

REALISE THE DREAM

National School Science & Technology Awards

Please use this nomination form for all projects that are being nominated for Realise the Dream.

Please send your nomination/s to Debbie Woodhall, Royal Society of New Zealand, PO Box 598, or 4 Halswell Street, Wellington no later than **12 October 2011** or nominations can also be sent electronically to Debbie.woodhall@royalsociety.org.nz

Your nomination needs to include.

1. A link url address to the 5 minute film of the student talking about their research. (They may have uploaded this onto Youtube). If you prefer not to do it this way then you can send as a DVD to me by 12 October 2011.
2. 1 page executive summary of research.
3. 10 pages (maximum) of relevant research material. This must include photos and graphs. However appendices such as (raw data, programming code; chip specifications) can be attached separately.
4. Relevant log book information (if this is electronic then it can be sent as an attachment)
5. 1 copy of student information form. Can be downloaded: <http://www.realisedream.org.nz/for-nominators.htm>

Teacher, Judge or Nominators name: _____

Competition or programme nominated from(if any) _____

Title of research: _____

Student's name: _____

Student's age: _____ Year level: _____

Student's school: _____

Student's address details: _____

Student's phone number: _____

Student's email address: _____

Has this piece of work won any awards?

Are you a teacher nominating a student? _____

Name: _____

School _____

Phone home: _____ Work: _____

Home address: _____

Email: _____

Do you agree to being contacted by the Realise the Dream selection panel if necessary?
Yes/No on 29th and 30th October 2011.

Please complete the form thoroughly.

EVALUATION CRITERIA FOR REALISE THE DREAM PROJECTS

Below we list the criteria that will be used by the selection panel. That panel will be able to apply the criteria only to the written material and DVDs/film presented by the students and their nominators. Exceptionally the selection panel may contact the nominator to help answer a question raised in the evaluation process. We strongly recommend that nominators and nominees take note of these criteria when preparing nominations.

These criteria will also be used by the judges at Realise the Dream in the process of identifying further award winners. In that case the judges will be able to examine the original nomination material as well as discuss with the nominees the project as submitted and any changes to the students' opinions subsequent to the nomination.

The criteria are organised under five main headings.

- 1. CONTEXT OF THE PROJECT**
- 2. DESIGN PROCESS**
- 3. EXECUTION OF DESIGN PROCESS**
- 4. SOUNDNESS OF INTERPRETATION**
- 5. APPLICATION OF RESULTS**

In addition there is a set of criteria used that are common to all of the above five headings. Projects need to:

- Maintain an appropriate focus on the project's aims.
- Show an appropriate level of originality and ownership of the work by the student while acknowledging assistance received.
- Include appropriate consideration of the suitability/reliability of the methods, results and conclusions.
- Meet all ethical criteria (compulsory and moral).

In the remainder of this nomination please indicate how well the project meets the criteria under the five main headings. Where possible and appropriate please include some reference to the common criteria mentioned above.

1 CONTEXT OF PROJECT

- Explains why this project was initiated.
- Reviews existing knowledge (Literature reviews/what has been done or made before etc.)
- Has a clear statement of purpose/question to be addressed.
- Discusses results or outputs in the context of other people's findings in the same or closely related fields.

In order to assist the judging panel to assess how well the project meets these criteria, please succinctly summarise the context of the project and within this context, what the project set out to do.

This research was initially a solution to one of the International Young Physicists Tournament problems. The student has continued to work on the problem and in particular the practical implications of his research findings. The is Blue Sky research and the data is all from the research undertaken. Massive background research was undertaken to complete the project.

2 DESIGN PROCESS

There are three broad approaches to research work. Each of these approaches generally comprise of a number of steps as in the table below.

The selection panel will expect to see clear and appropriate use of the following steps within the project design.

| Experimental Research | Technology Development/Research | Research to increase knowledge for environmental or social systems (where controlled experiments are not possible) |
|---|---|---|
| <ul style="list-style-type: none"> • Hypothesis • Prediction • Controlled experiments • Experiments/observations that involve controlled treatments and/or an attempt to falsify hypothesis by obtaining further experimental measurements • Theory to explain phenomena | <ul style="list-style-type: none"> • Define the problem • Generate ideas • Gather information • Develop an approach • Design various prototypes • Produce the preferred solution • Evaluate responses to identify the best solution • May continue to prepare improved prototypes | <ul style="list-style-type: none"> • A proposal or idea can be tested by evaluating options by gathering and analyzing data instead of controlled experiments (e.g. surveys) <p>The research may include:</p> <ul style="list-style-type: none"> • Hypothesis • Prediction • Observations that do not involve controlled treatments • Adjunct experiments that do involve controlled treatments • Theory to explain phenomena |

NB The selection panel and judges will need to be aware that some projects may use more than one of the approaches.

Please indicate in a factual way, the key features of the design process that you would like the judging panel to consider when assessing how well the project meets these criteria. (This may include reasoning for choice of treatments and number of replicates in a science investigation, information about prototype testing and redesign in a technology project, etc.)

Initial experiments were well designed and refined to gain improved reliability and precision. The theory used to explain all observations were sound and the level of analysis and computer modeling was outstanding. Prototypes were constructed at each stage to refine techniques of data acquisition. The results were surprising and new requiring contrasting ideas to be evaluated before deciding on a final conclusion.

3 EXECUTION OF DESIGN PROCESS

- Follows the specified plan.

- Achieves an appropriate level of completeness.
- Includes appropriate choice of equipment and materials, and specifically addresses the reliability and accuracy of the instruments and tools used.
- Achieves the levels of accuracy and precision required to meet the project aim (this will include appropriate levels of replication and repeatability).
- Attempts to verify its results (e.g. conducts some further test experiments or practically tests prototype products).
- Indicates that any choices made to deviate from the plan were appropriate.

Please itemise briefly the ‘outputs’ of the project (data, techniques, technology solutions, etc) and any related information you believe the judges should consider in assessing how well the project meets these criteria.

Time was spent to undertake initial experimental work and evaluate findings. Experiments were repeated to ensure reliability and accuracy. The mathematical modeling of the real world situation showed a strong correlation. The link of the research to a product with real world application is one I am sure he will continue to work on.

4 SOUNDNESS OF INTERPRETATION (of results/outputs/proposals)

- Understands the limitations of the experiments/data/process.
- Uses statistics effectively (including assessment of errors) where appropriate.
- Logical data processing steps are used to achieve an appropriate level of analysis.
- A clear relationship is made between the discussion and the research question/proposal.
- Alternative interpretations are considered.
- The results answer the question or address the projects purpose.

Please highlight the major findings or achievements relevant to these criteria, demonstrated in the course of the project.

The student has had to look carefully at his data throughout the project to ensure the relationships he was proposing were scientifically valid. Many alternative approaches were investigated and different theories considered. He has found out results that are truly new to him (and myself!). This was a superb solution to the initial problem and he has extended it since.

5 APPLICATION OF PROJECT (Consider results and conclusions also)

- Was the project's purpose achieved? If not, then why?
- What should be the next step(s) along this line of investigation/development – or perhaps is there a recommendation that this line of work should not be pursued?
- Any new directions that are suggested by the results? This may include spin-off discoveries.
- Wider implications – is there value in the results that goes beyond the original project's aims or context?
- Has the project made a significant contribution to advancement of knowledge – for the students involved or anyone else? This can include knowledge gained deliberately

through for example testing an hypothesis, or unexpectedly through a chance observation.

Please briefly indicate features of the report that best demonstrate the nominee's awareness of the application(s) of their project.

The initial problem was answered to great effect in the international final of IYPT. The additional hours that the student has spent since then has enabled him to further refine his practical techniques. This has allowed him to "see" finer details than ever before and as result 'image' particles with no more than a simple pen laser and water droplet that are too small to see in a microscope. These are all results new to the student and all of this work is outside of the prescribed content for his Yr13 course.

ANY OTHER COMMENTS?

This is an intellectually demanding project which has stretched the creativity and practical skills of a top scholar. He has thrived in the research environment and his solution is one he can be proud of.

Signed:

(nominator)

Date: