Tinkering, Curiosity, Grade 9 Boys and Small Computers

Martin Chambers
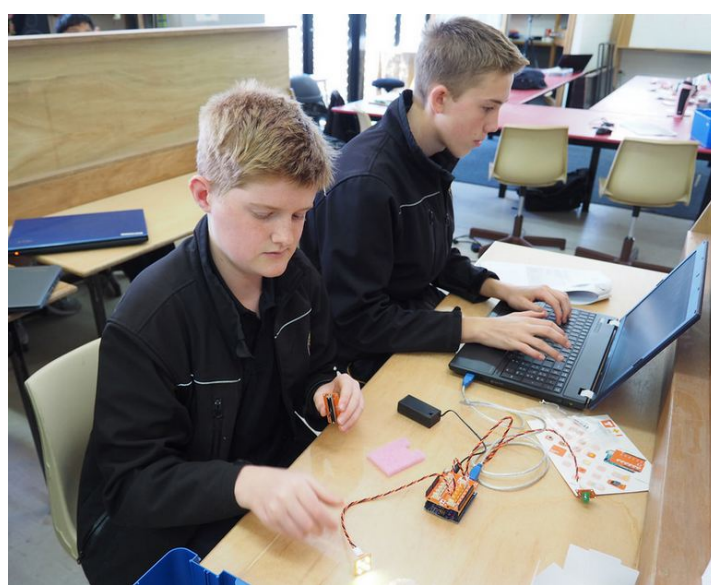The Hutchins School, Hobart, Tasmania

IBSC

Introduction

The aim of this action research project was to **improve levels of curiosity** in teenage boys through the action of Making. We are all born with curiosity, but it seems as we get older our levels of it diminish. Curiosity is an important 21st Century learning skill – something we need to foster and develop in boys as they grow.

My hunch was that by using small computers (Arduinos) and offering the boys a tinkering challenge to **build and control** their own inventions, I would be able to raise their general levels of curiosity. Obvious benefits to their learning across all subjects would be a positive outcome.

The Research Question

Can tinkering with small computers enhance curiosity in Grade 9 Boys?

Research Context

- The Hutchins School, Hobart Tasmania, Australia
- Anglican Boys School founded in 1846
- Approximately 1000 boys from Kindergarten to Year 12
- Founding member of IBSC and accredited through Council of International Schools (CIS)

Participants

- Ten Grade 9 students (14/15 years old) were the participants in the project.
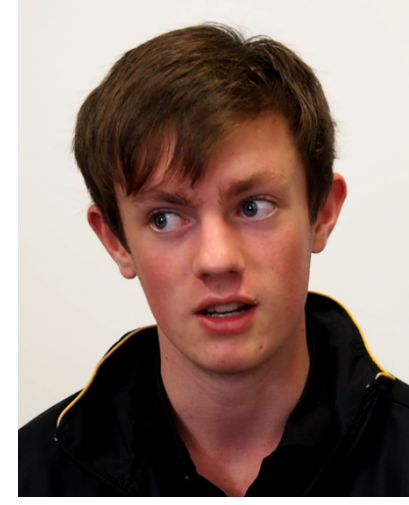
The Research Action

The boys undertook a two day tinkering workshop (experimenting/building without the fear of failure) with small computers, Arduinos.

As skill levels increased throughout the workshop, the boys were given the challenge to design and create an invention using the Arduino Uno microcontroller, Tinkerkit Shields and various maker materials such as wood, glue and plastics.

Curiosity levels of the boys were measured before, during and after the workshop in order to determine any change.
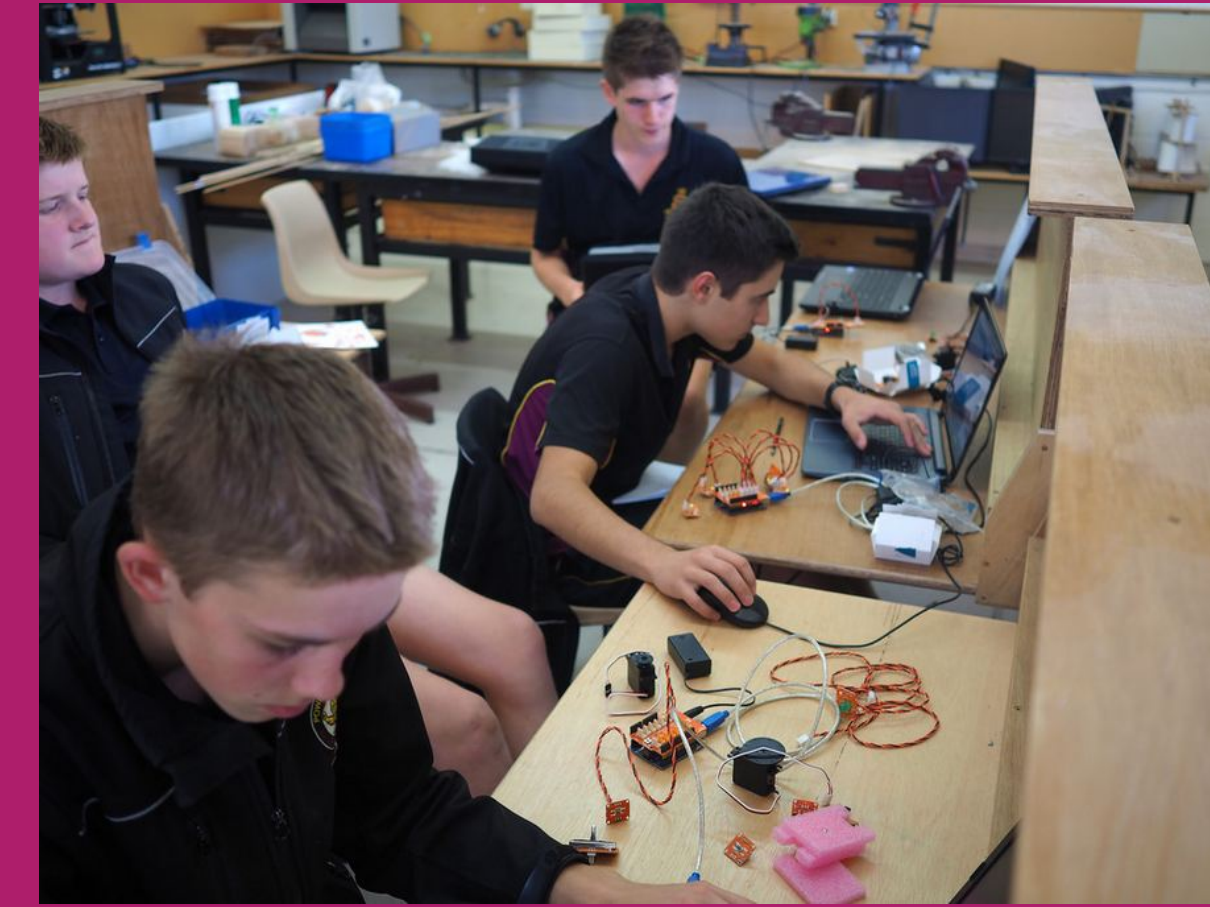
Data Collection

Data were collected to determine if the boys' level of curiosity increased or decreased after tinkering with small computers. Data were collected by the researcher, the boys themselves and colleague teachers. The data collection tools used were:

- Pre & Post Curiosity Survey (Tool #1)
- Student Self Assessment Checklist (Tool #2)
- Teacher Observation Checklist (Tool #2 again) *A number of colleagues assisted.

Students were also interviewed and video taped before and after the workshop.

Data Analysis

Through analysis of the data produced by both the survey and checklist tools, I am confident that **tinkering with small computers did enhance curiosity in the majority of Grade 9 Boys**. A further analysis of the interviews undertaken with the boys added more anecdotal evidence that curiosity levels had increased.
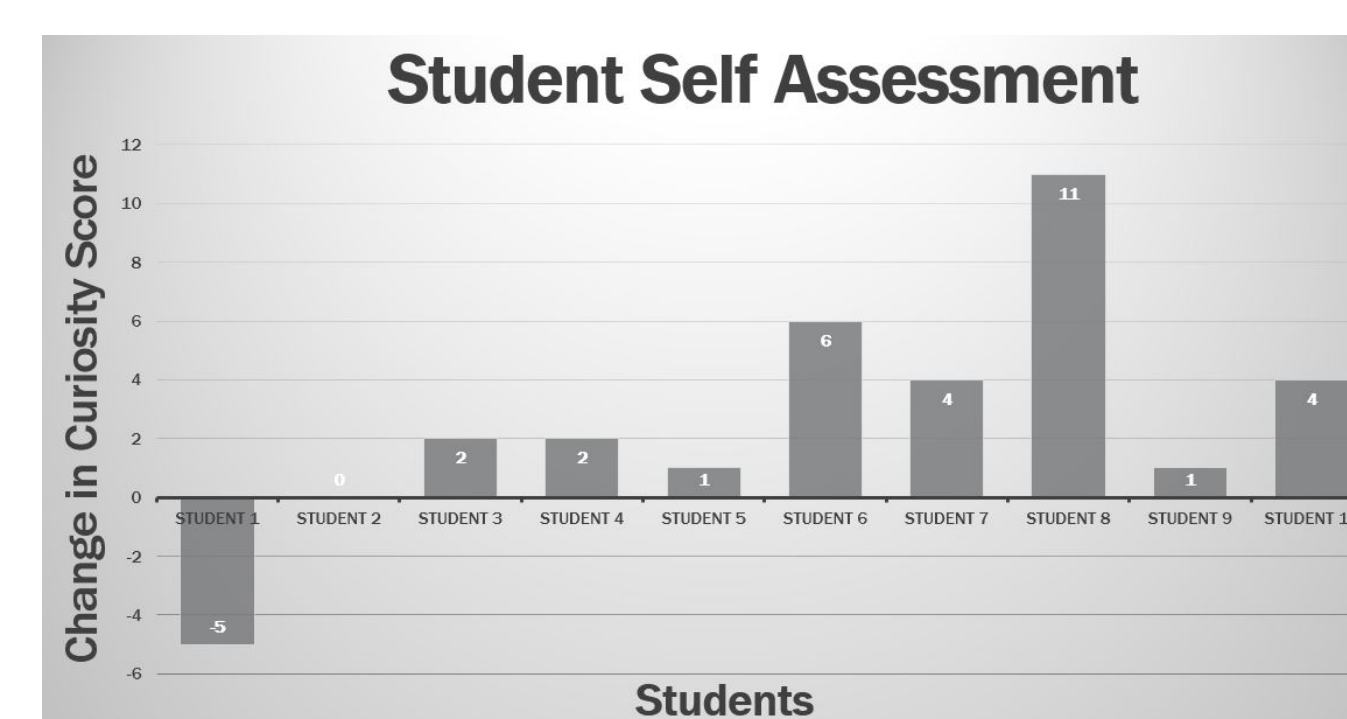
Key Findings and Discussion
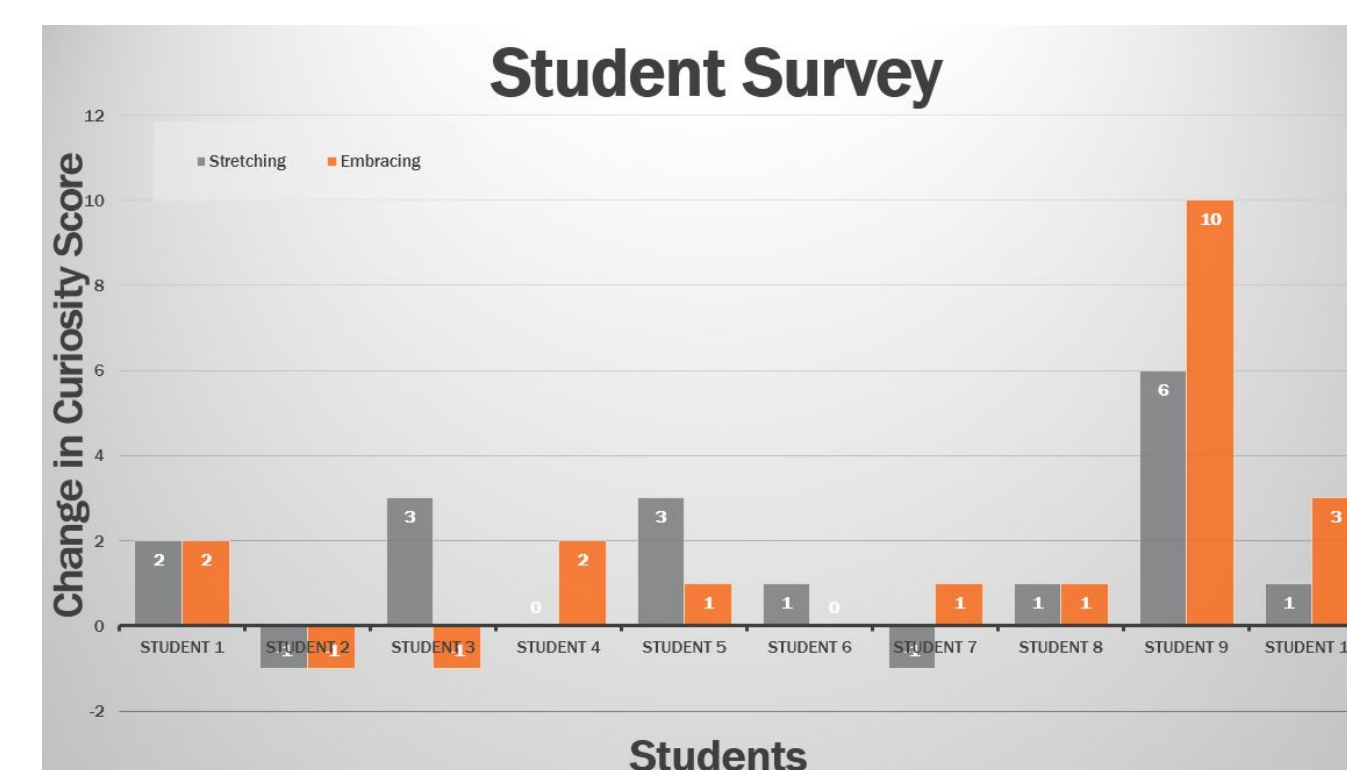
Student Survey

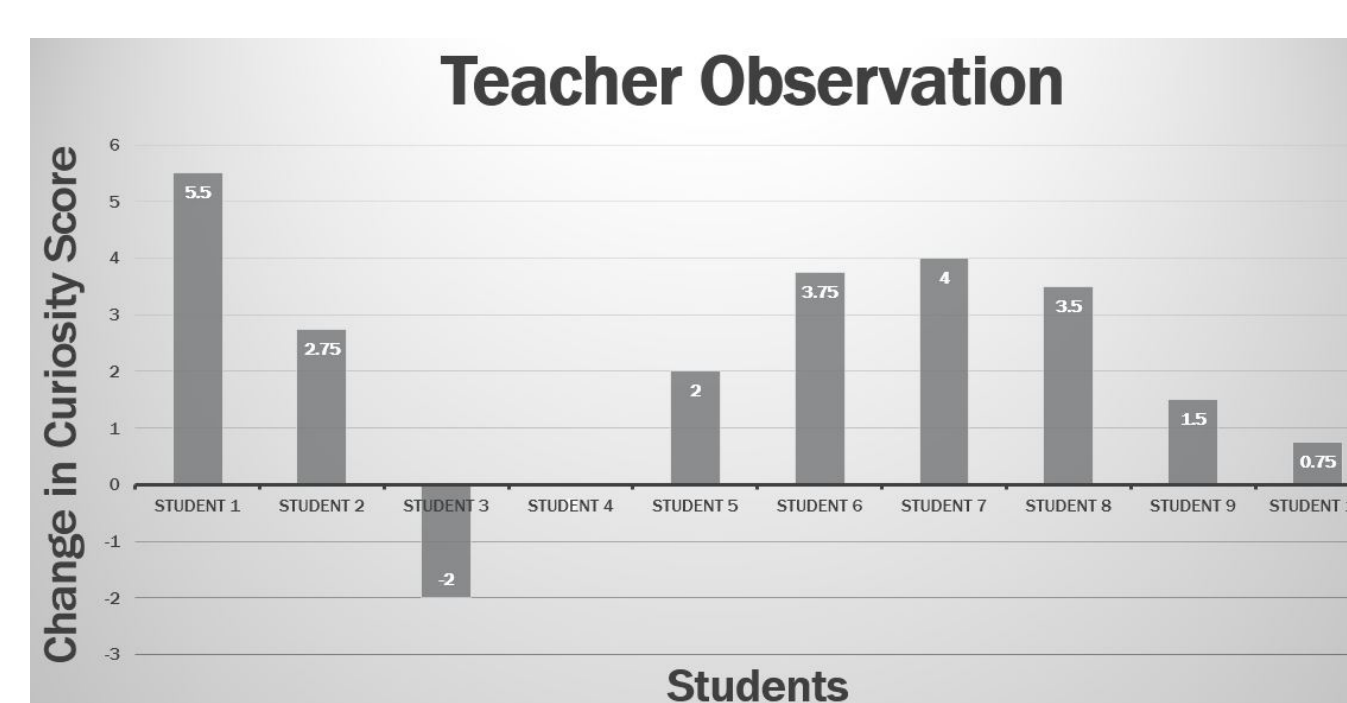### Student Survey - Curiosity Score Increased

Boys' Voices
"Absolutely beneficial. Fun, everyone enjoyed themselves. I learnt so much."
"When we were free to explore we learnt a lot more."
"When you work in a group you can share ideas."
"I enjoyed more of the freedom."

Student Self Assessment

Student Self Assessment - Curiosity Score Increased

Boys' Voices
"Was cool watching something you coded yourself working."
"Making a finished product was the most rewarding."
"Enjoyed interfacing the Arduino."

Teacher Observation

Teacher Observation - Curiosity Score Increased

Boys' Voices
"I felt sharing code with everyone was good."
"I don't pay attention very well so it's easier to experiment and tinker."
"You have a whole new universe to play with."

Conclusions

The boys thoroughly enjoyed the workshop and created:

- Traffic Light Systems
- LED Rotating Lighthouse
- Fridge with Internal Light
- Secret Code Treasure Box

Curiosity scores (as shown in the graphs) had improved for the majority of the boys. This was validated through three different assessments as well as through observation and interviews.

The **aims were met for this project** by offering:

- Challenging and open ended tasks
- Hands on "Maker style" learning
- Materials (computers) used to which the boys could relate
- Group and teamwork orientated setting
- A good mix between skill acquisition and open ended creative learning processes

A similar workshop could be run in the future or the project replicated in a full semester class.

The project has demonstrated to me that boys' curiosity can be improved significantly by Maker type activities.
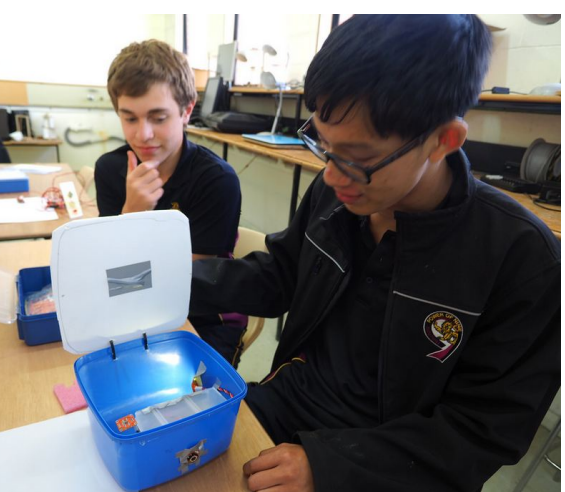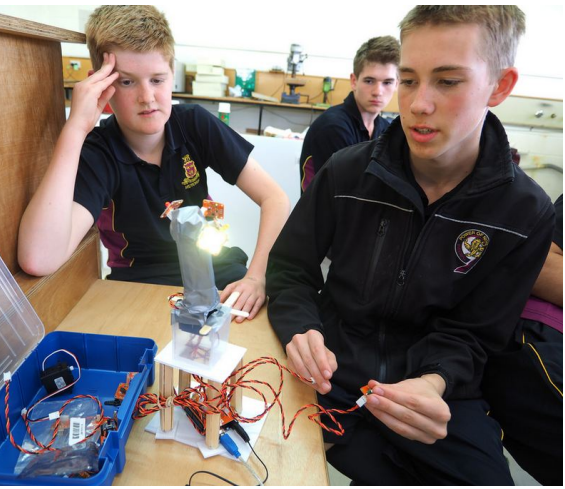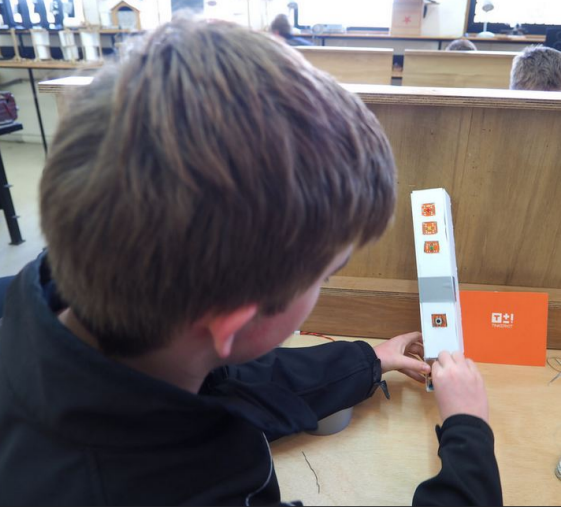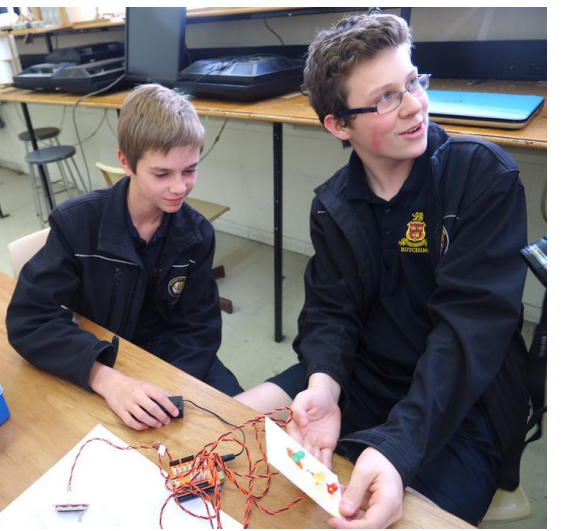
Key Readings

Barrett, Tom. (2013). *Can Computers Keep Secrets? How a Six-Year-Olds Curiosity Could Change the World*. NoTosh.

Boxhall. (2013). *John Arduino Workshop*. No Starch Press.

Craig , Wayne. (2011). *Curiosity and Powerful Learning. Northern Metropolitan Region School Improvement Strategy*. Department of Education and Early Childhood Development.

Gelb , Michael J. (1998/2004). *How to Think Like Leonardo da Vinci: Seven Steps to Genius Every Day* . Delta / Random House.

Martinez,S. & Stager,G. (2013). *Invent to Learn; Making, Tinkering, and Engineering in the Classroom*. Constructing Modern Knowledge Press.

RSA Social Brain Centre. (June 2012). *The Power of Curiosity*.

Curiosity Measurement Tools
#1: http://psychfaculty.gmu.edu/kashdan/CEI-II.pdf
#2: http://files.eric.ed.gov/fulltext/ED030154.pdf

Further Information

This poster and further information is available at www.theibsc.org

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