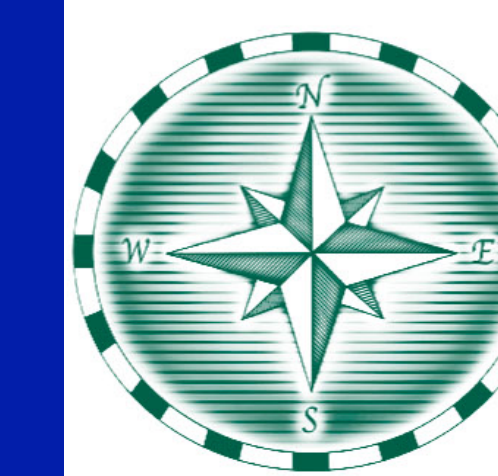




How does Maker Learning impact Grade 8 boys' perseverance in Design and Technology?

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IBSC

Introduction

Through my action research project I wanted to address the need for improved perseverance and an appetite for challenge in Grade 8 boys in Design and Technology.

Often, particularly in Grades 7 and 8, the boys are quick to 'give up' when the going gets tough with a project. They are also very dependent on the teacher's instructions, rather than thinking for themselves about how they might construct their projects.

I undertook this research to observe the effect of making learning on Grade 8 boys' appetite for challenge, risk taking, perseverance and independence. Maker Learning is important to boys as school is fine-motor orientated and Making helps boys develop these fine motor skills, which helps them to be more successful at school.

I also wanted to see the 'take home' rate of projects increasing as a result of the changes I will make in the classroom.

The Research Question

How does Maker Learning impact Grade 8 boys' perseverance in Design and Technology?

Research Context

Poole Grammar School is a selective state run boys' high school with some 1200 students. There are 179 boys in Grade 8. Due to the practical nature of Design and Technology, there are no more than 20 boys in a class.

Participants

I chose to work with Grade 8 for this project. Without having seen the list of students I would be teaching, I chose one of my Grade 8 Resistant Materials groups, which has 18 boys. For a selective grammar school, this was quite a diverse group of students with quite a wide range of abilities. I did not teach any of these students in Grade 7, which made them an ideal group of students to be working with as there were no existing expectations in terms of my teaching style and student/teacher relationships.

The Research Action

- I reduced the teacher input into a design and technology project in terms of practical demonstration by using 'flipped learning' to teach Health and Safety considerations for workshop safety and safe tool use.
- I encouraged 'trial and error' in the making process and allowed complete freedom in terms of final design and functionality (but there was still a loose brief).
- I changed the project brief to be that of a 'Maker Learning' project rather than a 'design, watch and copy and make' project.

Data Collection

* Growth Mindset rubric * Pre and post project questionnaires * Student journals for homework * Audio recordings * Video recordings of practical lessons * Video recordings of students interviews * Observations

Data Analysis

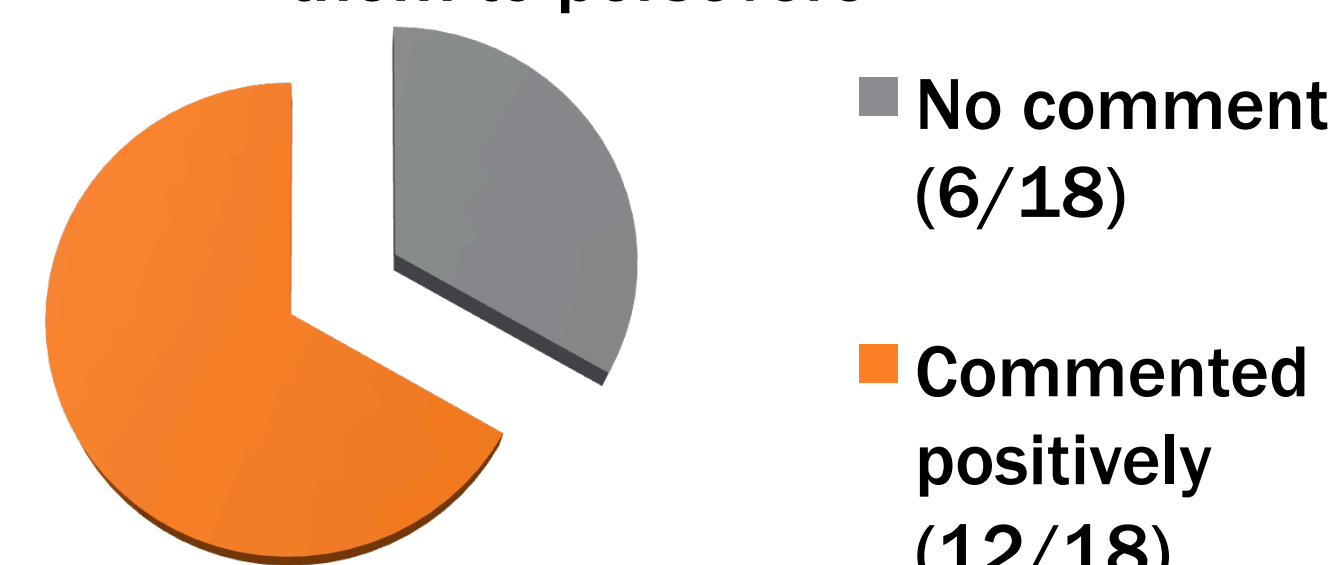
1. Reading of data a number of times and listening and creating transcripts of interviews, audio and video recordings for accurate perception of information.
2. Compiling a collection of useful/inciteful quotations
3. Key observations annotated and categorised from recurring patterns identified in transcripts
4. Making note of any comparative analysis (to other previous practical lessons for example)
5. Summative analysis - categories
6. Categories to be used: Before project feelings, broken down into 'excited' and 'worried', 'positive' and 'negative', Boys during project feelings, Start of first practical lesson, End of first practical lesson, Critical breakthrough points in manufacture, Post project feelings, The boys, Teaching assistant, Observers
7. Codes generated for each category - Excel spreadsheet style format
8. Relationships between key concepts identified using concept webs
9. Findings organised into 'themes' from concept webs as areas for further discussion

Key Findings and Discussion

Team Work and its impact on perseverance

Maker Learning doesn't just foster perseverance and resilience, it demands teamwork too. Team work was so often the difference between success or failure

Percentage of boys in the class who reflected positively on the value of team work in helping them to persevere



'What really worked was the team, as a team they really helped each other - they came up with some really good ideas to help each other.'

Changes in confidence levels and its impact on perseverance

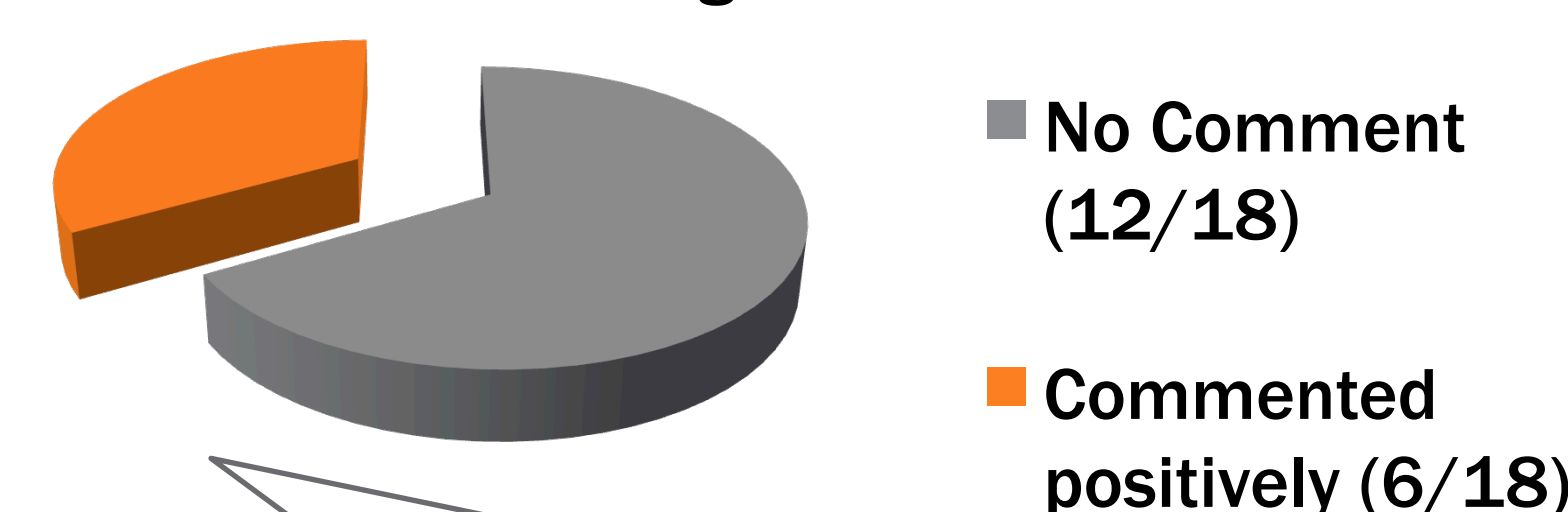
Progress was rapid during the first 4 lessons of the practical element of the project. From the analysis of my data, four stages of 'Learning how to persevere' were identified.

Stage of 'Learning how to Persevere'	Description
Concern	Worrier, showing a real lack of confidence, little progress made here
New Confidence	Using others to make progress
Effective Problem Solver	Making good progress independently
Sharer	Real confidence in own abilities to overcome problems and share new skills with others in the group

The freedom of choice and its impact on perseverance

Boys' motivation levels were high and after listening to the student interviews carried out at the end of the project and reading some quotations written by my observer in the final lesson of the project, I established that the boys loved having the freedom to write their own project briefs.

Percentage of boys who reflected positively on being given the freedom of choice in their project in terms of design and manufacture



'The entire design of my grabber was a choice. We were given complete freedom in coming up with the design and the mechanism, so the mechanisms and the design were all a choice I made.'

'The best part was having the freedom to do what I wanted with it., we could pretty much do what we wanted and I thought that was really good. '

Conclusions

- Maker Learning had a positive impact on Grade 8 boys' perseverance, whatever stage they may have been at in the process of 'Learning how to persevere.'
- In some cases there was a reduction in quality of finished outcomes, compared to outcomes from prior rotations when a 'demo lead' approach was taken, but this was not something that any of the boys voiced as a concern at any point during the project. The benefits far outweighed a small reduction in quality of outcome or a prolonged route to a finished outcome.
- Maker Learning gave the boys the confidence to be flexible and there was no doubt that the boys suddenly had to learn to be flexible!

'My grip was originally going to be my trigger, but in the end I modified it. I tried to make a very complicated mechanism to begin with and when I put it all together it didn't work, so I had to take it all apart and have another go again. '

- I learnt that Maker Learning is a very effective way to increase challenge in the classroom. By not truly challenging our boys, we are potentially doing them a disservice.

- I will be sharing my research findings with other staff in other subjects. I look forward to being a part of a new approach to Maker Learning in our school

'I have definitely made several mistakes while I have been working, but the good side to all of my mistakes is that I have learned from them and there is more towards learning from mistakes, than there is in getting everything right first time.'

Key Readings

Action Research readings

- Stringer, E. (2007). Introduction to Action Research
- Sagor, R. (2000). Guiding School Improvement with Action Research - What is Action Research? (Chapter 1)
- McNiff, J. (2002). Action Research for Professional Development. Concise advice for new action researchers

'Maker' readings

- McWilliam, E. (2009) Teaching for creativity: from sage to guide to meddler
- Paul, A M. (2013) How do we inspire young inventors?
- Martinez, S L and Stager, G. (2013) Invent to Learn: Making, Tinkering, and Engineering in the Classroom
- Gerstein, J. (2013). STEAM and Maker Education: Inclusive, engaging and self-differentiating.
- Gerstein, J. (2014). The Educator as a Maker Educator
- Gerstein, J. (2013). Is It Project-Based Learning, Maker Education or Just Projects?
- Gerstein, J. (2011). The Flipped Classroom Model: A Full Picture

Further Information

This poster and further information is available at <http://www.theibsc.org/>.
Researcher's Email and Blog Link: barbera@poolegrammar.com and <http://barberannabel.edublogs.org/>