The project took place over 6 x 50 min periods. The teams were autonomous and learned through cycles of Thinking, Making and Improving. Although many of the students were unable to realise successful, working wind turbines, the learning that occurred when students cycled through thinking, making, and improving their prototypes was more important than simply arriving at a finished working one. Furthermore, the “Teaching Mantra; Less Us, More Them”, firmly supports the research question. If the students have autonomy then the teacher will “grant more authority, responsibility and agency to the learner” (Martinez and Stager, 2013)

Research Context

The Shore TAS faculty runs elective courses in Design and Technology, Industrial Technology and Graphics Technology. This presented an opportunity to run a collaborative design project across these three subjects. The design project involved students working in teams of 6-7 students (2-3 Design and Tech students, 2-3 Industrial Tech Students and 2-3 Graphics Tech students).

The Research Action

Design teams were presented with the scenario that they had to use wind power to survive on an outback farm with no available energy grid. Their brief was to develop PBL programs.

In adopting a Maker Learning approach, and applying it to this project, some successes and shortcomings have been identified.

The Research Question

How can designing and making prototypes in specialised skill-set teams enable Grade 9 boys to be more autonomous makers?

Data Collection

- Pre and Post action surveys to gain insight into the students’ perceptions and preferences regarding collaboration and group work, strengths, weaknesses, successes and failures in TAS and in the project itself.
- Boys write journals during the course of the project, commenting on their progress and planning for subsequent lessons. They also commented on their feelings about fellow team members.
- Two design teams were filmed extensively as they worked and observations were taken from the recordings.

Data Analysis

The survey responses, journal writing and video observations were examined. Boys responses and evidence from their activity highlighted many examples of autonomy and what it means to be an "autonomous maker".

Key Findings and Discussion

- Boys highlighted the need for creativity to be part of the making process. If they are being told what to do each step of the way and are not given freedom to explore ideas and design solutions then they are not really working autonomously.
- Creativity was also demonstrated in the choice of design process that boys followed.

"making projects like these were very rewarding and I was able to use my own creativity."

- Boys realised the importance of effective collaboration in their teams and they quickly organised themselves into allocated tasks. However they were critical of the effectiveness of their collaboration and of team members who didn’t communicate.

"I enjoyed everyone splitting up into their strongest sections and then coming back into a group to put the final design back together."

- Evidently, collaboration was not helpful or effective for some students. TH (mentioned above) worked in isolation from his team for most of the project and he managed to produce a propeller that won the competition for his team.

- Boys largely relied on trial and error to develop their designs and make the turbines. However they became aware that research plays an important part in the design cycle.

"...have more specific roles and plan what we will do with research instead of just trial and error"

Conclusions

Boys were grouped into common themes regarding:

- creativity
- collaboration and teamwork
- designing and making skills
- successful design realisation

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