IPRO 330
Dynamic and Contemporary Science Fair Projects
Fall 2008
The Problem

- Chicago Public School (CPS) students have problems with:
  - Deficient presentation skills
  - Data analysis
  - Basic laboratory techniques
  - Project ideas
  - Finding resources

For completing a science fair project.
The Objectives

- Provide a website as a comprehensive resource
- Attract CPS teachers and students
- Increase the amount of visits to our website
- Improve the quality of the website content
  - Making lab note-taking guides
  - Writing general laboratory techniques
  - Increasing the amount of inquiry-based projects
Previous Accomplishments

- Established contacts
- Promoted the website
- Created science fair projects
- Added a quiz
- Revamped our website
Science Chicago – LabFest!
Present One of Our Projects
Current Main Page

Project Ideas
Data Analysis
Presentation
Writing
Display
Links
Safety
Lab Techniques

$\sqrt{a^2 + b^2} = c^2$
Note Taking Guides

General Science Lab Note Taking

A lab notebook should be an organized and detailed account of anything you do when conducting research or doing an experiment. It is necessary to prepare your notebook in detail before you do your lab and to fill in data as you do the experiment.

The answers to these questions should be thought out before you do your experiment and you should write them down in your lab notebook. Later, when you are doing your experiment analysis and results, you can refer to your notebook and see how well your research answered your questions or supported your predictions.

Here are the general steps that you should follow while doing your lab note taking for a science fair project. "When you are done reading these steps, you may want to check out more detailed information for particular subjects or see our lab note taking samples!"

Write the Dates:

- Write the date that you are doing the experiment in any format you prefer.
- Keep in mind that some experiments run for multiple days, so you will need to record the date each time you work in your lab notebook.

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Lab Techniques

Gel Electrophoresis

Definition
A method used for the separation of deoxyribonucleic acid (DNA), ribonucleic acid (RNA), or protein molecules using an electric current applied to a gel matrix.

Application
Forensics, molecular biology experiment, genetics, microbiology and biochemistry

Difficulty
Procedure: Hard
Concept: Hard

This experiment contains toxic chemicals as well as extreme sterilization condition. Please refer to the Safety section for careful handling of chemicals.

Concept
Gel refers to a crosslinked polymer that can contain and separate a target molecule due to its pores inside. It is usually composed of different concentrations of acrylamide and a cross-linker, producing different mesh networks of polyacrylamide or agarose.

Electrophoresis refers to the electromotive force (EMF) that is required to move the molecules through the gel. Nucleic acids are negatively charged but placing them in a well that is on the negative side of the EMF will make them migrate towards the positive side of the gel.

Based on the size of the molecule, they will migrate at different rates. The lighter the molecule, the faster the molecule travels.
Invisible Ink

Objectives
To write and visualize words with invisible ink.

Application
Learning probability, properties of matter, reaction, matter, name, string, ventilation, etc.

Difficulty
Procedure: Easy
Concept: Moderate

Concept
Invisible ink is a substance used for writing, which is invisible on application, or when applied to paper, and which can later be made visible by some means. Once the writing is done, the paper or writing surface should appear clean and of normal texture as surrounding material.

Invisible ink is a substance used for writing, which is invisible on application, or when applied to paper, and which can later be made visible by some means. Once the writing is done, the paper or writing surface should appear clean and of normal texture as surrounding material.

There are two types of invisible ink. Different types of chemicals can be applied and observed under neutralizing conditions. Ultraviolet light, fluorescence, and the addition of other chemicals that undergo a photochemical reaction to stoppage, coating, testing, stenciling, or other means. One such example is the use of benzil. Benzil is an organic compound used in the manufacture of benzil. Benzil is a yellowish, oily liquid that is insoluble in water. Benzil is a yellowish, oily liquid that is insoluble in water.

Materials
- Benzil (benzil)
- Phenomenon solution
- Cotton swab (bambac)
- Water (water)
- Detergent
- Ammonium (ammonium)
- Acetic acid (acetic acid)

Procedure
- Cut a piece of paper. Dip the cotton swab into the phenolphthalein solution and write a message on the paper or draw a picture onto the paper.
- Dip the paper into the water that contains ammonia and observe the color appear on the paper then disappear.
- Repeat the same process with Acetic acid and nothing should appear.

Analysis
There is no specific analysis associated with this experiment.

Conclusion
Does the writing disappear after coating the paper with solutions that contain ammonia and nothing else? If not, does coating with more solutions help the lines to appear? How long does it take the word to appear onto the paper?

Extension
More compounds can also be applied to produce invisible ink. For example, organic substances, including odor-diffuse, honey, lemon, milk, salt, and sugar can be used to create secret messages.

Reference
- http://www.sciencefair.math.iit.edu
Illinois Institute of Technology IPRO 330 (sciencefair.math.iit.edu)

Dynamic and Contemporary Science Fair Projects in CPS

SCIENCE FAIR EXTRAVAGANZA:
EVERYTHING YOU WANT TO KNOW ABOUT SCIENCE FAIR PROJECTS

This flier is meant to inform and teach you about the many helpful tools found at the IIT SCIENCE FAIR EXTRAVAGANZA website. The following pages will show you the ways that our website can help both you and your students through the challenging task of creating and performing an experiment for a science fair. Below is a table of contents, including page numbers, showing where to find specific information on the various areas for which our website provides assistance. If you are interested in exploring our website and learning more about it for yourself, please visit it at

sciencefair.math.iit.edu
The Plan

• Get the word out
• More hits
• Judge CPS science fairs
• Informational flyer for CPS teachers
• More projects
• Laboratory techniques
• Lab note-taking guides
# The Sub-team Plans

## Communication Group:
- Distribute publicity material to CPS teachers
- Judge at 10+ science fairs
- Present for 12+ science fair coordinators
- Communicate with other IPRO groups
- Help with the website layout and design

## Content Group:
- Review and re-categorize old projects
- Develop lab note-taking guides
- Create 8 new projects
- Develop lab techniques section
- Learn and update website with various contents
- Change website keywords to promote it in search engines
The Difficulties

• Obtaining feedback from CPS teachers and students
• Creating lab note-taking guides
• Shrinking of our team
• Producing contemporary and dynamic science fair project ideas
• Updating website
• Too many requests for help
Revised Plan

• Judge more science fairs
• Eliminate the technical sub-team
• Involve content sub-team into uploading projects and guides to the website
• Increase the number of internal links in our website
Code of Ethics

• Overarching Statement:
  “The Science Fair website will provide a quality service to all Chicago Public Schools students, as well as maintain the integrity of the science fair system and its affiliates.”

• Pressures and Risks
  • Finding the right balance between giving too much and not enough information
  • Legalities of using copyrighted materials on the website
Results

• Participated in Science Chicago event LabFest! at the Museum of Science and Industry
• Presented to CPS science fair coordinators
• Added guides with essential laboratory techniques
• Created lab note-taking guides
• Created an informational flyer for publicity and distribution to CPS teachers
• Generated 8 more projects for current project data bank
• Received large number of requests for help judging science fairs
Results Continued

- Number of hits to our website increased approximately 800% compared to last semester
Future of this IPRO

• Need web development specialists
• Increase more inquiry-based projects
• Write a National Science Foundation proposal
• Publicize website
• Conduct more research into areas of deficiency in science fair reference material
Acknowledgements

• IPRO Office
• Angela Dumas, CPS City-Wide Science Fair Coordinator
• Judith Lederman, Math and Science Education Department
• CPS Teachers
Questions...