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

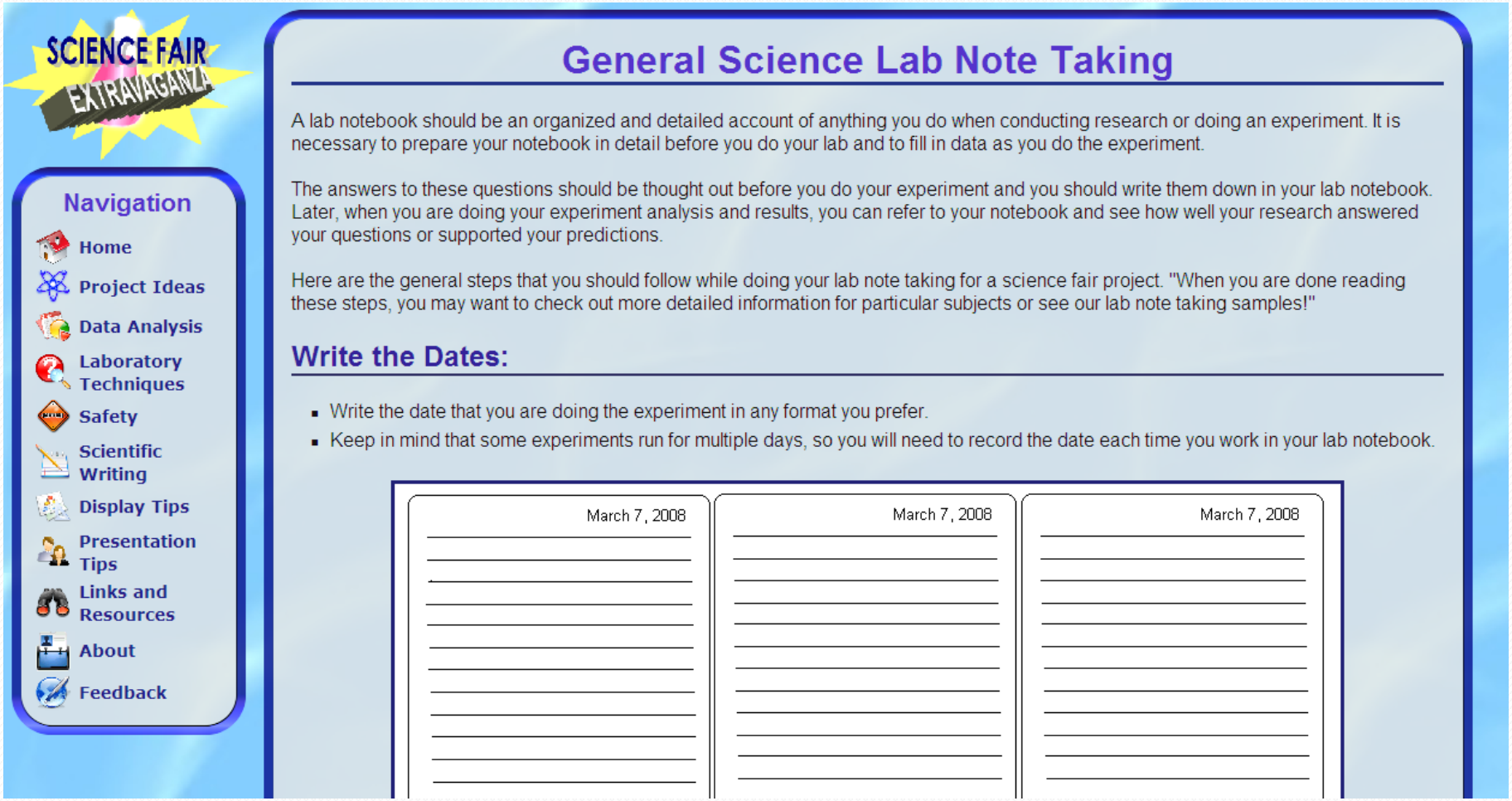
- Established contacts
- Promoted the website
- Created science fair projects
- Added a quiz
- Revamped our website

Science Chicago – LabFest!

Present One of Our Projects

Current Main Page

Note Taking Guides



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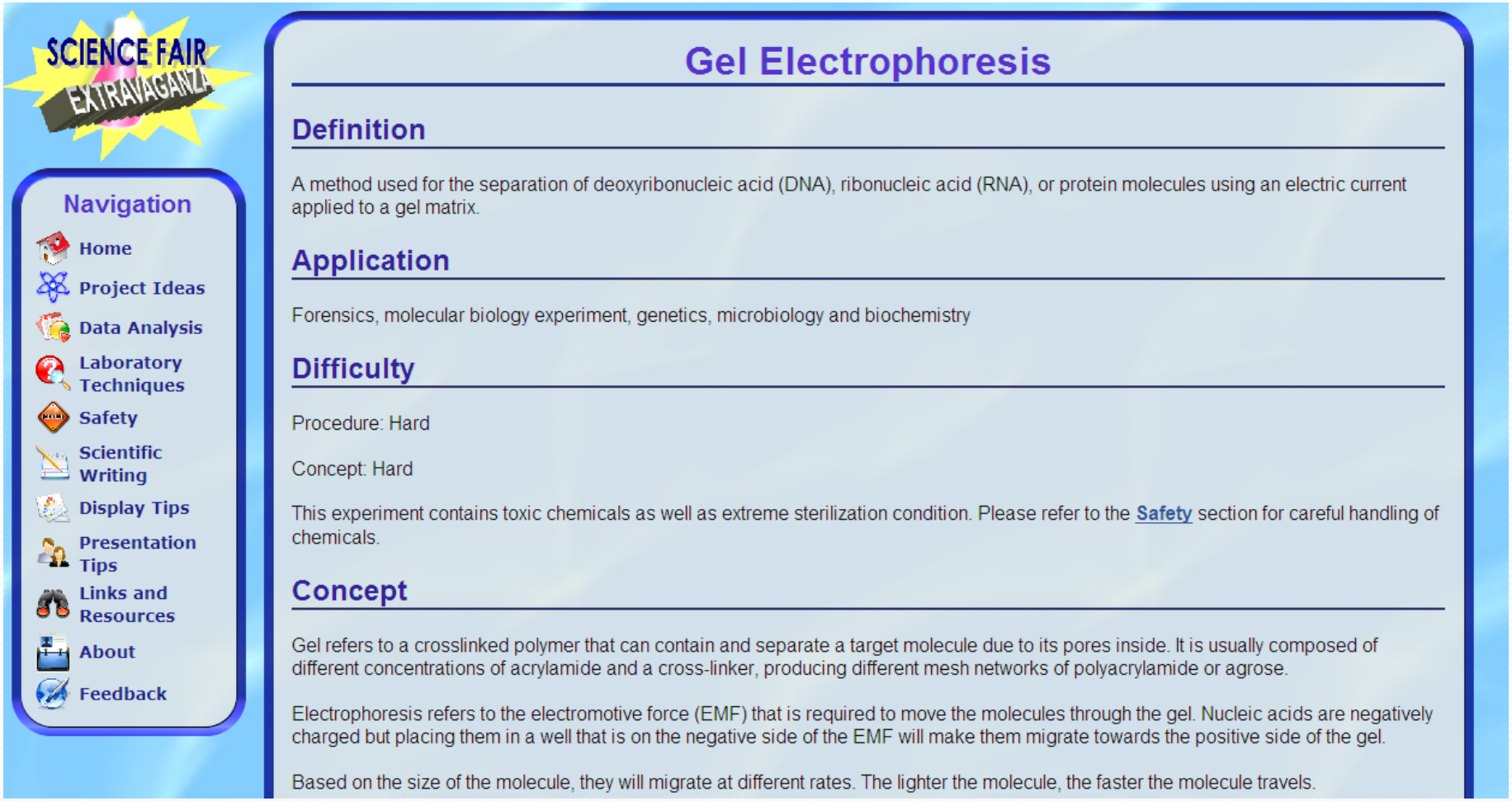
Lab Techniques



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Project Bank

Invisible Ink

Mysterious Ink...

Objective

To write and visualize words with invisible ink.

Application

steganography, espionage, anticounterfeiting, property marking, hand stamping for readmission, etc.

Difficulty

Procedure: Easy

Concept: Medium

Concept

Invisible ink is a substance used for writing, which is either invisible on application, or sooner thereafter, and which later on can be made visible by some means. Once the writing is dried, the paper, or writing surface should appear blank and of similar texture as surrounding material.

There are few types of invisible inks. Different types of Chemicals can be applied and visualized under heating conditions, ultraviolet(UV) light, fluorecence, and the addition of other solutions that undergoes acid-base reaction by dropping or spraying, fuming of vapours, or other means. One well-known example will be the blueprint. Based on such principles, toy invisible ink pens with two tips, one for invisible ink writing, and another tip for developing the ink, or a decoder tip, was developed and sold on market.

BluePrint, an example of invisible ink:

Invisible ink: with UV-light

BluePrint, an example of invisible ink:

Invisible ink: pen

Even though the problem seems to be difficult, the invisible ink can be easily made at home by applying ammonia fumes onto paper written with phenolphthalein. Phenolphthalein is a chemical compound that usually used in titration. It turns colorless in acidic solutions and pink, or even purple in basic solutions depending on the indicator concentration. Ammonia is normally encountered as a gas and very easy to evaporate. Since ammonia acts as a base or a proton acceptor, even though it is colorless in its liquid form, when interacted with phenolphthalein, the solution turns pink. Therefore, by spraying ammonia fumes onto phenolphthalein, the invisible writing appears onto the paper. However, as ammonia fumes evaporates, the invisible writing disappears again.

Materials

- Solid Iodine Crystal

phenolphthalein meets basic solution

- phenolphthalein solution
- cotton swab (brushes)
- White Paper (paper towel)
- beaker
- ammonia (spray with ammonia)
- acetic acid (vinegar)
- The sheet of paper may be used repeatedly for writing multiple messages after the firs message disappears.
- All the material used in this experiment are very easy to be acquired. Solutions of acetic acid and ammonia can be stored in suitable containers that prevent evaporation.

Procedure

- Cut out one piece of paper, dip the cotton ball or brush into the phenolphthalein solution and write a message or draw a picture onto the piece of paper. Dry the paper in air.
- spray the paper towel with Windex that contains ammonia and observe the word appears on the paper then disappears.
- 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 successfully appear and disappear onto the paper after sprayed with ammonia and acetic acid? If not, does spraying with more solutions help the words to appear? How long does it take the word to appear onto the paper.

Extension

Many compounds can also be applied to produce invisible ink. For example, organic substances, including colar drink, honey, lemon, milk, onion juice, soap water, sugar can all be oxidized to brown color when heated.

Reference

- http://en.wikipedia.org/wiki/Invisible_writing
- http://www.52bsaxue.com.cn/ArticleContent.asp?ID=1678

Informational Flier

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

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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."

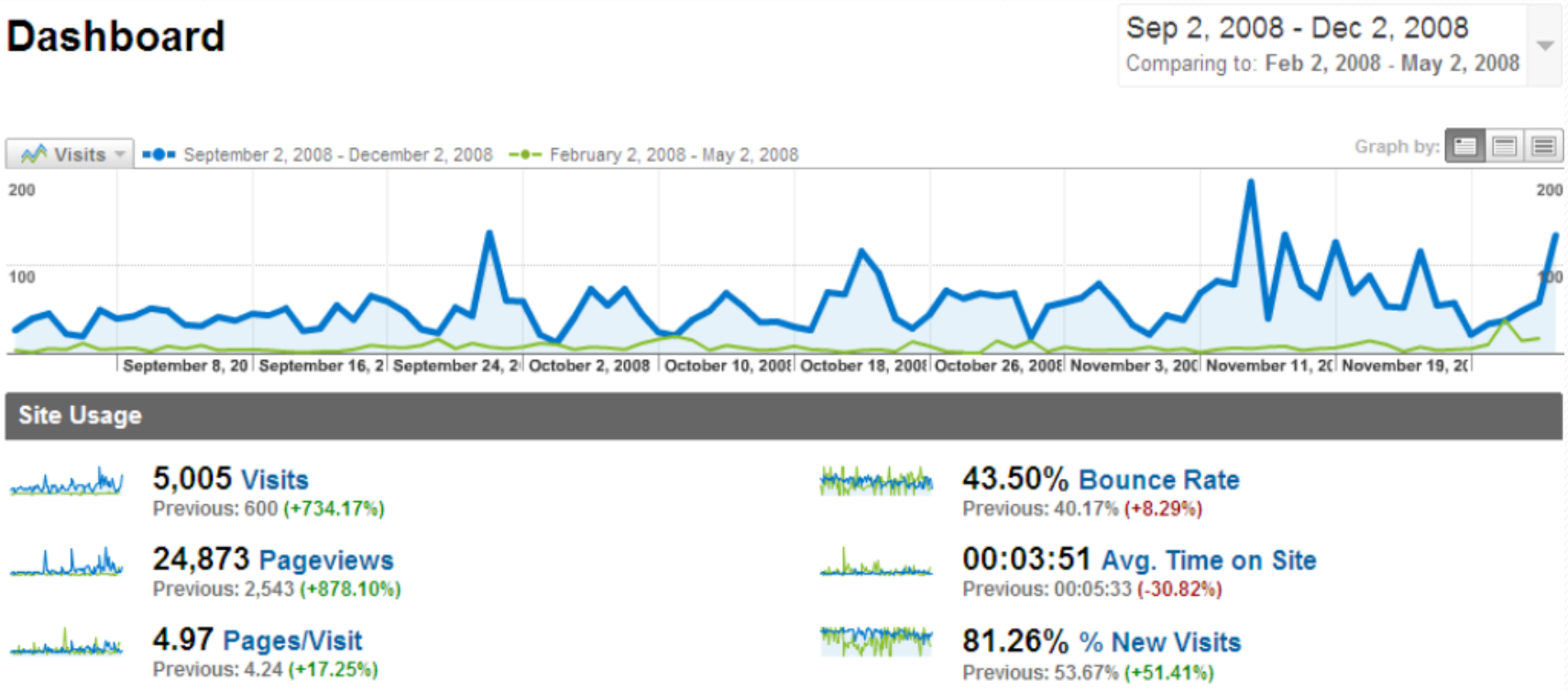
- Pressures and Risks
  - Finding the right balance between giving too much and not enough information
  - Legalities of using copyrighted materials on the website

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…