

**Practicum in STEM Leadership**  
**Professional development proposal**  
**Denzil Mackrory**

1) What is the title of your STEM professional development?

Engineering in the NGSS (PK - G10)

2) Why did you select the topic?

Three years ago, the school I currently teach in adopted the Next Generation Science Standards (NGSS) from grade 1 through to grade 10. I teach NGSS to grade 9 in an Introductory Physics course that is taken by all grade 9 students. As a teacher new to NGSS I found the 3 dimensional approach to science teaching a little daunting. After getting to grips with it, I found the engineering standards and performance expectations inspirational. I designed the Intro Physics course with a combination of physical science standards and engineering standards. Each topic had a science component combined with an engineering activity. Last year, I took the E in STEM course, which provided tremendous insight into how to weave engineering into my STEM teaching. This has been a personal revelation for my personal growth as a teacher. Over the past year, I have spoken to science teachers from the middle school and the elementary school and found (without sounding arrogant) that I was ahead of the curve. Many teachers found it daunting to implement engineering activities into their lessons. I knew with all that I have learned, that this could be an area I could help in and thus decided to select the topic above.

3) Who is your proposed audience (minimum 12)? Which teachers will you serve with your PD and activities? What grades, subjects, and how many students do they teach?

Proposed Audience - All science teachers from pre-kindergarten to grade 10. This would reach all students in the aforementioned grades.

4) What "general" science or mathematics concepts or learning goals will you and your materials address which can potentially replace other classroom activities?

- Introduction to the NGSS Engineering standards.
- Engineering - a catalyst to integrating STEM.
- Design thinking and the design cycle.
  - NASA Design Squad cycle (resource).
- Keeping a Design Journal
  - NASA eClips ES design journal (resource).
  - NASA eClips MS/HS design journal (resource).

- Engineering activities appropriate for your grade.
  - o NASA Design activities (resource K-8)
  - o NASA Design Squad - On the Moon (resource K-10)

5) How and where do you intend to carry out your PD? How long will the session be? When will it be held? Will teachers have access to computers?

Our school provides professional development opportunities every Wednesday afternoons in sessions called Impact. Every so often we have sessions called teachers teach teachers (T2T). Teachers will be given the option to sign up to my session if they wish. It is in this session I have been given time to deliver the proposed session. All teachers will have their laptops and Internet connection. The session will take place in our multi purpose rooms that can take from twelve to a hundred people. The session will be delivered for over an hour on the 3<sup>rd</sup> of April 2019.

6) What outcomes or expectation do you hope to see for your educators?

Teachers will feel empowered to deliver engineering activities in their science lessons.

Teacher will engage with the NASA Design squad design cycle and journals.

Teachers will consider engineering design activities that are appropriate to their grades.

7) How will you follow up with the teachers in attendance?

In FlipGrid, I will create a classroom of the participants. I will ask teachers to record a short video on what they have achieved since attending the session. They can then also review each other's achievements across grade levels.

I will also have an open door policy to field any questions or issues with teachers planning to implement engineering activities. I will also be happy alongside teachers in planning and delivering lessons to any grade, provided I am supported and given time by the school.

8) What data collection methods (e.g. surveys, interviews) will you use to analyze the PD's success?

Before the session I will send out a 2-minute survey to the participants as a Google form aimed at gaging their current experience with NGSS and engineering. Following the session I will have another 2-minute survey to gauge whether they feel more empowered to tackle engineering in the classroom. I will also ask for general feedback on the session.

