ILLINOIS INSTITUTE OF TECHNOLOGY

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

Project Plan

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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 intend 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,* is already fully functional thanks to the efforts of previous IPRO 330 groups. Our team aims to further improve and publicize this website. To improve the website we will be addressing suggestions given by CPS teachers and students as well as outside education professionals in an effort to provide a high quality and useful project. The success of our IPRO will be assessed by increasing the number of daily hits received by *Science Fair Extravaganza* and by positive direct interaction with CPS students.

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. If our IPRO team is 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

IPRO 330 will continue to work closely with Chicago Public Schools (CPS), primarily at the high school level, in order to improve the Science Fair program. Although CPS has no financial involvement in this IPRO project, our IPRO has established numerous contacts with educators who are gracious enough to volunteer their time to assist our efforts. Our primary contacts include:
- Angela Dumas – City Science Fair Coordinator

- Tammy Butler – Chicago Public Schools Post-Secondary Specialist

- Eric Williams – Chicago Public Schools Post-Secondary Specialist

- Alicia Choi – Area 23 Science Fair Coordinator

- Sophia Kim – Area 21 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. This collaboration has already proven valuable as it has allowed each team to specialize their project to some degree. One organization that our current IPRO team has established a relationship with is Science Chicago, an initiative spearheaded by the Museum of Science and Industry. We will continue to

attempt to establish affiliations with other area organizations designed to encourage the study of science and participation in Science Fairs.

From previous semesters of IPRO 330, we have 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. New projects posted to our website will be held to the standards employed by the Spring 2008 IPRO team.

The hard work of earlier IPRO 330 teams is evidenced by 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 list of IIT students who have worked on the project. Additionally, the website has been designed to allow users to give feedback either through e-mail or by responding to a simple survey. The website is currently obtaining approximately 30 hits per day, with the record of 51 hits in a single day being set quite recently, September 10, 2008.

3.0 Objectives

IPRO 330 has one clear and main purpose: to increase high school student interest in science and mathematics in Chicago Public Schools (CPS). This is a very lofty and broad goal, so IPRO 330 has chosen to use the CPS Science Fair program as a vehicle to achieve this purpose. IPRO 330 is a continuing IPRO, meaning that we have a foundation and a base of work that has already been accomplished. As a result, one of the project goals of this team will be to publicize the project throughout the CPS system. Specifically, we will be focusing on the three most involved sources in high school students' lives: students, teachers, and parents. To reach these potential customers we have a team that is responsible for presenting 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 will also be participating in Lab Fest at the Museum of Science and Industry and Science Chicago starting September 20. This is a vital next step for IPRO 330 as the ideal of the project is 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 will be focusing 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 include:

- 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, there will be a group of students in our IPRO focused on improving the website and implementing new projects.

3.1 Ethics

One of the most critical goals of IPRO 330 is to act responsibly and ethically at all times. The overarching principle of IPRO 330 is to guide and encourage the participation of high school students in Science Fairs and future careers in scientific research, and to maintain the integrity of all our activities throughout this process.
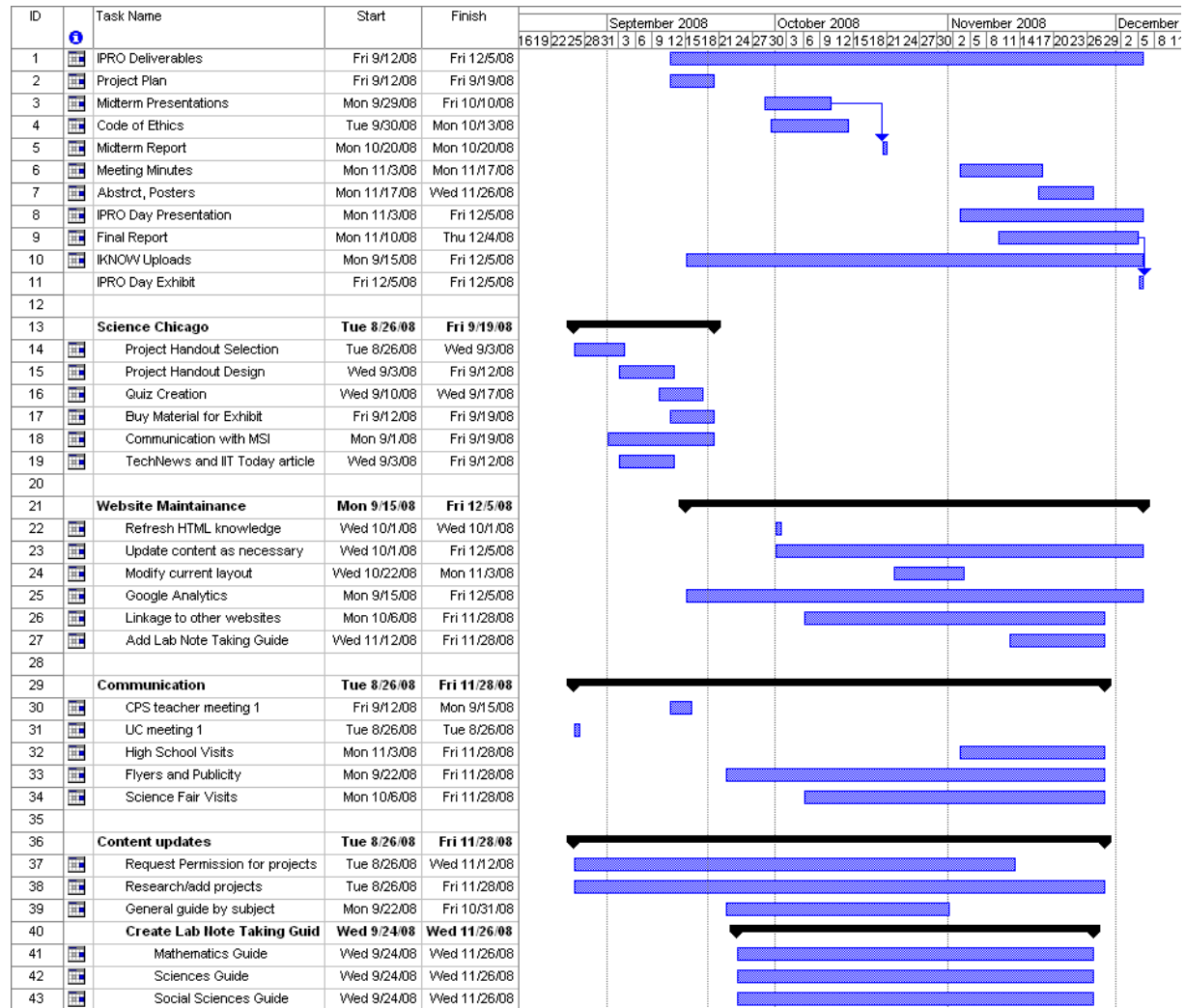
Specific Ethical Guidelines:

- All aspects of the Science Fair website will abide by the constraints set by applicable local, state, and national laws.
- Material presented to the *Science Fair Extravaganza* visitors will be original creations or will give appropriate citations; plagiarism is strictly prohibited on the website.
- The credibility of the material presented online or from other reference material needs to be verified and confirmed with expertise. Reference for the work of others must be cited and properly identified in order to prevent breach of copyright and intellectual property laws.
- All Information on the website is under the regulation of the law.
- No derogatory statements will be presented in the website.
- Substances listed under all projects will be legal for students under 18 years of age to utilize or present in public conventions under regulations.
- The service offered (i.e. the website) will not differentiate amongst users, but will allow access to anybody in the community who desires use of the service. Specifically, there will be no use of a login function to allow some users wider access than others.
- Feedback requisition from Chicago Public School students will be accepted as guidance to ensure website credibility and promote the success of students during their science fairs.
- Program systems are required to ask students to input their age. People below 13 years old may still input their data, but we shall only utilize the feedback of users above 13 years old.
- Contracts and agreements, both intra-team and external, must be established and followed by every participant.
- Careful documentation, such as records, meeting minutes, original plan and status report, should be completed in a periodic fashion regarding agreement and accomplishments between those who have collaborated with the project in the form of a contact list.
- All collaborators, including science fair coordinators, Chicago Public School teachers, and IIT faculty who contribute meaningful suggestions or information to the website will receive appropriate credit and be referenced on the website.

4.0 Methodology and Gannt Chart

The Gannt Chart below details all of the major tasks to be completed by our IPRO team this semester. Included in the chart are IPRO deliverables, Science Chicago, Website Maintenance, Communication, and Content Updates.

The IPRO 330 methodology is developed with a mix of structure and flexibility that we believe will allow us to take on any goal we adopt. It is necessary to have some flexibility in our plans because many of our activities are dependent on the approval and requests of our collaborators. If a Science Fair coordinator wants us to volunteer for a specific area Science Fair, we will do our best to adjust our schedules to make it to that particular Science Fair.

IPRO 330 has divided into three subgroups, each designed to work on a different aspect of the overall project. The communications and publicity sub-team takes primary responsibility for conversing with CPS instructors and administrators, publicizing the website to the community, and setting up visits to both high school classroom and Science Fairs. The content sub-team is responsible for creating or ethically obtaining the content that will be posted on the website, as well as revising the information that is currently presented. Lastly, the technical sub-team is responsible for the maintenance of *Science Fair Extravaganza* and the addition of the new content created by other team members.

ID		Task Name	Start	Finish
1		IPRO Deliverables	Fri 9/12/08	Fri 12/5/08
2		Project Plan	Fri 9/12/08	Fri 9/19/08
3		Midterm Presentations	Mon 9/29/08	Fri 10/10/08
4		Code of Ethics	Tue 9/30/08	Mon 10/13/08
5		Midterm Report	Mon 10/20/08	Mon 10/20/08
6		Meeting Minutes	Mon 11/3/08	Mon 11/17/08
7		Abstrct, Posters	Mon 11/17/08	Wed 11/26/08
8		IPRO Day Presentation	Mon 11/3/08	Fri 12/5/08
9		Final Report	Mon 11/10/08	Thu 12/4/08
10		IKNOW Uploads	Mon 9/15/08	Fri 12/5/08
11		IPRO Day Exhibit	Fri 12/5/08	Fri 12/5/08
12				
13		**Science Chicago**	**Tue 8/26/08**	**Fri 9/19/08**
14		Project Handout Selection	Tue 8/26/08	Wed 9/3/08
15		Project Handout Design	Wed 9/3/08	Fri 9/12/08
16		Quiz Creation	Wed 9/10/08	Wed 9/17/08
17		Buy Material for Exhibit	Fri 9/12/08	Fri 9/19/08
18		Communication with MSI	Mon 9/1/08	Fri 9/19/08
19		TechNews and IIT Today article	Wed 9/3/08	Fri 9/12/08
20				
21		**Website Maintainance**	**Mon 9/15/08**	**Fri 12/5/08**
22		Refresh HTML knowledge	Wed 10/1/08	Wed 10/1/08
23		Update content as necessary	Wed 10/1/08	Fri 12/5/08
24		Modify current layout	Wed 10/22/08	Mon 11/3/08
25		Google Analytics	Mon 9/15/08	Fri 12/5/08
26		Linkage to other websites	Mon 10/6/08	Fri 11/28/08
27		Add Lab Note Taking Guide	Wed 11/12/08	Fri 11/28/08
28				
29		**Communication**	**Tue 8/26/08**	**Fri 11/28/08**
30		CPS teacher meeting 1	Fri 9/12/08	Mon 9/15/08
31		UC meeting 1	Tue 8/26/08	Tue 8/26/08
32		High School Visits	Mon 11/3/08	Fri 11/28/08
33		Flyers and Publicity	Mon 9/22/08	Fri 11/28/08
34		Science Fair Visits	Mon 10/6/08	Fri 11/28/08
35				
36		**Content updates**	**Tue 8/26/08**	**Fri 11/28/08**
37		Request Permission for projects	Tue 8/26/08	Wed 11/12/08
38		Research/add projects	Tue 8/26/08	Fri 11/28/08
39		General guide by subject	Mon 9/22/08	Fri 10/31/08
40		**Create Lab Note Taking Guid**	**Wed 9/24/08**	**Wed 11/26/08**
41		Mathematics Guide	Wed 9/24/08	Wed 11/26/08
42		Sciences Guide	Wed 9/24/08	Wed 11/26/08
43		Social Sciences Guide	Wed 9/24/08	Wed 11/26/08

5.0 Project Budget

Our project has no financial sponsors outside of the IIT Interprofessional Project Office. Our largest expenditures are the printing costs for brochures, business cards, and poster boards. Due to our participation in Science Chicago our budget request also contains money for science experiment supplies. Lastly, our budget entails some money for transportation costs as members will have to travel to pick up supplies for Science Chicago, to have meetings with CPS leaders, and to travel to University of Chicago for meetings with our collaborators at that university. The budget breakdown by category is as follows:

Category	Requested	Explanation and Details
Supplies	$250	Experiment supplies for Science Chicago, and other lab experiments including canola oil, wood skewers, balloons, M&M's, and various other small supplies.
Services	$750	Printing of materials for lab experiments and publicity of the website, including business cards, brochures, and posters.
Travel	$50	Expenses for important off-campus meetings with CPS teachers and administrators, U of Chicago web team, and other collaborators.
TOTAL	$1050	

6.0 Team Members

Name	Year – Major	Strengths
Sam Nemanich	3rd Year – Biomedical Engineering/Science Education	Contact with CPS Office of Math and Science
Joshua Tate	4th Year – Applied Mathematics	Mathematics/ Previous IPRO 300 Experience
Xuan Kang	4th Year – Biomedical Engineering	Bilingual/Event Organizing
Andrew Mehr	4th Year – Psychology/Political Science/ Humanities	Technical Writing/Research

YoungJu Jo	4th Year – Electrical Engineering/Applied Mathematics	Projects/Illustrator and Photoshop experience
Mark Rhodes	4th Year – Electrical Engineering	Remedial Science/Programming
Brianna Elg	3rd Year – Psychology	Technical Writing/Visual Presentation
Kyle Gay	3rd Year – Physics Education	Contacts/Research/Projects
Rocio Diaz	4th Year – Chemistry	Previous IPRO 330 Experience/ Contacts/Programming/Projects

6.1 General Team Structure

- Team Leaders

  The team will be led by Rocio Diaz and Joshua Tate. Both of these students were members of the Spring 2008 IPRO 330 team. The leaders will be responsible for coordinating the sub-teams, ensuring that each sub-group is coordinating with the other sub-groups and progressing at an appropriate pace, running all meetings, and considering all aspects of this project before providing a directed vision. Rocio and Joshua are also responsible for meeting with Professors Fasshauer and Pelsmajer (Faculty Advisors) to get feedback on their plans and to make sure that they are covering all aspects of the project that need to be addressed at the upcoming meetings.

- Sub-teams

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

  The communication/publicity team is 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.

6.2 Project Monitoring Roles

- Meeting Roles

    o   Minute Taker – Rocio Diaz

    o   Agenda Maker – Joshua Tate

    o   Time Keeper – Xuan Kong

- Assigned Status Roles

    o   Weekly Timesheet Collector/Summarizer – YoungJu Jo

    o   Master Schedule Maker – Sam Nemanich

    o   iGroups Organizer – Brianna Elg