



IBSC Action Research Project 2014/15

Boys as Makers

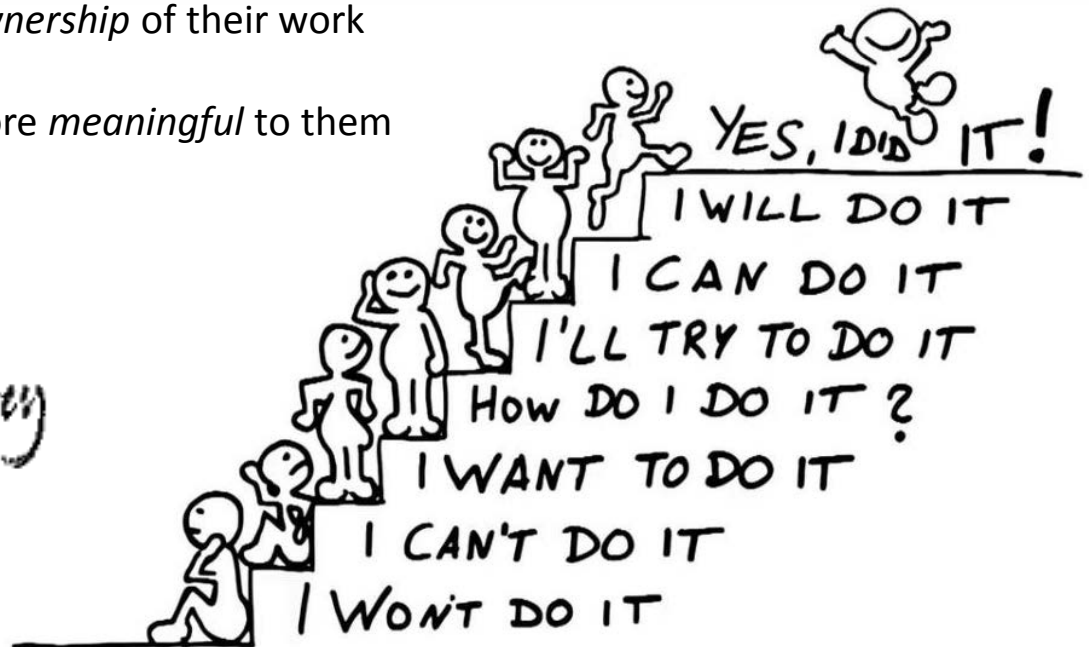


How does maker learning impact KS3 boys' perseverance in Design and Technology?

What is Maker Learning?

- Maker Learning – learning which takes place through initial failure, trial and error, testing and tinkering, making choices, struggling, taking risks...
- Departure from traditional methodology that expensive mistakes should be avoided – this hampers creativity and imagination
- Provides students with real challenge and an opportunity to take risks; an opportunity to participate in ‘hard fun’
- Leads students to take more *ownership* of their work
- Project/classroom activity is more *meaningful* to them

✓ Exceeding what they think they could believe.



Introduction

- Through my action research project I wanted to address the **need for improved perseverance and an appetite for challenge** in KS3 boys in Design and Technology.
- Often, particularly in Years 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 KS3 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** - helping them to be more successful at school.
- I wanted to see the **'take home' rate of projects increasing** as a result of the changes I will make in the classroom.

The Research Action

Existing teaching methodology:

- Students are given a good example of a finished outcome to observe
- Students are given demonstrations throughout the project with step by step instructions to ensure all boys achieve a successful outcome
- Misconceptions are addressed as soon as they arise and these are shared with the whole class

The 'action' during the research project

- Reducing the teacher input into a design and technology project in terms of practical demonstration. Doing this by using 'flipped learning' to teach Health and Safety considerations for workshop safety and safe tool use.
- Encouraging 'trial and error' in the making process and complete freedom in terms of final design and functionality (but there was still a loose brief)
- Changing the project brief to be that of a 'Maker Learning' project rather than a 'design, watch and copy and make' project.
- Total hands off approach from teacher

Data Collection

- Growth Mindset rubric - self and peer assessment in terms of how many risks they've taken, how many choice they've made, how many mistakes they recovered from and what they've struggled with each lesson
- Questionnaire at the beginning and end of the project
- Student journals for homework
- Dictaphone recordings
- Video recordings of practical lessons
- Video recordings of students interviews
- Observations carried out by my Head of Department, Link SLT member and by the Headmaster

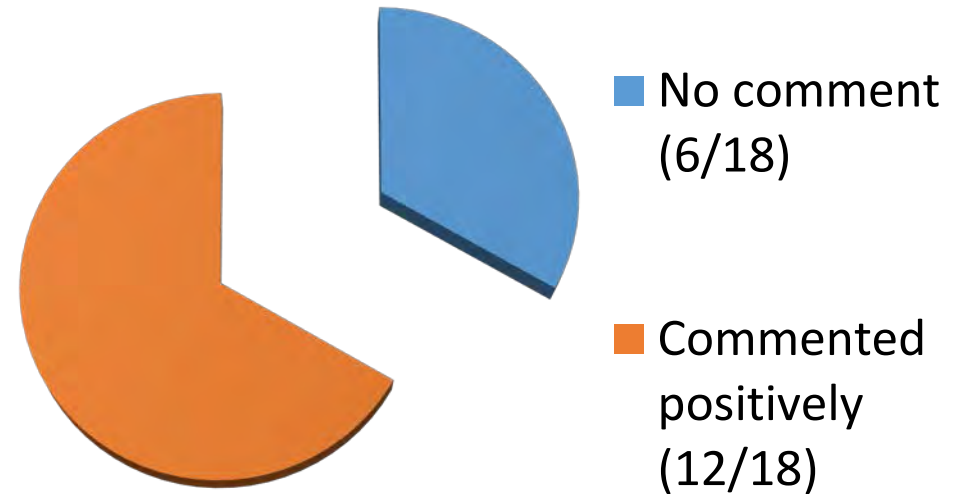
Action Research video filmed by the boys!

Team Work and it's 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

'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.'

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



Changes in confidence levels and it's impact on perseverance

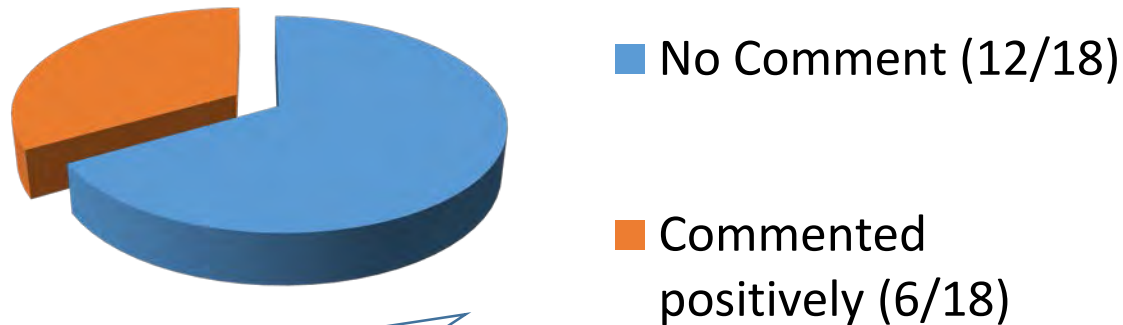
Progress was rapid during the first 4 lessons of the practical element of the project. Following analysis of my research data, I'd like to present the stages of **'Learning how to Persevere'** like this:

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 it's 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 had loved having the freedom to write their own project briefs.

Percentage of boys who reflected positively on being given the freedom of choice with this 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. "

The confidence to be flexible and its impact on perseverance

There was no doubt that the boys suddenly had to learn to be flexible!

'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.'

'My grip was originally going to be my trigger, but in the end I modified it. I also made a mistake with my elastic - it was too long at one point, so I ended up tying more knots in it to make it shorter.'

'It was a big struggle trying to make your own mechanism without any help from the teacher.'

What has already been learnt through the action research carried out so far?

- Maker learning doesn't just foster perseverance and resilience, it demands team work too. Team work was so often the difference between success or failure for some of the boys in the group with this project.
- Maker learning brought out leaders within the group
- Progress was rapid
- Motivation levels were high
- Students were elated with their successes
- Students created truly original design ideas that I haven't seen before with this project
- Increase in resourcefulness and originality in terms of use of available materials
- Prolonged levels of engagement - a more focussed and perhaps serious attitude towards the project

✓ Teamwork
✓ Collaboration.
✓ Confidence
✓ Controlled/managed well.
✓ RISK / FAILURE - reasoning!!
✓ Resilience...
✓ FLAIR.
No 2 outcomes are the same.

What has already been achieved through the action research carried out so far?

- Quote
- "I enjoyed this project the most due to the freedom. I made what I wanted to do"
 - "I really enjoyed the chance to walk around and ask others opinions for what they thought of my design and how to improve." "Unfortunately it snapped when it fell, but I can fix it easily."
 - "I learnt the most. I made so many mistakes - I had to continuously change my design. - I've really enjoyed." "I know what I would change - it's been my most favorite unit in DT."

The boys have gained:

- Greater team working skills
- The ability to collaborate effectively
- Increased levels of confidence in their own abilities
- The ability to explain what they have gained from failure
- An understanding of the importance of perseverance
- Resilience

Production diary excerpt from Ellis Evans:

“I struggled when I needed to remove two nails and I couldn't use the nail removers successfully so I got frustrated. Then I had an idea that I could use a flat head screw driver to lever the nails out. After getting the nails out I felt relieved.”

Production diary exert from Freddie Henville:

“My biggest struggle was the fact that we had no instructions to follow so I had to figure out how to make a fully functional working grabber

I overcame this struggle by doing a lot of trial and error. If something wasn't quite right I could adjust it and if I wasn't happy about something I could change it with ease”

Production diary exert from Joseph Gibson-Clarke:

“I cut a bit of wood and it was too small so I could do nothing with it and I ended up not using it.

I sawed it more and found a better use for it so I didn't waste any of the resources given to me”

Production diary exert from Will Murray:

To fix the problem I had with my grabber, I had to make an L shape out of some left over wood. This helped because it reinforced the jaw so that it didn't come open and stayed still at the bottom 😊

The risk in this was that it might not have worked like I wanted it to, and I could have been left with an unresolved problem and I would have used my last piece of wood.... But it did work! 😊

Production diary exert from Jacob Hand:

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