Faculty of Science

Discovering for tomorrow

Nelson Mandela Metropolitan University

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Science to Schools

Department of Chemistry, Science Faculty

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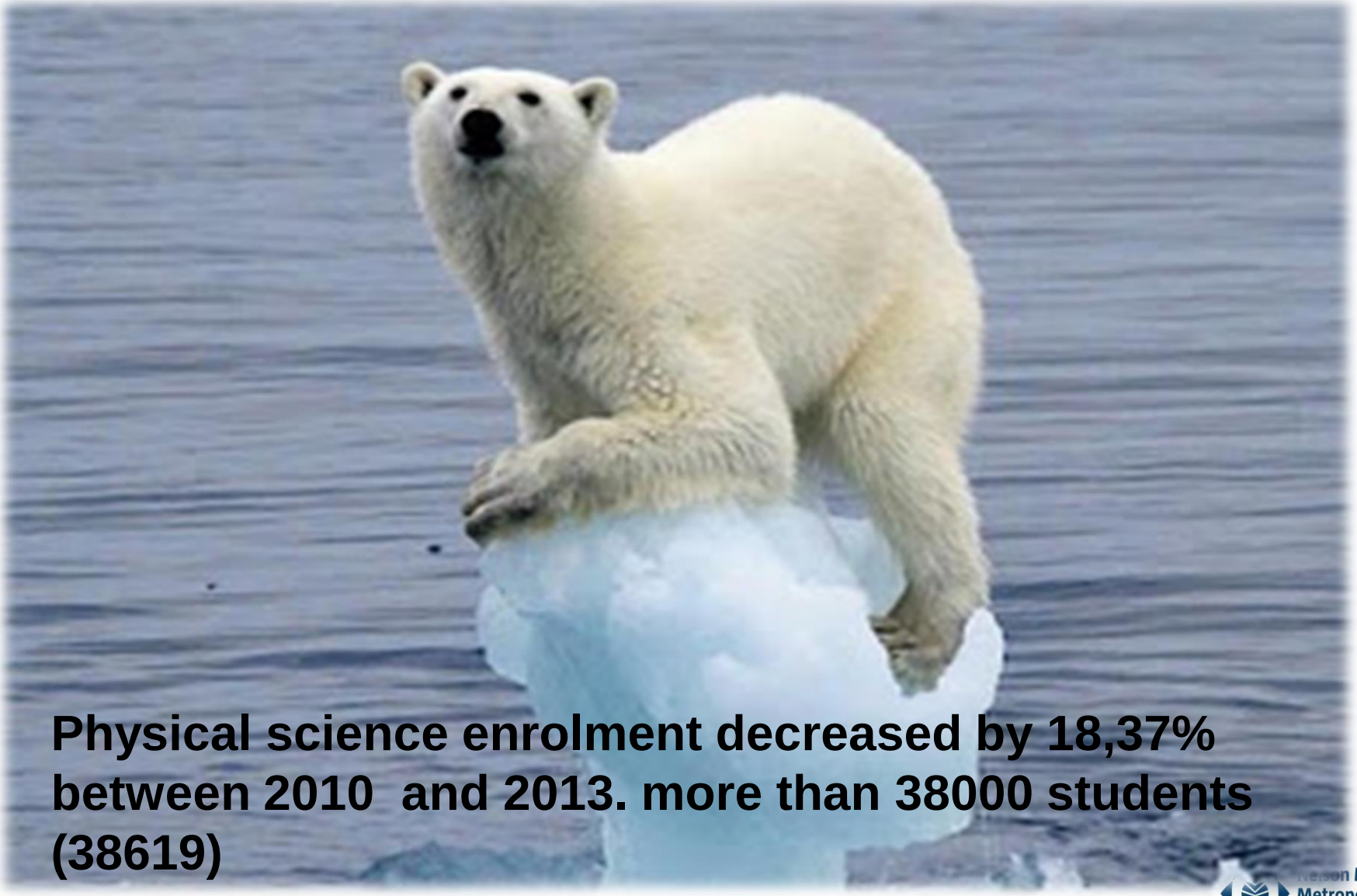
Presentation Scope

- Background to project
- Chemistry education problems
- Engagement activities within Project
- Project deliverables: Experiments, Presentations/Shows, Teaching Manuals, Empowered Teachers and Kit
- Future plans
- Action Pics

The state of Science Education in RSA??



Physical science enrolment decreased by 18,37% between 2010 and 2013. more than 38000 students (38619)

Quote

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The problem…we know what's wrong

"Our progress as a nation can be no swifter than our progress in education."
-- Former U.S. President
John F. Kennedy

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Problems in Chemistry at NMMU & Schools

- Weak extrapolation of science to real world
- Weak in problem solving (common sense?)
- Lazy and disinterested attitudes - more interested in their phones and electronic devices than careers
- Lack of encouragement from guardians

Problems in Chemistry at NMMU….

- Just here to get the practicals done – student scholars tend to celebrate when give a lecture off
- Too few questions!!!
- Want the easy route – never asking for challenges

Aim

To **stimulate** primary and secondary school learners in the science classroom and outside to **increase their affinity** for science.

Achieved through **striking science** and **memorable experiments**.

Hypothesis:

This will increase the number of children selecting *Physical Science* as a subject and will encourage, nurture and support future careers in science.

Objectives

- Visit schools demonstrating syllabus related science experiments
- To steer a higher percentage of scholars to careers in science
- Empower teachers to do experiments
- Develop a **“Science Discovery Week”** for teachers where teachers learn to do sustainable, low cost, but high impact experiments (primary and secondary schools)
- Compile a training manuals describing the experiments and how to conduct
- Promote this work via Youtube, Facebook, Twitter, etc.
- Source low cost reagents & equipment

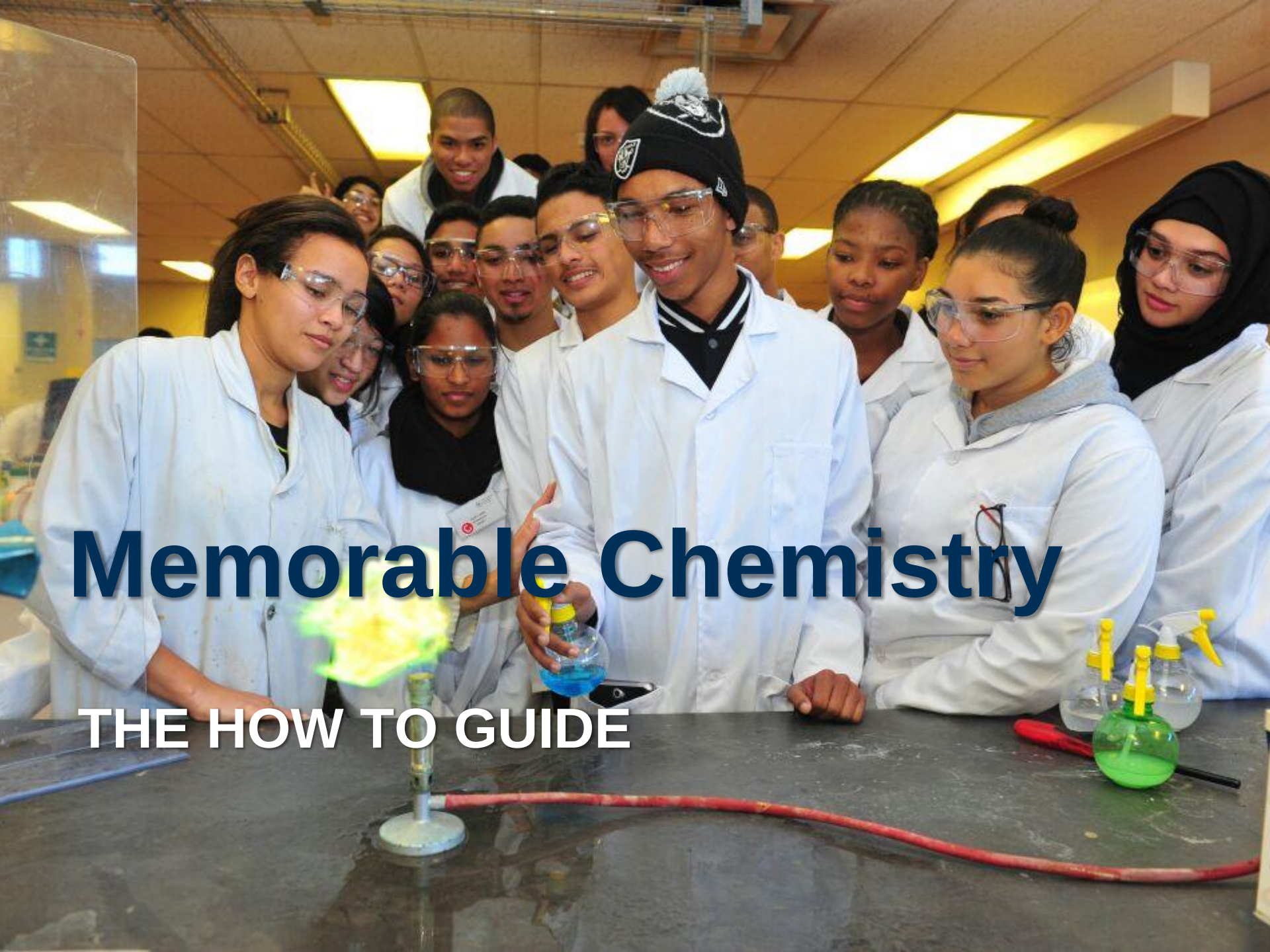
Objectives…

- Develop a macro science kit at minimal cost.
- Source and commit potential funders in industry and government.
- Collaboration with synergistic persons and organizations
- Assist scholars with school science projects.
- Share and publish findings in academic journals
- Expand the reach of the programme to schools in the broader Eastern Cape, especially rural areas, and even wider to a national stakeholder group.

What does NMMU contribute…??

- Outreach visits
- Open days
- Lab visits at NMMU – STEM, primary & secondary schools
- School visits – talks / demos
- Science Discovery Week

Where is the leverage?



Memorable Chemistry

THE HOW TO GUIDE

Memorable chemistry

"Mans mind stretched to a new idea never goes back to its original dimensions"

Oliver Wendell Holmes

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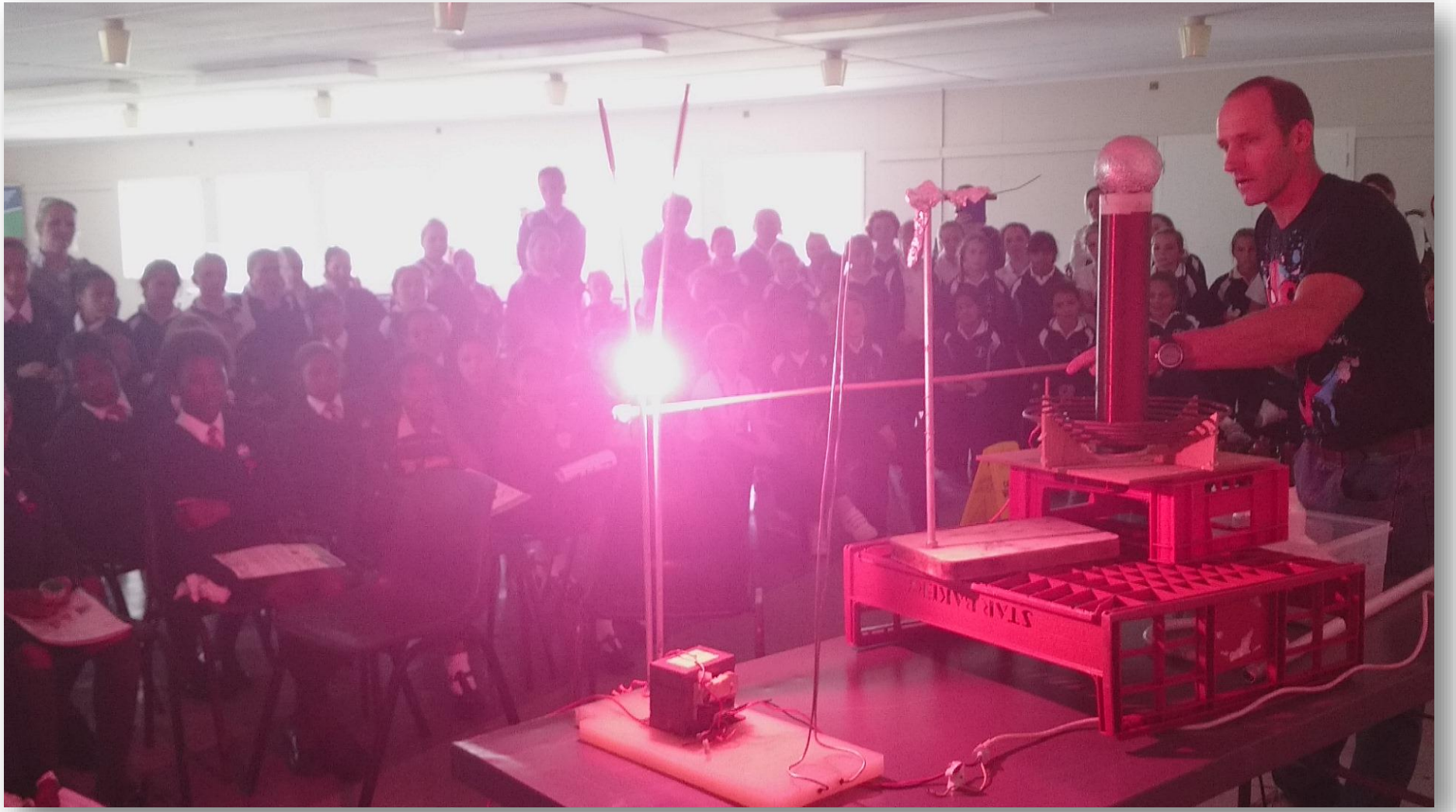
Nitrocellulose – (“Dragons Beard”)

Memorable chemistry / science - HOW????

- Excite them
- Inspire them
- Raise their heartrate
- Surprise them
- Shock them
- Intrigue them
- Engage them
- Horrify them
- Arouse their curiosity

Electricity in action – Strontium Excitation on a Jacobs Ladder



Chemical volcano

Edible Slime – calcium alginate encapsulated water pockets

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Levitating Bubbles – Floating bubbles bounce on invisible carbon dioxide

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S.T.C. Project boosts open days

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Science discovery week feedback – school lab problems highlighted

- Kids have no lab *(you don't need one!!)*
- Have a lab, but not used *(Make time!)*
- Very few demos – experiments, if any
  (NMMU Chem Dept can offer 130+)
- Teacher-Learner interaction is lower at public schools

No lab! = no excuse

Chemistry Diploma student doing interactive chemistry at an aftercare

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School lab problems continued…

- Poor teacher attendance / no teacher (only substitutes)
- Self study (experiment at home, You tube?)
- Teacher is scared of doing demos.

  (Ask for help – we can try a procedure and make it safer, or say NO WAY!)

Activity to address the problems

2013 Asanda Mbombiya - BTech Student – School syllabi experiments development

2014 Engagement Funding (R68000) &

6 Student assistants &

Lecturer replacement grant

1 BTech Student Project (Portable Fumehood Dev.)

2015 Engagement Funding (R25000) &

SETA – 5 student assistants (Lucky Break!)

1 BTech Student Project)

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Diploma Student Trainees – Photography Project

Difficulties

1. Red tape with purchases – often use own funds and claim back

2. Managing students

3. Lack of enthusiasm / follow up from teachers / officials

4. Time constraints.

Successes w.r.t objectives

- Many school visits – demos, shows and training sessions Yes
- Empower teachers to do experiments – Yes and No
- Develop a “Science Discovery Week” for teachers - doing a 2015 trial
- Compile a training manuals – 50% Done
- Promote this work via social media – yes, growing fast.
- Source low cost reagents & equipment – yes, ongoing
- Develop science kit at minimal cost – 70% done
- Source and commit potential funders in industry and government – 10% done

Successes w.r.t objectives

- Collaboration with synergistic persons and organizations - expanding
- Assist scholars with school science projects – yes
- Share and publish findings in academic journals – no
- Expand the reach of the programme to schools in the broader Eastern Cape, especially rural areas, and even wider to a national stakeholder group - no
- Collaboration with synergistic persons and organizations - expanding

Science to Schools

1. Primary schools (grades1-7)

Procedures assigned to grades 4-7 texts books.

Teacher training pilot pgm to run this term@ Clarendon

Can we engage the teachers to initiate experimentation?

2. Grades 8 & 9 Can we influence subject selections?

Procedures assigned to grades 8 & 9 texts books.

3. Grades 10-12 Can we encourage a career in Science?

Procedures assigned to grades 10,11 & 12 texts books.

4. Teachers Can we engage the teachers to initiate additional experimentation?

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The Grade 4 visits – 3 Days

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Maths in Action 2015 – Chemistry Contribution

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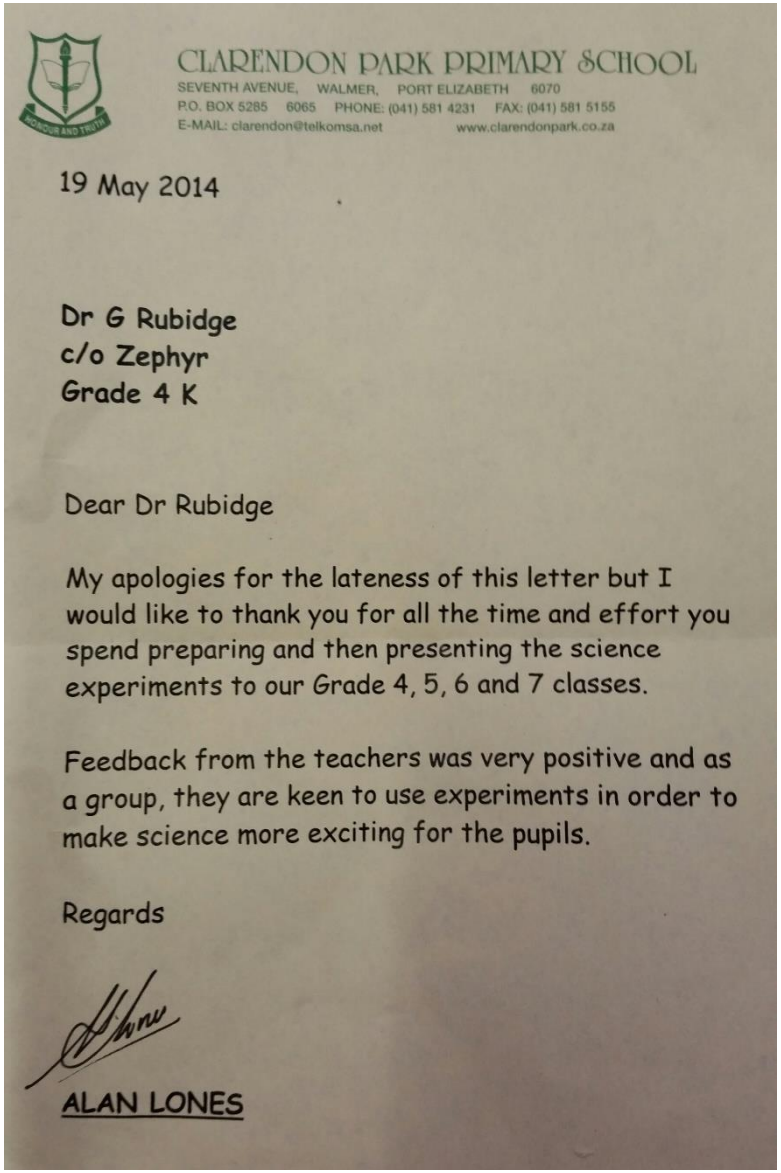
Physics in Action Demo

Recognition



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19 May 2014

Dr G Rubidge
c/o Zephyr
Grade 4 K

Dear Dr Rubidge

My apologies for the lateness of this letter but I would like to thank you for all the time and effort you spend preparing and then presenting the science experiments to our Grade 4, 5, 6 and 7 classes.

Feedback from the teachers was very positive and as a group, they are keen to use experiments in order to make science more exciting for the pupils.

Regards

ALAN LONES

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Science and Disability

INCLUSIVE SCIENCE

Demonstrations in action: Disability Month – Northern Lights School

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Science and the Disabled

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Social Media

- Facebook
- NMMU Chemistry (Closed group)
- Science Rocks WhoooHooo (page)
- WhatsApp Group - sharing experiments

Future plans

- Industrial funding
- Seek lecturer replacement funding
- Masters student to register in chemical education – increased focus
- Increased collaboration with science centers
- Implement training weeks for teachers
- Write article on chemical education

Research – Science Parties

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Why science parties?

- Targeted at a younger audience
- Fun yet educational activities
- Making learning fun
- Associating science with enjoyment
- The main goal will be to introduce science at an early stage where a child is at his or her most impressionable.

Conclusion

- Education
- Action
- Shift the mindsets
- Responsibility

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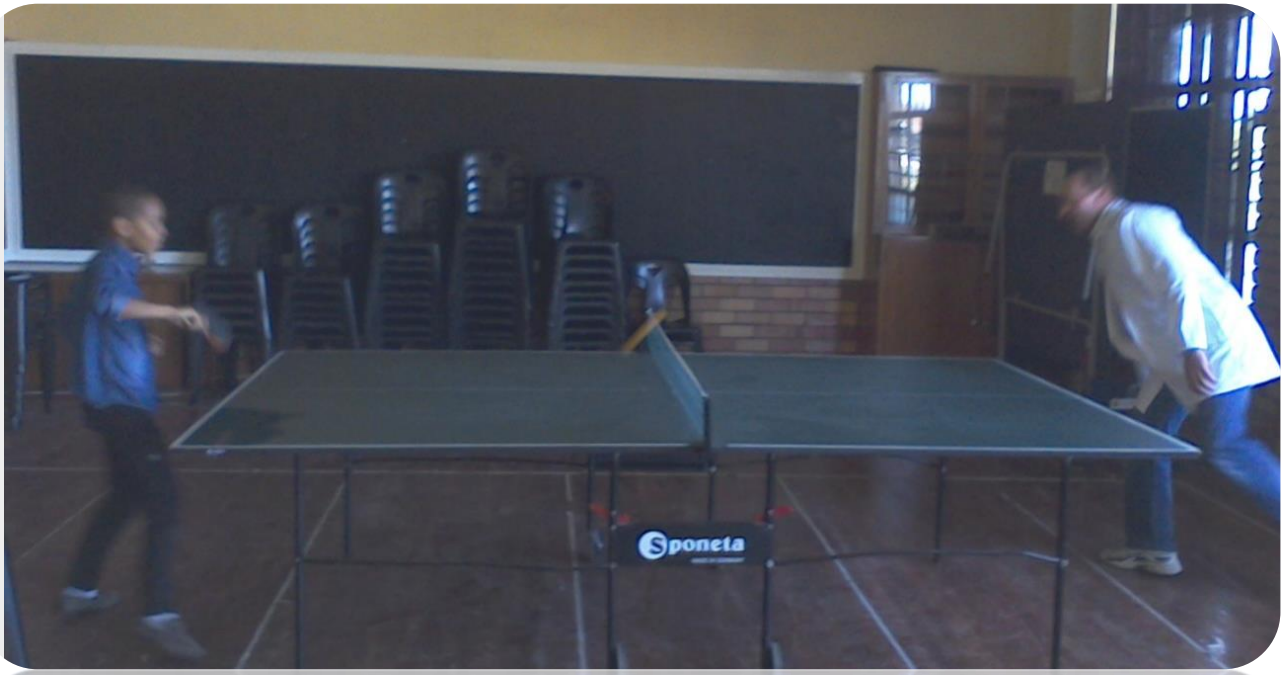
Final Thought



"Our real problem is not our strength today. It is rather the vital necessity of action today to ensure our strength tomorrow. "Calvin Coolidge"

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