Cat 1 Projects

Briefing for
Cat 1
7 March 2014
## HCI Projects Day (12 categories)

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<th>Category 1</th>
<th>Category 5</th>
<th>Category 9</th>
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<td>Experimental</td>
<td>Creative arts</td>
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<td>research</td>
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<td>Category 2</td>
<td>Category 6</td>
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<tr>
<td>Non-experimental</td>
<td>Language arts-English</td>
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<td>Category 3</td>
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<td>Inventions</td>
<td>Language arts</td>
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<td>Chinese</td>
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<td>Category 4</td>
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<td>Resource</td>
<td>Service learning</td>
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<td>Development</td>
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<td>Category 8</td>
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<td>Service learning</td>
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What is Cat 1 project about?

- Experimental research
- Need to carry out experiments in the lab
- Data collection needed, more than literature search
The Scientific Method

1. Ask a question
2. Do background research
3. Construct hypotheses
4. Conduct experiments & collect data
5. Analyse results & draw conclusions

- Hypothesis is true: Report Results
- Hypothesis is false/partially true: Think again
Examples of non Cat 1 Projects

- Causes of Tsunami
- Effects of global warming on our planet
- Layman guide to science experiments
- Cures to cancer
- Hydroponics
Examples of Cat 1 Projects

- Utilization of starch for the production of biodegradable plastic.
- Synthesis and characterisation of nanometric semiconductors
- Effect of aqueous extract of *Eucalyptus globulus* on bacteria
- Analysis of heavy metal concentrations in canned tuna fish
How to get started?

Source for an idea which is
- Creative (if possible)
- Feasible
- Has good application
- Interesting
Sourcing for ideas

- There are many websites on science fair project ideas. For example:
  - http://www.all-science-fair-projects.com/
  - http://www.sciencebuddies.org/
- Start early, sourcing for ideas take time. Discuss with mentor to check whether the idea is feasible.
Where to find ideas?

- Search engines
  - google
  - Google scholar
  - Pubmed
  - Elsevier – browse journals by subject (only abstracts)
  - Scirus (http://www.scirus.com)
  - open access journal (http://www.doaj.org/)
Where to find ideas?

- HCI projects day websites. Browse through to find out what has been done. Project ideas can be obtained by modifying existing ideas or extending them.
Where to find ideas?

• Science books/magazines/newspaper

Brown tap water still safe for drinking
Rusty look may be from iron silt in a building's older pipes but is not health hazard: PUB
Victoria Vaughan, Straits Times 17 Jul 09;

IT JUST looks dirty. On average, two Singapore households a day have been reporting brown or rusty tap water, but the Public Utilities Board (PUB) says it is still safe to drink.

Older buildings are more likely to be affected as they could still be using iron water pipes. PUB stopped the use of such pipes in 1980.

'Over time, iron sediment can accumulate in these pipes. Water flowing through the pipes may pick up the sediment,' said a PUB spokesman.
Where to find ideas?

- Removal of metal ions using eggshell
Feasibility of ideas

- Is there a clear rationale?
- Does the project increase knowledge in the field?
- Is there application/interest value in your project?
- Is there room for future expansion on the project?
Feasibility of ideas

- Originality
  - Is your project simply a repetition of others’ work? Did you make any modification?
  - Have you referred to for similar projects?
Feasibility of ideas

- Can a workable outline of your methodology be formulated?
- Do you have preliminary data/other research work to support your methodology?
- Does the strategy have a strong theoretical or conceptual base?
- Can your experiments be performed in your school lab? If cannot, can you get external help?
- Is it possible to collect quantitative data?
- Is it possible to collect sufficient data within 3-6 months?
Doing Background Research

- Read up on the theory behind your project idea.
- Research on the history of similar experiments or invention.
- Research on the techniques and equipment required to investigate your topic.
Searching for methods

- After idea is finalized, search for methods
- Google to find possible methods, discuss with mentor to check feasibility and whether the reagents/instruments needed are available.
- Be very clear what data you need to collect.
Grading – Prelims

- Focus on feasibility
- Rationale/introduction
- Clear objectives & hypothesis
- Variables (controlled, independent and dependent)
- Materials, Apparatus and equipment
- Methods
Grading - Prelims

- Pass prelim I – 10 points
- Prelim II – 5 points
Grading – Semi Finals

- Everything listed in prelims
- **Detailed methods** (include photos)
- Results (organised in tables, graphs)
- Interpretation of results
Grading – Finals

- Everything listed in semi-finals
- More in-depth discussion of results
- Conclusion
- Applications
- Limitations
- Future studies
Comment on the following ideas

- Which brand of detergent is most effective in removing stains?
- Effect of music or talking on plants
- Determining the antibacterial resistance of toothpastes – An in vitro study
- Effect of colours on emotion
- Nanostructured CoN, CoO and Co$_3$O$_4$ as a high capacity and long life anodes for Li-ion batteries
Preparing for prelims

- 5 min presentation
- Everyone present must present.
- Be confident in presenting, do NOT read from script all the time.
A group of students have come up with the following idea for Projects Day: “Investigating the antibacterial properties of fruit peel extracts on $E.\text{coli}$”

What should the objectives, hypothesis and the variables be?
Objectives

- To investigate whether fruit peel extracts from mango peel, banana peel and orange peel have antibacterial properties against *E. coli*.
Hypothesis

- Fruit peel extracts have antibacterial properties against *E. coli*.
<table>
<thead>
<tr>
<th>Controlled Variables</th>
<th>Independent Variables</th>
<th>Dependent Variables</th>
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<tbody>
<tr>
<td>Mass of fruit peels</td>
<td>Type of fruit peel</td>
<td>Zone of inhibition</td>
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<tr>
<td>Volume of solvent used in the extraction</td>
<td></td>
<td></td>
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<tr>
<td>Volume of fruit peel extract used in the well diffusion test</td>
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<tr>
<td>Volume of <em>E. coli</em> added to the agar plate</td>
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Groups who cannot make it on prelim I or request for early/late slots or wish to change titles

- Inform Mrs Sow via email (pehyk@hc.edu.sg) by 28 March.
Risk Assessment and Research Plan

Need to submit risk assessment and research plan prior to the start of experimentation.
Both available in projects day website.
The END

Thank You!