ILLINOIS INSTITUTE OF TECHNOLOGY

IPRO 330 – Dynamic and Contemporary Science Fair Projects for Chicago Public Schools

Final Report

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1.0 Abstract

The primary purpose of the Interprofessional Project (IPRO) 330 team is to promote the study of mathematics and the sciences amongst Chicago Public School (CPS) students. We have strived to achieve this goal primarily by enhancing the website sciencefair.math.iit.edu and by interacting directly with CPS students, educators, and administrators. The website, entitled *Science Fair Extravaganza,* was fully functional from the beginning of this semester due to the efforts of previous IPRO 330 groups. Our team has endeavored to further improve this website and publicize it to appropriate audiences. To improve the website we have addressed the numerous valuable suggestions by CPS teachers and students as well as outside education professionals in our effort to provide a highly useful website. We helped publicize the site by attending science-related events in the Chicago area, including LabFest! at the Museum of Science and Industry, and volunteering to judge numerous science fairs in Chicago. The ultimate objective of our IPRO was to increase the number of daily hits received by *Science Fair Extravaganza* and to have positive direct and indirect contact with CPS students that will predispose them to utilize our website to the fullest possible degree.

2.0 Background of the Problem

The purpose of the Chicago Public School (CPS) Science Fair program is to combine the work of many fields into a single interdisciplinary project. The components of these projects include research, creation and execution of the methods, recording of the results, data analysis, the forming of a conclusion, a written report, a visual presentation, and an oral presentation. These steps entail the use of many aspects of English, science, mathematics, and often history. The Science Fair is a powerful tool to raise students' awareness of and interest in the scientific method and scientific work. This is precisely why our IPRO is assisting CPS with this program. IPRO 330 is continuing its quest to rectify the poor quality of projects, the deficient presentation skills, and the general lack of interest in the Science Fair program displayed by many middle and high school students in the CPS system. Students often have trouble finding a project that not only piques their interest but is also appropriate for the Science Fair and lies within their budget. Some students have suggested that this is partially because they have not been able to find acceptable projects through the internet.

A number of other recurring problems arise in Chicago Science Fair projects. The most notable problems are that students:

- Do not understand how to record certain data,
- Do not know how to analyze certain data, especially when applying statistical methods,

- Often use an ineffective graph or chart to display their data,
- Frequently neglect an analysis of their possible sources of error, and
- Demonstrate poor verbal and visual presentation skills.

The societal costs of these problems are indirect but large. The United States currently suffers from a shortage of engineering, mathematics, and science professionals. Students of many countries, including China, Japan, and India, get a better mathematics and science education than do American students. In fact, the United States ranks in the lowest third of all major world countries in the field of mathematics. At the root of this shortage lies, in part, a general disinterest amongst American students in these technical subjects. Although it is a difficult criterion to measure, if our IPRO team has been successful in making even one student motivated to pursue the study of mathematics or science in college, then society will inevitably be benefited and we can consider our IPRO a success.

2.1 History of IPRO 330

As in previous semesters, IPRO 330 worked closely with Chicago Public Schools (CPS), primarily at the high school level, in order to improve the Science Fair program. Although CPS had no financial involvement in this IPRO project, our IPRO established and maintained numerous contacts with educators who have been gracious enough to volunteer their time to assist our efforts. Our primary contacts this semester included:

- Angela Dumas – City Science Fair Coordinator
- Alicia Choi – Area 23 Science Fair Coordinator
- Judy Lederman – IIT Director of Teacher Education, Senior Instructor

Although there have been very few efforts in the past to improve the Science Fair program, the Spring 2008 IPRO 330 team developed correspondence and eventually a partnership with a group from the University of Chicago that has goals similar to our own. Although contact continued throughout the semester, the University of Chicago group has been unable to fulfill its pledged goals, and our IPRO has decided to move on with our project without being slowed by the hurdles of our counterpart. Another organization that our current IPRO team has established a relationship with is Science Chicago, an initiative spearheaded by the Museum of Science and Industry and supported by various other IIT departments and organizations throughout the semester.

From previous semesters of IPRO 330, we inherited a great reference guide for CPS students to consult when they are looking for a science fair project or are preparing their presentation. The Spring 2008 IPRO 330 team ensured that the project ideas listed on the website followed numerous ethical guidelines. They rewrote a number of projects to guarantee that they simply provided guidelines for students to complete a project. That is, they made sure that our

website did not detail the entirety of any project – including results and analysis that students could copy verbatim and present as their own project. All of the new projects posted to our website have been held to the standards employed by the Spring 2008 IPRO team.
The hard work of earlier IPRO 330 teams is evidenced by much of the content on our website, sciencefair.math.iit.edu. Visitors to this site may not only view our various projects and guides, but they may also see the pictures and lists of IIT students who have worked on the project from Spring 2007 to our semester, Fall 2008. Additionally, the website was designed to allow users to give feedback either through e-mail or by responding to a simple survey. By the end of last semester, the website was obtaining approximately 30 hits per day.

3.0 Objectives

Our one clear and main purpose was to increase high school student interest in science and mathematics in Chicago Public Schools (CPS). This was a very lofty and broad goal, so IPRO 330 chose to use the CPS Science Fair program as a vehicle to achieve this purpose. One of the project goals of this team was to publicize the project throughout the CPS system. Specifically, we focused on the three most involved sources in high school students' lives: students, teachers, and parents. To reach these potential customers we established a Communications sub-team whose sole responsibility was to present the website to students in classrooms, to teachers and parents, to the readers of Tech News, and to the general CPS student body by developing posters to be distributed in the schools. IPRO 330 also participated in LabFest! at the Museum of Science and Industry, a part of Science Chicago, on September 20. This was a vital step for IPRO 330 as the ideal of the project was to reach out to middle and high school students in an educational and inspiring way.

IPRO 330 has an existing bank of Science Fair projects and guides that are located on the website sciencefair.math.iit.edu. We focused our efforts on making our website more effective and appealing by complying with the needs and suggestions expressed by professionals within IIT, the Chicago Public Schools, as well as other professional education venues. Specifically, our team goals included:

- Adding guidelines for taking notes during experiments
    - Easy to follow
    - Useful for many disciplines
    - Consult other organizations that have this information available
- Creating an idea generator for developing individualized projects
    - Produce specialized ideas based on user input
    - Include a variety of project ideas

- Creating guidelines of experimental techniques by subject area
    - Include mathematics, traditional sciences, and social sciences
    - Easy for middle and high school children to understand
- Providing links to outside resources
    - American Chemical Society
    - Illinois Science Teachers Association
    - Other science fair websites
- Bettering the projects listed on our website
    - Fix errors in old projects
    - Request permission from other sources to adapt their experiments
    - Add a number of new experiments

We feel like the guides are a way to implement more mathematics into the Science Fair program as a whole. In addition, a group of students in our IPRO focused on improving the website and implementing new projects.

4.0 Methodology

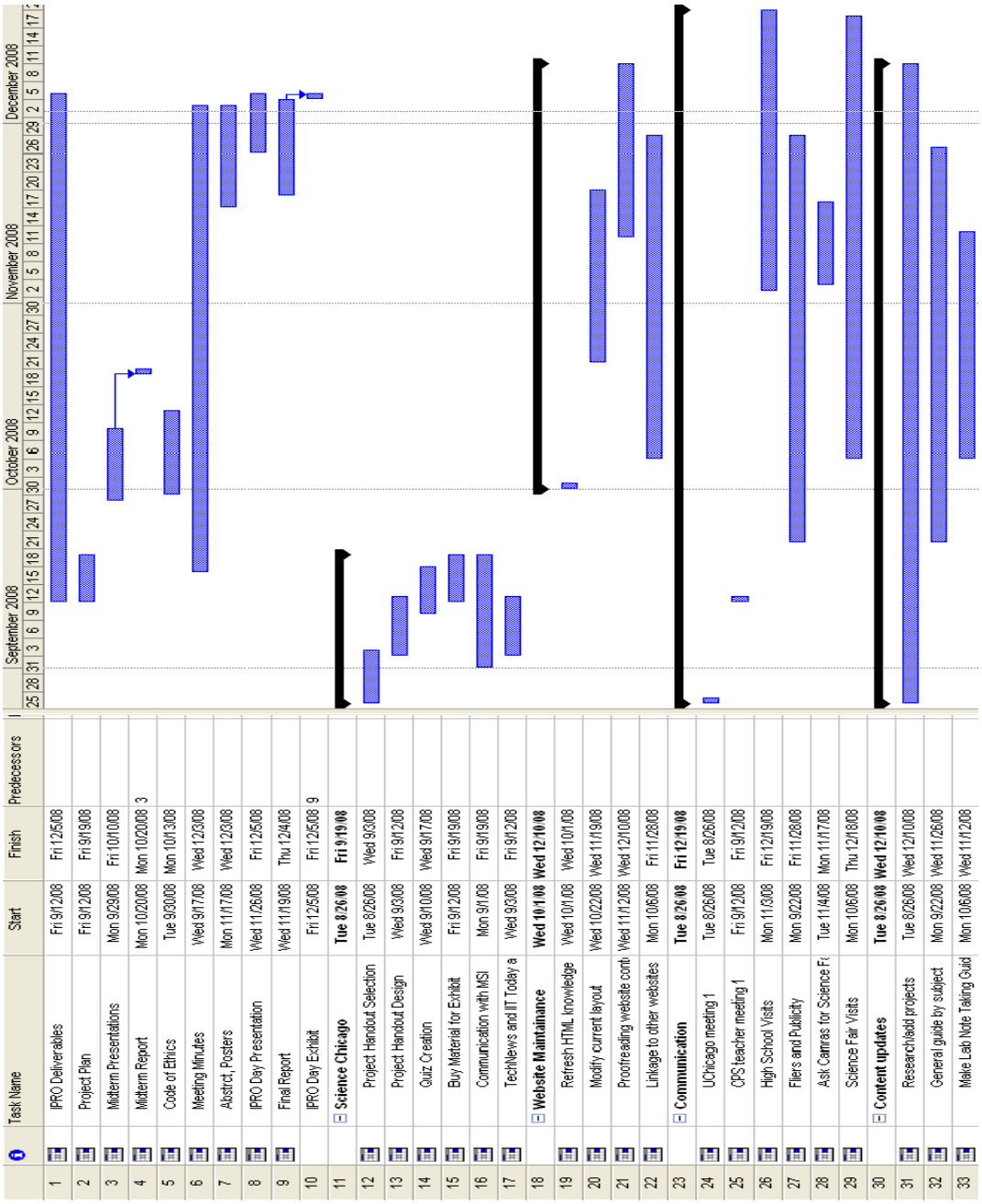
Our semester began with an important opportunity to publicize our website in the community placed on our doorstep. We took our team to ScienceChicago's LabFest! at the Museum of Science and Industry, where children of various ages in the community came to our booth and participated in two science experiments that we had set up. To promote our IPRO and our website our team passed out business cards and reading material about our project to the LabFest! visitors. As a result of our efforts, we experienced our first major spike in the number of hits of the semester.

In our meetings we discussed our goals and decided on two major semester goals: to continue to increase the amount of useful content on the website, and to aggressively promote the site so that the hard work of our team and those of previous semesters could produce tangible results. It was at this point that we reorganized our sub-teams, dismantling the technical team in order to dedicate more resources towards our two main goals. The content team began an aggressive schedule to add new information to the website. Weekly goals for additions were established and achieved. Also, a need became apparent for a massive proofreading of the site, causing the team to distribute the task accordingly.

Although not reflected in the Gantt Chart or methodology from the Project Plan, the Communications team adopted a strategy developed by the Spring 2008 IPRO 330 team and decided to judge local science fairs to help get the word out. Not only did this provide a unique

volunteering experience, but it also put us in contact with some leaders in the science education community in Chicago and started to get some word of mouth circulating about our endeavor. In November we began to see hit totals on sciencefair.math.iit.edu never before achieved. The Communications team was inundated with requests to judge numerous science fairs, and has had to adjust its task lists to make an effort to accommodate the demand.

4.1 Final Project Gantt Chart



	Task Name	Start	Finish	Predecessors
1	IPRO Deliverables	Fri 9/1/08	Fri 12/5/08	
2	Project Plan	Fri 9/1/08	Fri 9/19/08	
3	Midterm Presentations	Mon 9/29/08	Fri 10/10/08	
4	Midterm Report	Mon 10/20/08	Mon 10/20/08	3
5	Code of Ethics	Tue 9/30/08	Mon 10/13/08	
6	Meeting Minutes	Wed 9/17/08	Wed 12/3/08	
7	Abstrct, Posters	Mon 11/17/08	Wed 12/3/08	
8	IPRO Day Presentation	Wed 11/26/08	Fri 12/5/08	
9	Final Report	Wed 11/19/08	Thu 12/4/08	
10	IPRO Day Exhibit	Fri 12/5/08	Fri 12/5/08	9
11	**Science Chicago**	**Tue 8/26/08**	**Fri 9/19/08**	
12	Project Handout Selection	Tue 8/26/08	Wed 9/3/08	
13	Project Handout Design	Wed 9/3/08	Fri 9/12/08	
14	Quiz Creation	Wed 9/10/08	Wed 9/17/08	
15	Buy Material for Exhibit	Fri 9/12/08	Fri 9/19/08	
16	Communication with MSI	Mon 9/1/08	Fri 9/19/08	
17	TechNews and IIT Today a	Wed 9/3/08	Fri 9/12/08	
18	**Website Maintainance**	**Wed 10/1/08**	**Wed 12/10/08**	
19	Refresh HTML knowledge	Wed 10/1/08	Wed 10/1/08	
20	Modify current layout	Wed 10/22/08	Wed 11/19/08	
21	Proofreading website conte	Wed 11/12/08	Wed 12/10/08	
22	Linkage to other websites	Mon 10/6/08	Fri 11/28/08	
23	**Communication**	**Tue 8/26/08**	**Fri 12/19/08**	
24	UChicago meeting 1	Tue 8/26/08	Tue 8/26/08	
25	CPS teacher meeting 1	Fri 9/1/08	Fri 9/12/08	
26	High School Visits	Mon 11/3/08	Fri 12/19/08	
27	Fliers and Publicity	Mon 9/22/08	Fri 11/28/08	
28	Ask Camras for Science Fa	Tue 11/4/08	Mon 11/17/08	
29	Science Fair Visits	Mon 10/6/08	Thu 12/18/08	
30	**Content updates**	**Tue 8/26/08**	**Wed 12/10/08**	
31	Research/add projects	Tue 8/26/08	Wed 12/10/08	
32	General guide by subject	Mon 9/22/08	Wed 11/26/08	
33	Make Lab Note Taking Guid	Mon 10/6/08	Wed 11/12/08	

5.0 Team Structure and Assignments

Name	Year – Major	Contributions
Sam Nemanich	3rd Year – Biomedical Engineering/Science Education	• Established connection with IIT Math department and CPS system for promoting the website; • Obtained the exact dates, times, and locations for science fairs in the Chicago area • Obtained opportunities for providing presentations in front of CPS teachers • Assisted the write-up of the lab note taking guides • Prepared flier and suggested ideas to be used in LabFest! • Updated the brochure created by Rocio for IPRO day • Made presentation slides and presented to CPS teachers in local schools to promote the team's website • Assisted with writing of the Final Report
Joshua Tate	4th Year – Applied Mathematics	• Learned how to use Tortoise SVN and taught other students in IPRO 330 to use it • Attended and purchased necessary items for LabFest! • Wrote the math and engineering section of the lab-note taking guide • Helped prepare and present the midterm presentation • Cooperated with Rocio and the professors to organize and prepare for meetings
Xuan Kang	4th Year – Biomedical	• Uploaded two new projects and various laboratory

	Engineering	techniques • Created a new section of the general techniques and a template for it • Wrote the biochemistry section of the lab note taking techniques and the general lab note taking techniques section • Designed a flier for and participated in LabFest! • Modified poster for IPRO Deliverables • Helped re-categorize all projects by difficulty • Wrote the ethics and helped with the Gantt chart section of the project plan • Edited the final presentation slides and presented at IPRO day • Assisted with writing of the Final Report
Andrew Mehr	4th Year – Psychology/Political Science/ Humanities	• Edited techniques and projects on the website and numerous other written documents submitted by team members • Researched useful website keywords to promote website on search engines like google.com • Took responsibility to lead activities and meetings in the content sub-team • Took charge of IPRO Project Plan deliverables • Established contacts with the Camras group • Participated in LabFest! and created a quiz for the visitors • Helped prepare and present the midterm presentation

		• Uploaded projects onto the website and organized projects currently on the website • Helped re-categorize all the projects • Judged Dunbar High School science fair • Helped write and edit the Final Report
YoungJu Jo	4th Year – Electrical Engineering/Applied Mathematics	• Modified the layout of projects to make them more appealing • Helped with uploading projects for the first half of the semester • Uploaded projects • Participated in LabFest! • Modified poster for IPRO Deliverables • Completed engineering lab note taking guide • Communicated with other IPRO groups to organize our efforts • Judged elementary school science fair • Worked on the final poster for the IPRO group • Assisted with writing of the Final Report
Mark Rhodes	4th Year – Electrical Engineering	• Researched useful website keywords to promote website on search engines like google.com • Participated in LabFest! • Uploaded projects and technique sections on the website • Made presentation slides and presented to CPS teachers in local schools to promote the team's website

		• Edited website for content and layout • Edited the final presentation slides and presented at IPRO day • Assisted with writing of the Final Report
Brianna Elg	3rd Year – Psychology	• Edited techniques, projects and other content on the website • Helped re-categorize all the projects by difficulty • Wrote and uploaded multiple projects • Edited behavioral sciences lab note taking guide • Created a single-page poster advertisement of the website to post in schools • Created banner for and participated in LabFest! • Completed three sections of the IPRO Project Plan • Contacted outside websites for permission to use their project ideas • Judged Dunbar High School science fair • Assisted with writing of the Final Report
Kyle Gay	3rd Year – Physics Education	• Interacted with CPS administrative members and CPS school teachers • Established connections between IPRO and IIT MSED administrators • Made informational flier for CPS teachers • Established links between our website and other websites • Helped prepare and present the midterm presentation

		• Acquired information regarding science fair judging opportunities • Helped prepare the final presentation • Assisted with writing of the Final Report
Rocio Diaz	4th Year – Chemistry	• Led the team meetings and team organization • Took team meeting minutes • Organized weekly meeting with the two professors and Joshua • Helped technical group in uploading and making changes to the website • Assisted the content group in creating lab note taking guides • Participated in LabFest! • Created brochure for the IPRO • Created presentation slides and presented to CPS teacher in local schools to promote the team's website • Edited the final presentation slides and presented at IPRO day • Assisted with writing of the Final Report

5.1 General Team Structure

- Team Leaders: The team was led by Rocio Diaz and Joshua Tate and the first three month of the semester, and Rocio led the team for the last month of the semester. Both students were members of the Spring 2008 IPRO 330 team. The leaders were responsible for coordinating the sub-teams, ensuring that each sub-team was coordinating with the other sub-teams and progressing at an appropriate pace, running all full-group meetings, and

considering all aspects of this project before providing a directed vision. Rocio and Joshua were also responsible for meeting with Professors Fasshauer and Pelsmajer (Faculty Advisors) to obtain feedbacks on their plans and to make sure that they were covering all aspects of the project that needed to be addressed at the upcoming meetings.

- Sub-teams
  - For the first half of the semester

Sub-team	Members	Sub-team Leader
Communication/ Publicity	Kyle Gay & Sam Nemanich	Kyle Gay
Technical	Joshua Tate, Mark Rhodes, YoungJu Jo & Rocio Diaz	Mark Rhodes
Content	Xuan Kong, Brianna Elg & Andrew Mehr	Andrew Mehr

    - Sub-team Responsibilities
      - Communication/Publicity team: in charge of maintaining external contacts with Chicago Public Schools and with other professional and paraprofessional organizations in order to gain insightful feedback from students, teachers, and parents as well as to promote the website.
      - The technical team is responsible for maintaining, improving, and implementing new projects and guides to the website.
      - The content team is accountable for reviewing and improving old projects, developing guides for lab note-taking, and creating new projects that are contemporary and dynamic for Chicago Public School students.
  - For the second half of the semester:

Sub-team	Members	Sub-team Leader
Communication/ Publicity	Kyle Gay, Sam Nemanich, Yongju Jo & Rocio Diaz	Kyle Gay
Content	Xuan Kang, Brianna Elg, Andrew Mehr, Mark Rhodes, & Joshua Tate	Andrew Mehr

    - Changes in the sub-team responsibilities:
      - The Technical sub-team was cancelled, since the technical problems for uploading slides onto the website were solved, and all the students in IPRO 330 were taught how to upload pages onto the

website by themselves. Therefore, members in the technical sub-team joined the other two teams.

- The Communications/Publicity team is in charge of maintaining external contacts with Chicago Public Schools and other professional organizations to gain insightful feedback from students, teachers and parents, as well as to promote the website. During the second half of the semester, the promotional methods including sending out fliers, providing promotional presentation and speeches for CPS teachers, judging major science fairs, doing demonstrations in various events, creating a Facebook.com group, and asking assistance from students in other IPRO groups and student organizations become priorities. The publicity team also accepted responsibility for modifying the layout of projects to make them more appeal to the general public.
- The Content team was accountable for reviewing, re-categorizing and improving old projects, developing lab note-taking guides, creating new projects that are contemporary and dynamic for Chicago Public School students, and introducing new laboratory techniques that would enable CPS students to design projects they are incapable of accomplish before. Besides these, the content group made modifications to the layout of the webpage to make it more appeal to the general public.

5.2 Project Monitoring Roles

- Meeting Roles
  - Minute Taker – Rocio Diaz
  - Agenda Maker – Joshua Tate
  - Time Keeper – Xuan Kang
- Assigned Status Roles
  - Weekly Timesheet Collector/Summarizer – YoungJu Jo
  - Master Schedule Maker – Sam Nemanich
  - iGroups Organizer – Brianna Elg

6.0 Budget

IPRO 330 Budget

Category	Requested	Approved	Used
Supplies	$250	$250	$170
Services	$20	$750	$750
Travel	$50	$50	$0
Total	**$320**	**$1050**	**$920**

Although $170 was originally budgeted for supplies in expectations of the costs of LabFest!, we requested an additional $80 for other expenditures throughout the semester, anticipating a possible second event similar to LabFest! No such opportunities arose that our IPRO felt was worth pursuing, so this additional $80 was not necessary and was not utilized.

Initially, we requested a total of $320 from the IPRO office for supplies, services, and travel. Shortly after we decided to participate in LabFest! event in the Science Chicago initiative, our budget requirements had to be greatly increased. After our initial request of $20 for Services from the IPRO office we discovered that we required $750 for printing and other office services for our brochures and business cards for LabFest! After consultation with the IPRO office, funding for the services category increased from $20 to $750 for printing and other IPRO office service expenditures.

We had originally believed that it was likely that our Communications sub-team would be required to travel off-campus in order to fulfill all of their objectives. To allow this sub-team the opportunity to travel, we requested $50 for travel reimbursement. However, our events that were off-campus were easily accessible by public transit, which is free for all of our team members since we each possess U-Passes. This $50 proved to be unnecessary and was not utilized.

7.0 Results

One of the most important results from the work of the IPRO this semester is that we were able to expand our communication and interaction with various teachers and students throughout the Chicagoland area. This is likely the cause of a significant increase in the number of visits to our website. Sciencefair.math.iit.edu went from approximately ten visits per day during the spring 2008 semester to approximately 54 visits per day during the fall 2008 semester. Clearly,

one of the main results from this semester is the fact that more people are using our website now and, perhaps even more importantly, these people are using more aspects of our website than they were before.

The results for the fall 2008 semester of our IPRO are:

- Recognition
    - We have greatly increased the number of teachers and students that know about and use our website
    - Early in the semester many of the IPRO team members attended LabFest! at the Museum of Science and Industry presented by Science Chicago, and there those team members presented two experiments from our website. While some students helped visitors with the experiments, other team members used the opportunity to talk with the teachers and parents about our website and the different aspects that can assist their children with science fair projects
    - Our team compiled and distributed a 9-page informational flier that highlights the main aspects of our website and had this flier distributed throughout the CPS and ISTA, giving teachers a more detailed look at our website and how to properly navigate and use it
    - Our team members also gave multiple presentations for local teachers, showing off the various aspects of our website and giving the teachers an opportunity to express interest and give us feedback on the work that has already been accomplished
- Links to Outside Websites
    - A main goal of our communications team was to establish links between our website and several outside websites that are regularly visited by both students and teachers involved in science fairs
    - We were able to establish one such link, which is to the official CPS student science fair website, www.chicagostudentsciencefair.org
    - Having this website link to our website is a huge accomplishment in that many students and teachers visit this website in order to find resources to use when dealing with the CPS science fair
    - Other website links that are in the process of approval are to the Illinois Science Teacher's Association and the Chemistry Teacher's Association websites
- Adding Guidelines for Taking Notes during Experiments
    - We were able to create several lab note taking guides and have posted them under our Data Analysis portion of the website

    - These guides give students performing experiments in the areas of engineering, mathematics, general sciences, and behavioral sciences specific guides for taking notes while they are performing their experiments
    - Step-by-step instructions as well as detailed example images are provided for the students to make the process of note taking less strenuous and confusing
- Creating Guidelines of Experimental Techniques by Subject Area
    - We were able to create several guides with experimental techniques, and have posted them under a new section entitled Lab Techniques
    - We have added guides for how to perform several techniques that are essential to several of the projects we have listed on our website
    - These guides give students step-by-step instruction as to how to acquire certain materials, safety concerns, the concept behind the technique, and detailed descriptions and illustrations as to how to perform the technique
- Bettering Projects Listed on Our Website
    - We have updated all of the projects that we created this semester
    - We corrected many errors that may have been missed in previous semesters
    - All dead links between pages have been fixed, and students can freely navigate between several pages of the website without running into problems
- Community Outreach
    - Expanded general community knowledge about our website
    - Number of visits to our website and the average time spent on our website have increased greatly

8.0 Obstacles

Throughout the semester, the team was well organized but occasionally lacked a common driving goal or purpose. Our biggest struggle as a group was to realize what our fundamental team goal was and to take steps together in the right direction to achieve that goal. The semester began with much hurried preparation for LabFest! for Science Chicago, so we never focused on our major goals until a few weeks into the semester.

Around the middle of the semester, sometime after peer reviews, the first order of business at the meeting was to definitively decide what we were going to accomplish this semester and who was going to take what responsibilities. We realized we were not all on the same page and this discussion provided a means for everyone to voice their own feelings about what goals we should or should not be pursuing. We addressed another problem during this time. It was here we consolidated our sub-teams from three to two. We eliminated the technical team and split

its members into the existing content and communications teams. The technical team was responsible for updating and maintaining the website. They found that it was inefficient for each group member to send them their updates when everyone in the team was capable of doing it without assistance. Thus, we had a short tutorial on how to update the website, and it turned out to be a relatively easy process that everyone mastered easily. From then on, each team member had the knowledge, skills and abilities to edit the website. This turned out to be helpful because many people were working on content to be added, so they could then upload it at their own convenience.

The actual website provided some challenge because none of the group members possessed much website design knowledge. We struggled to communicate with previous IPRO 330 members who were website design experts to get some essential information about the website. An online tutorial provided an adequate overview of how to access the website, and was comprehensible by all members. In general, however, the technical knowledge was lost in past semesters because we were constantly asking questions about certain website problems and were seeking answers from anyone. A better turnover of the website information would have been helpful this semester. If next semester's group has no one with current website design and HTML knowledge, this gap will continue to grow.

The communications team encountered an unexpected problem late in the semester. The sub-team received almost two dozen requests to judge science fairs. Many of the dates are during finals week or the week immediately preceding it, which are challenging weeks for our group members to attend. Expecting all of us to attend all of the science fairs was clearly unrealistic. We reached out to other IIT student groups for assistance, but the dates again conflict with the priorities of many students during these two weeks. We tried to attend as many as we could, but some opportunities were not feasible for any team member. We did not anticipate this kind of response. However, after reflecting on how we presented ourselves, it could have been expected. During many communications with CPS teachers or administrators, we occasionally mentioned that we judge science fairs. It may have been more appropriate to say, "We are willing to help judge science fairs based on our schedule." We were not a group that simply judges science fairs. Indeed, that is not even a goal of our group. Some teachers may have believed otherwise, and thus contacted us expecting participants. We regret not communicating clearly to teachers and that we will not be able assist with every Chicago area science fair. Initially, we were desperate to do some hands-on work but now find ourselves with far too much. The communication was made with the teachers, but the message of our goal was not clear, creating a new, unanticipated problem.

Another unique challenge was that each member wanted to participate in something the group was doing, but sometimes struggled to find what he or she could do to help because at times the tasks to be completed were less than clear. At other times, however, we were all busy doing multiple things at once. Balancing the workload and keeping it consistent throughout the semester was a definite challenge we faced. Adding additional pressure on the team was the loss of one group member late in the semester due to personal reasons, so everyone needed to participate and contribute extra.

Eliminating the technical sub-team helped this issue because it was often these members who ended up having fewer responsibilities than the other team members. As part of the other sub-teams, they were given more work and the teams were able to significantly expand their work capacity. For instance, the content team grew from three members to five. They were then able to work on adding more project ideas as well as devise the laboratory technique guides.

9.0 Recommendations

IPRO 330 accomplished several objectives this semester; however, there still exists an almost infinite amount of work to be added to the project. Our main effort on the website was to cater to as many students as possible with the available resources and time allotted.

The primary need for the future of this project is to maintain the relationships with Chicago Public School (CPS) officials as well as to develop new relationships. This semester our focus was publicizing the website through contact with teachers, attending LabFest! for Science Chicago, and judging science fairs. A brochure and poster were developed this semester to distribute to CPS teachers and increased the number of traffic hits on the website, these tools should continue to be used in the future. This amount of communication needs to continue with attention to feedback from teachers, students, and parents. Further contacts that would benefit the project include various university professors who can offer their expertise on how to improve projects as well as offer ideas for the direction of IPRO 330.

Advancement of the website content to better address the needs of students is another area that should be addressed by the future members of IPRO 330. This semester two new aids were added to the website, laboratory techniques and laboratory note-taking guides. Both of these aids offer room for expansion of the project and are in the beginning stages. The laboratory techniques section is still very weak in addressing the needs of the CPS students and should be extended to cover all techniques discussed in provided projects as well as any other useful science laboratory techniques. Links should also be included from each project to the

appropriate technique. Organization of the laboratory techniques should follow the subject areas of science fairs with the possibility of each technique having its own page for ease of linking projects to techniques and vice versa. These techniques should not only include complex designs such as gel electrophoresis (developed this semester) but also simpler tasks such as measuring volume or calculating significant figures. The developed laboratory techniques addressed a specific concern for CPS students performing science fairs. Therefore, they should be placed in a location on the website that is highly visible and links should also be established between the projects and the note-taking guides. The future members of IPRO 330 must also address improving the projects section on the website. This may include altering the previously developed projects and adding additional projects in subject areas that are lacking in number of projects. This semester we focused on adding medium projects and providing more chemistry projects to further develop a popular subject for science fair projects. Possible improvements to the projects include making them more open-ended, standardizing the format to a higher degree, and adding more engaging pictures.

The website must be maintained to reflect new ideas, respond to feedback, and continue the objective of IPRO 330, to provide CPS students access to a complete set of information for completing science fair projects. The previously developed tutorials allow future groups to learn the underlying system of the website and to add content or alter the structure. Implementing new projects and techniques should be simple with the separation of the content from the style. It is very important that this is understood. The future teams should also continue to track the amount of website traffic hits using Google analytics.

IPRO 330 is also in contact with a similar group from the University of Chicago. Future groups should continue communication with University of Chicago and ultimately create a link with their finished product to enhance the current website. Jointly working with the University of Chicago, which is taking on some of the more logistical roles of the Science Fair, will be beneficial to both parties as we have both strongly agreed that there is no need to “reinvent the wheel.”

A final direction for the future of IPRO 330 is to obtain sponsorship. This may be accomplished through the National Science Foundation application for a grant. This is an extensive task but the benefits would be substantial. Financially, IPRO 330 has been limited to providing science fair projects that are of low-cost and include materials that are readily available at local department or hardware stores. The goal of the included projects is that students can afford or have access to any outside materials that they might need in the completion of their science fair project. However, with the funds received from a grant or sponsorship IPRO 330 could

expand drastically to provide needed materials or to develop an actual Science Fair Extravaganza laboratory at the Illinois Institute of Technology. This laboratory would invite children to learn about science and provide the opportunity for students to have access to more costly equipment when performing their own science fair experiments. The laboratory would not only be monitored by IPRO 330 members but would also be staffed by federal work study students attending IIT. Transportation for students from surrounding Chicago Public High Schools could also be provided with the funds. Advertising of Science Fair Extravaganza could also be widely expanded bringing more attention to the website.

10.0 References

This semester, we counted on different people to promote our IPRO team and our website. We would like to thank the following individuals who have enabled IPRO 330 to be so successful.

- Judith Lederman: Chairperson of the Math and Science Education Program. She has communicated with many CPS teachers who are enrolled in her program. Some of these CPS teachers assist with semi-annual meetings which are conducted on 3424 S. State on the IIT campus. Usually these meeting are in April and October. This semester she helped our communications team send out publicity materials such as the educational flier.
- Angela Dumas: Chicago City Wide Science Fair Coordinator. She has helped our IPRO since spring 2008 and continued to do so this semester. She arranged a time for us to speak to CPS teachers who are involved in doing science fairs. We had two sessions, 15 minutes each, where we spoke about our project, primarily our website. In these two sessions we explained to CPS teachers how they could benefit from using our laboratory techniques, data analysis, and presentation guides.
- Additionally, we received an enormous amount of requests to judge science fairs and help students complete their projects. Many of the following CPS teachers and science fair coordinators have not only requested our help, but have provided us with vital feedback to the functionality of our website

School	Contact	Email
Hanson Park		CWTaglia@cps.edu
Arthur Ashe Elementary	Mary Jedry	mkjedry@cps.edu
Julian	Monique Murray	moniquemurray383@hotmail.com
Daniel R. Cameron Elementary	Raquel Gonzalez, Asst. Principal	RGonzalez2@cps.k12.il.us
Dunbar Vocational	Myrna Alvarez	m_alvarez58@yahoo.com

Edison Gifted Center	Harlan Wallach	wallach@northwestern.edu, edgifted.org
Lionel Hampton	Rita Leary	RELeary@cps.edu
Schurz	Harriet Smith	htsmith@cps.edu
Cook Elementary	Brian Cagle	bcagle@cps.edu
King College Prep	Alicia Choi	AYChoi@cps.edu
Richards	Gurpreet Juneja	GKJuneja@cps.edu
Lane Tech	Christopher Dignam, Asst. Principal	cadignam@cps.edu
Crane Tech Prep	Stacie Chana	SJChana@cps.edu
Coliss High	Monica Morrow	mmorrow@cps.k12.il.us
Joplin School	Laurel A. Martin	lamartin1@cps.k12.il.us

11.0 Resources

We are grateful for the financial support by the IPRO office this semester that enabled us to complete our project goals. We were initially approved for $320 to spend on supplies, services, and travel. $170 was spent in supplies for LabFest! for the Chicago Science initiative at the Museum of Science and Industry. For this particular event, we invested this money to buy all of the materials for two of our activities. These two activities are the M&M packing, related to Mathematics, and the Balloon C-Strength, related to Chemistry. We bought M&M's, wood sticks, balloons, napkins, calculators and vegetable oil. The IPRO office was able to provide us with all the printing materials necessary to present these two activities at the LabFest! even after our initial budget proposal that did not include these expenditures was submitted. The IPRO office expanded our budget by adding an extra amount of $730 for services. Our total budget for this semester was then $1050. From this budget, we have only $130 left over.

Everyone in our team participated significantly in LabFest! Seven of our nine members attended the event, which lasted a total of eight hours. Additionally, we each spent approximately five to ten hours in planning prior to the event. We created the brochures with the respective activities in about ten hours. Also, the materials such as the M&M's in packages of almost 10 pounds proved difficult to find. Therefore, about 2-3 hours were spent looking for the materials and buying them in bulk from retailers. Another hour was spent in checking that the IPRO office had our poster, brochures and business cards printed out. The most expensive part, and probably the most time consuming of our entire project was LabFest!, but we feel that we distributed the workload evenly. Despite the high costs, however, the results from going to this event were great. We were able to attract many CPS students and teachers to our booth and

took the opportunity to inform them about our website. Shortly after this event there was a very clear increase in the number of visits to our website, which proved what a great accomplishment this was for us.

Other resources utilized in this project for this semester include the utilization of the Math department's printer and laptop computers. Around the middle of the semester, we had an hour-long meeting with IPRO 320 and IPRO 332, and we talked about uniting efforts to reach out for CPS teachers. Both IPRO groups had important events with retired CPS teachers and also one High School visit. Therefore, we printed out brochures to give these to the two IPRO groups. These groups then passed out these brochures in their events and High School visit and proved to be another great resource for IPRO 330.

Although, the whole team has participated in science fair judging, we have not included expenses for traveling. Rather than having the IPRO office reimburse these individuals for their expenditures, they have simply bared the costs themselves. Many of the schools are near IIT campus. For those that are not near campus, most team members used public transportation. However, at least one of our team members and one of our advisors have used their car to go to these particular science fairs. We have spent a great amount of time participating in these science fairs. The shortest science fair judging opportunity was two hours, and the average was approximately three. On average, each team member judged three science fairs, counting for a average of approximately nine hours each. Multiplied by the eight members on our team at the end of the semester, this equals approximately 72 person-hours of judging.

Additional information regarding the breakdown of the budgetary resources can be found in section 6.0 Budget. Additional information regarding the breakdown of the personnel resources can be found in section 5.0 Team Structure and Assignments, section 5.1 General Team Structure, and 5.2 Project Monitoring Roles.

12.0 Acknowledgements

IPRO 330 would like to extend its thanks to the many people who helped make this project a success throughout the semester. Special thanks go to the IPRO office at IIT for their gracious support and aid with the printing of our numerous fliers, brochures, business cards and posters. Specifically, we are grateful for the efforts of the following people for their selfless support in publication and responsiveness toward our project:

- Judy Lederman: MSED Teacher Certification Chair, Illinois Institute of Technology

- Angela Dumas: Citywide Science Fair Coordinator, CPS
- Myrna Alvarez: Teacher, Dunbar Vocational Career Academy

IPRO 330 would also like to extend its gratitude to Thomas Jacobius for his never ending support and dedication to the IPRO program and all of the students of IPRO. Also, IPRO 330 would like to thank Dr. Michael Pelsmajer and Dr. Gregory Fasshauer for their dedication to the cause of IPRO 330, and their continuing support for the students of this group.