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
Physical science enrolment decreased by 18.37% between 2010 and 2013. more than 38000 students (38619)
“Education is the most powerful weapon which you can use to change the world.”

Nelson Mandela
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
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?
“Mans mind stretched to a new idea never goes back to its original dimensions”

Oliver Wendell Holmes
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
Levitating Bubbles – Floating bubbles bounce on invisible carbon dioxide
S.T.C. Project boosts open days
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
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)
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 (grades 1-7)
   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?
The Grade 4 visits – 3 Days
Physics in Action Demo
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

[Signature]

ALAN LONES
Science and Disability
INCLUSIVE SCIENCE
Demonstrations in action: Disability Month – Northern Lights School
Science and the Disabled
Social Media

- Facebook
- NMMU Chemistry (Closed group)
- Science Rocks WhooHoo (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
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
“Our real problem is not our strength today. It is rather the vital necessity of action today to ensure our strength tomorrow.” — Calvin Coolidge