they were from the University of Pittsburgh's Learning Research and Development Center (LRDC). The center's goal is to describe what learning is, where and how it happens best, how it can improve, and how research can help. The research findings from LRDC are applied, in conjunction with education practitioners and business and government enterprises, to improve public instruction.

Our presenters explained that they were working in conjunction with Dr. Christian Schunn, who is a research psychologist specializing in the study of innovative cognition, to develop curriculum for engineering classes. This type of curriculum is known as Design-Based Learning (DBL) which is a type of project-based learning where students learn what they need to know at the time the application of the principles is required for work on the project. In our presenters' group they have been working on designing 6 to 8 week long DBL units for middle school and high school math and science classrooms. These units use the engineering design process as for their basis. This structure in curriculum has shown to improve the design outcomes of projects and provide organization for the science and math learning in the class. To show us how this curriculum works, Dr. Reynolds and Dr. Apedoe were going to take us through a sample run of one of their lessons which they had designed for a high school chemistry class.

Our task was to design a heating or cooling system which would solve some problem that we had run across in our personal lives or had seen in the media. So we were put into groups of four and we began to brainstorm where we thought a heating or cooling system would be useful to have.

Our task was to design a heating or cooling system which would solve some problem that we had run across in our personal lives or had seen in the media. So we were put into groups of four and then we began brainstorming on what situation called for the need of a heating or cooling system. Some of the ideas my group came up with were: 1) A house in the desert needing an AC unit. 2) Personal cooling device for soldiers in hot and dry climates. 3) Heating system for a house in arctic climate. 4) Cooling system for electronics in hot places.

Next, we discussed these needs as a class with our presenters and then they asked us to pick the scenario we would like to try to solve. My group decided to work on the personal cooling system for a soldier. Now, we were asked to think up what were some possible constraints for making this device. We began considering that our soldier would need this device to be light weight, durable, portable, nontoxic, and have low energy consumption. After these considerations were documented on a worksheet we were asked to discuss in our groups where we had seen similar devices for heating or cooling and what principles were behind their operation and to jot down these ideas. They reminded us that we had to remember we were posing as a chemistry class so that we would need to consider the problem from that angle.

Next we were asked to brainstorm what we wanted to use for our device and sketch a picture of it. Our idea was that we were to develop a special type of cloth which was treated with a chemical that would react with human perspiration to generate an endothermic reaction thus cooling the person down. This process would probably be irreversible however this chemical treatment could be repeated to the fabric of the cloth and hence would ‘recharge’ the clothing again for use.

Once we had come up with our idea our presenters gave all the groups some chemical data sheets to look over so we could generate ideas on what chemicals and reactions we might want to consider for our device. Then we went through a guided lab where we mixed some of the chemicals presented to us to see what the reactions yielded. We measured the temperatures of the chemicals before and after the reactions to see if they were endothermic or exothermic. Since my group was looking for an endothermic reaction we settled on a reaction that was endothermic and non-toxic.

After this our presenters explained that we had just successfully completed one of their classes and gone through an engineering process. They said that in the classroom setting the students’ ideas in essence would be guided so they would come to similar conclusions. Dr. Reynolds then handed out a sample of the lesson that we had gone through on CD. I have to say that after going through this lesson I was quite impressed with its effectiveness on what I had picked up in that brief hour that I was exposed to the program. I can only imagine what a semester with the program would be like. I was a bit curious as to if they had done any research on the effectiveness of this particular lesson but didn’t get to ask before the end of the session.

Final Remarks

With the end of the last session and a few remarks from the last guest speaker of the evening, that pretty much wrapped up the official schedule of the event. After this I managed to get a few moments to interview Dr. Kelly and Ms. Farole. I inquired about information on ASEE student membership from Dr. Kelly and then I asked a few questions of Ms. Farole about what was all involved in the setting up of such a workshop. After the interviews I thanked them for a job well done on the workshop and that I really appreciated them having me as a guest to the event.

Now with all good conferences, it tends to be quite useful to analyze what information was gleamed from attending. Indeed I had picked up a lot of new information and in essence I had answered quite a few. Not to mention that I had also achieved several of the many goals I had set for myself before I came to Pittsburgh.

For starters, I wanted to get some ideas for possible extension activities for PhysicsQuest. From the sectional with PCS Edventures, I was reminded of how much physics can be derived from one of kids' most fundamental assets, toys and play time, which they are very familiar with. But part of my job as an activity writer is to remind them of some of the physical principles that their toys imitate and function with. Plus my talk with the companies sales rep convinced me that this company would be an outstanding one to work with in the future for developing new ideas and projects.

Next, I wanted to investigate possible methods for the application of an Engineering Physics degree in the informal education field. Well I happened to discover that there are indeed more companies being started to meet the new demand for teaching STEM education. PCS Edventures is just one such company that specializes in converting kids toys into an educational experience. With my knowledge of the Engineering Design Process I could assist in the development of such toys and products used in K - 12 schools. Also there are numerous companies are beginning to get involved in supporting design competitions and fun after school programs for students. They are even making access to the technology easier for educators and DeSault is one company that is into funding such ventures.

Now not only did I want to learn more about what companies involved in education, but I am also curious about various organizations and how they do outreach. ASEE happens to be of interest to me so I was curious as to how it compares to the member organizations of AIP. ASEE is an organization which is primarily composed of engineers from the various fields of study who are in some way involved in the educating of tomorrow's engineers. I recently discovered that they also happen to have student membership to their organization.

Now both ASEE and AIP member organizations have very similar goals for public outreach but they do have slightly different philosophies and methods for achieving the same goal of public awareness of their respective professions. For AIP I will use APS since they are essentially the other part of my major "Physics." and the one I am most familiar with aside from SPS. ASEE's educational outreach philosophy is focused primarily on achieving the integration of Project Based Learning and its associated curriculum into schools so that students are exposed to the

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Engineering Design Process. For the physics community one of the newer philosophies of physics education is based upon encouraging the Inquiry Based Learning style.

ASEE also has a website called ASEE Engineering K – 12 Center which is composed of blogs and newsletters with information and new lesson's plans and suggestions on how to incorporate engineering principles into classroom activities. They are also working on building up an archive of teachers favorite engineering classroom activities. APS has a similar site which is called PTech which has similar resources including activities, lesson plans, and web links for further information for teachers to extend physics projects in the classroom. Another resource available to middle school teachers is the PhysicsQuest kit which is sent free to teachers who put in a request for it. This kit has 4 physics activities which are centered on a story involving an important person in physics history. The class can then submit answers to get involved in a drawing for a prize.

APS also has an additional website that is used for outreach and that is Physics Central whose aim is to keep anybody with a general interest in physics informed about what is going on. This site has blogs, contests, photographs, and fun articles on what is happening in the physics world. So as can be seen, both organizations use very similar techniques for reaching out to the public. There are undoubtedly more programs that these organizations are involved with however; the ones mentioned here are the ones which I am most familiar with.

Finally one of my last but yet most important reasons for attending the conference was to talk to various people about the skills that I have been acquiring through my work as an engineer and public outreach to see what options I would have after I graduate with my degree. I found that PCS and similar companies could be possible employers of my talents. I could also consider graduate school and get involved with curriculum development at the University of Pittsburgh. Also Clarkson College offered a graduate degree programs in education which included projects for their students to develop activities promoting energy conservation.

Indeed after this conference I have managed to put to ease some of the many questions I have had about this unique field that I am looking into. I now have more of an idea of what paths I can take once with this field. If anyone else is interested in a similar path which I am taking, I highly encourage you to attend national conferences put on by professional organizations. They give allow you to meet some really outstanding people in the profession. Plus you get a good sense of the latest happenings in the field and what companies may be associated with your interests. I highly recommend the AIP member organizations for people interested in physics and physics education along with ASEE for those interested in engineering education. I myself have an interesting mix. I personally am looking forward to attending my next conference which happens to be with AAPT in Edmonton, Canada.

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