Samantha Davenport - Valley View Secondary School.

Purpose:
The purpose of this case study is to evaluate and reflect upon the engagement levels as a result of involvement in the Engineers Without Borders program at Valley View Secondary School in 2013. Engagement levels will be evaluated through a range of different tools including attendance records, achievement records, observation, photographic evidence and student and teacher feedback. Future directions will also be discussed including adjustments for implementation in 2015 and planned methods of data collection to ensure continuity of assessment beyond 2015. This data collection will include student surveys, video evidence and interviews with students. This information will be collated and presented to leadership to highlight the continual development of the program and to celebrate the successes of the program and our students.

Student Cohort/Audience:
Engineers Without Borders is a compulsory subject for all year 9 students.

Activity Description:
Whilst engaging with this semester long course, students will be involved in a range of different hands on projects with an engineering focus. The first term of the program introduces students to small scale engineering based builds where students are given the opportunity to experiment with ideas and materials, practice their design briefing skills and reflect upon what they have learned from these activities. In addition to the practical, hands on side of the program, students are also required to engage in a theoretical component which focuses on the topic of ‘poverty’. Students define poverty, who is affected, who can help and how. We then link the students understanding of poverty and what can help to the work of engineers. Students learn about the work engineers do, the types of engineers that exist and how engineering differs when comparing engineering in Australia to engineering in a third world country. In the second term of the program students engage in one or two larger scale projects where they are required to take a concept or idea through the design process and build a prototype model. The theoretical component of term 2 is very closely linked to the practical as students will be learning about their Engineers Without Borders focus community (Nepal), what needs the community have and how they can be solved. They take this knowledge into the practical component and build a prototype of their own innovative solution.

Links to ACARA or other identified learning outcomes (Relevant ACARA outcomes, career capabilities).
AC – Geography (Year 9 & 10)
AC – Science (year 9 & 10)
Design and Technology (year 9 & 10)

What were the outcomes?
The outcome of the Engineers Without Borders program at Valley View Secondary school originally was to create a ‘hands on’ project based learning subject that is built around the learning style of our students. This project was also originally implemented to introduce students to engineering and the design process and as a foundation course for our Concept to Creation program.
The program was originally implemented in 2011 with a year 9 cohort and continued to be developed over the following years. 2013 saw the best version of Engineers Without Borders to date and the outcomes of the program during that year were consistently positive.
A particular example of this success was my work with my year 9 class. Out of the three classes that were studying EWB that semester, I had the more challenging of the cohort. This class was extremely complex with a range of different learning and behavioural needs present. In my experience with this class earlier in the year they were very difficult to engage and keep on task, no matter what task was put in front of them. However, throughout the course of the EWB semester I had some wonderful success stories from this group ranging from students transitioning from totally disengaged to achieving ‘A’ grades and improvement in attendance of chronic non attendees.(Supporting data will come from report cards, attendance records, work samples and photographs). As a result of the Engineers Without Borders program, students also learnt a range of skills –
Not only hands on based engineering skills but a range of soft skills including working productively in a group environment, problem solving, conflict management and group management skills.

Identified Issues?
After reflecting on the program at the end of 2013, below are some of the issues that have been identified

- More rigor in relation to Maths/Science links
- Behaviour issues – project based learning. Difficulties with students who cannot work independently or have trouble with self-guided tasks.
- Important to have motivated teachers who are willing to teach the subject.
- Importance of allocated budget and adequate resources
- Availability of appropriate technology – access to computers

Refinement or changes for the future?

- To break down the final major project into two smaller projects so that students don’t lose focus.
- Change some components of the theory to include more rigorous investigations of what engineering is and what work engineers do.
- Addition of more explicit maths and science links