# Enhancing Grade 6 boys engagement with Geometry using Scratch

Daniel McLachlan
The Ridge School, Johannesburg, South Africa

The Ridge School
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IBSC

## Introduction

The Ridge School was one of the first primary schools in South Africa to introduce computer education in the 1980's in the form of Logo, which was designed to get pupils to write simple computer programs.

I was especially inspired to use Scratch due to its foundation in Logo, which its creator Seymour Papert, from MIT, described as "a computer programming language that would allow children to be immersed in a "mathland" where one could learn Maths naturally through use, just as a child growing up in France learns French.

## The Research Question

How does using 'Scratch' enhance Grade 6 boys' engagement with Geometry?

## Research Context

The Ridge School is an independent primary school in Johannesburg, which has approximately 490 boys from Grade 0 to Grade 7. It is a small and nurturing school in a big city environment. The school has a dedicated holistic approach to education, whereby it it strives to achieve its motto where "boys are known and grown."

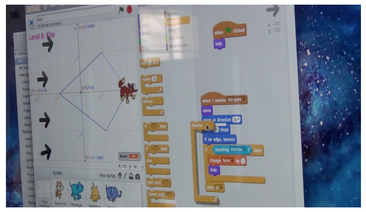
## Participants

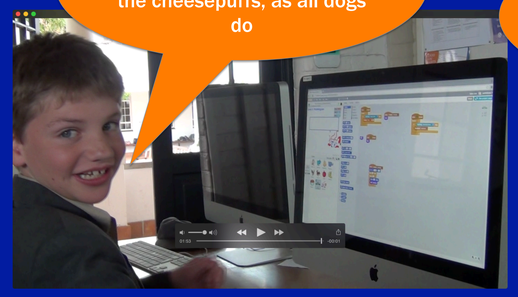
All 60 of the Grade 6's at The Ridge completed a game-making project in Scratch during the third term of 2014. However, my action research intervention focused on my Grade 6 Maths class of 9 boys.

## The Research Action

The research action focused on Making using a block-based programming language called Scratch, whereby I attempted to analyse how making a computer game in this medium enhanced boys' engagement with Geometry.

The boys were specifically tasked with creating a game in Scratch that would be used to teach the upcoming Grade 6's about quadrilaterals. This project was allocated six hours of class time, and took place over four separate sessions in our iMac computer lab. Please use the QR code below to see the full handout that was given to the boys, alternatively visit https://goo.gl/AYAIen







## Data Collection

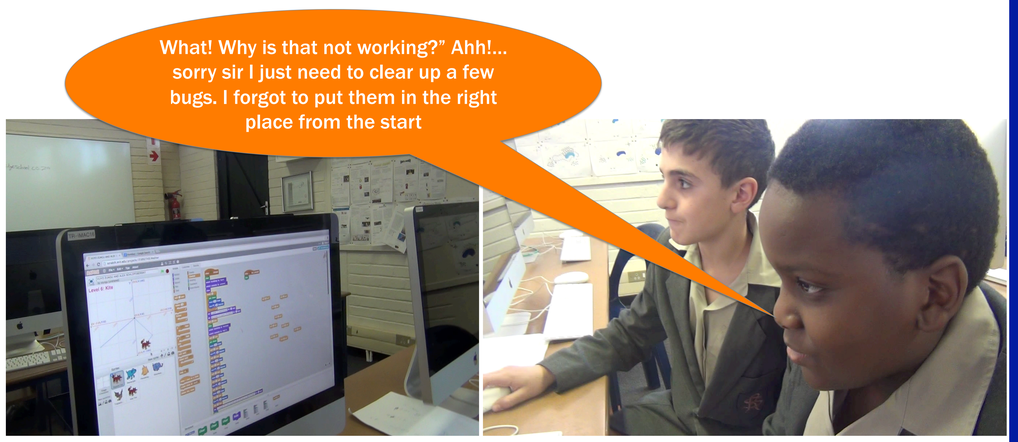
My data collection was primarily qualitative. My research was primarily concerned with the individual creative responses elicited by the Scratch application in terms of their understanding of geometry. This could not be measured quantitatively as these creative responses had more to do with learner experience than results or achievement. I used **observation**, alongside **video recordings** of the sessions, QuickTime **screen recordings** from the boys, individual **interviews** and **questionnaires**.

## Data Analysis

I analyzed the data thematically and noted obvious trends. The authenticity of the data was inherent in the student voice that was clearly represented in the initial questionnaire, the video recordings of the actual sessions and the post project interviews.

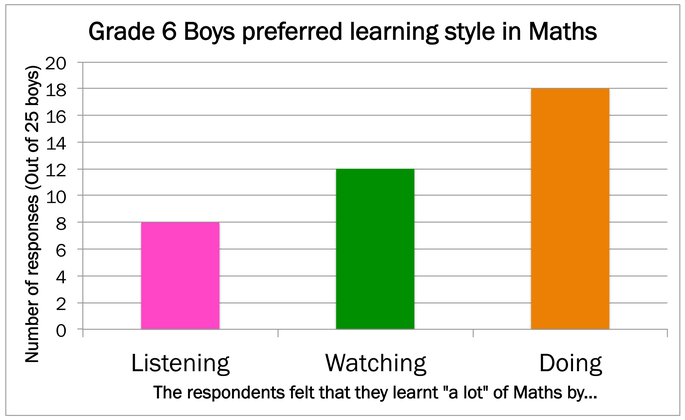
## Key Findings and Discussion

- Overall, there was clearly significant visible engagement by the boys during the four Scratch sessions; however, this could be attributed to the fact that they worked in pairs, as well as to the fact that they were working in the Scratch interface.
- To achieve all the goals of Papert's "constructionism", i.e. for learners to create, personalise, share and reflect within the project was complex and time-consuming, and I definitely felt that there wasn't sufficient time for this whole process to unfold so that the optimal amount of learning could take place.
- The complexity of the underlying programming concepts in Scratch, which are essential to the making component of the task somewhat hampered the boy's ability to fully engage with the geometric principles in the task




## Conclusions

- Scratch is a beneficial medium in which to explore primary school geometry concepts due to the fundamental mathematical principles inherent in interface; however, the logical sequencing of blocks to develop a fully functioning game was a noticeable barrier to learning for the boys
- The Grade 6 boys attribute a significant portion of their enjoyment of different sections of the subject to their perceived competence in that area of Maths, i.e. where they find the work easier, thus it is essential to set a realistic task for the boys
- A significant amount of programming groundwork needs to be laid, in order to make this a truly Maker based project, as well as to improve the boys self-confidence in the Scratch interface, which should lead to significant improvement in their engagement with geometric principles.




## Key Readings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## Further Information

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

Researcher's Email: dmclachlan@ridgseschool.co.za

Researcher's Blog: danielmclachlan.edublogs.org
(alternatively use the QR code on the right to access the blog)