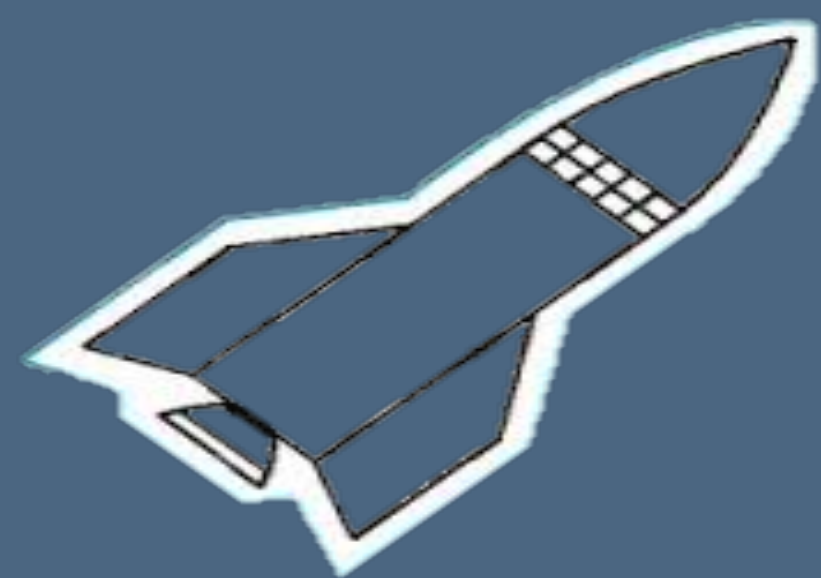


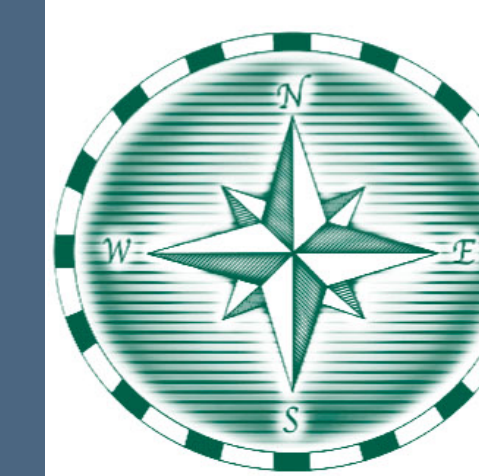


The Ridge School
Est. 1919



How can Making encourage risk-taking in Scientific Investigations?

Nicholas Diana
The Ridge School, Johannesburg, South Africa



IBSC

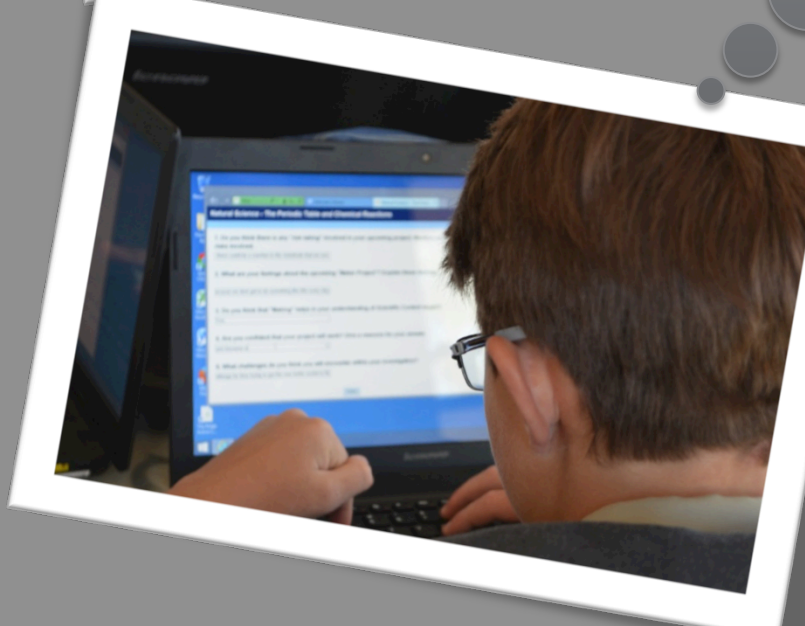
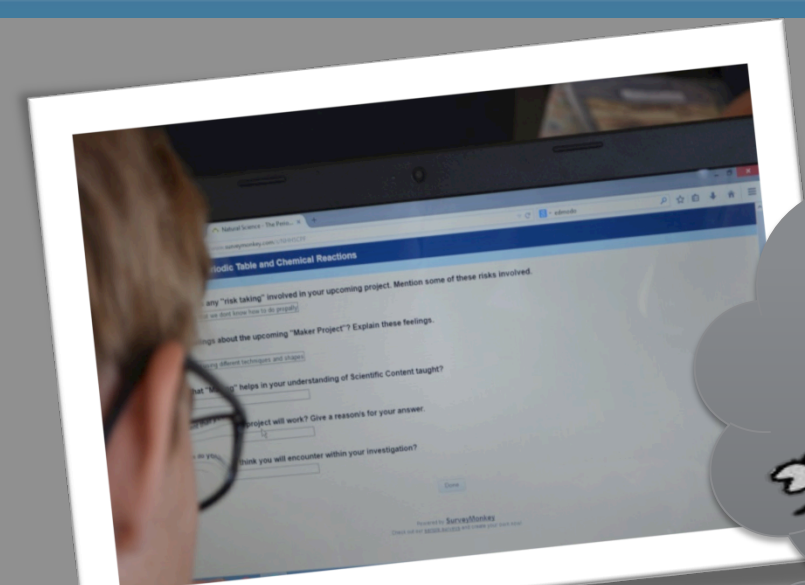
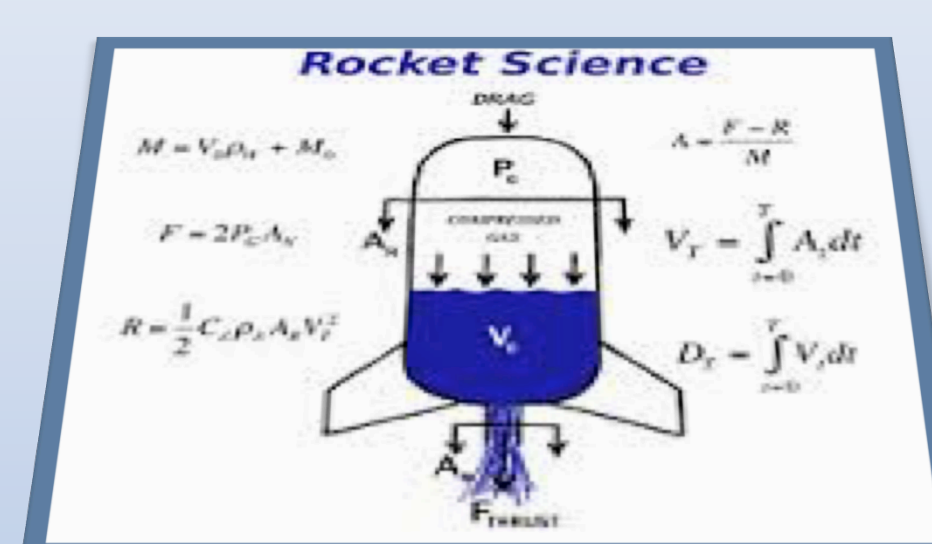
Introduction

"From birth, children want to learn, and they naturally seek out problems to solve." Risk-taking is a crucial phase of adolescence. By taking risks, we force our brains to make decisions that allow our brains to grow. These attitudes and actions form part of a student's understanding of "how things work", as they engage in scientific thinking and action long before they have even thought of a question.

ROCKET SCIENCE

The Research Question

How can Making encourage risk-taking in scientific investigations?



Research Context

The Ridge School is situated in Johannesburg and was established in 1919, and we are widely recognised as a leading South African boys' preparatory school. We offer an exceptional, balanced education which instils respect for self and enthusiastically embraces diversity. Our aim is the development of a confident individual with a generous spirit and responsible character.



Participants

I chose Grade 7 boys, aged between 12 years and 13 years. The boys have just finished competing in The Ridge School Science Expo, where risk-taking in investigative experiments also played a major role.

The Research Action

The Research Action was based on Making, and involved risk-taking through scientific investigations. The boys were tasked to create their own rockets, including their own rocket fuel to power their rockets. The boys had no prior knowledge of the elements of the Periodic Table or their chemical reactions. Trial and error would reinforce the steps taken to reach their objective.



Data Collection

Qualitative data collection was a key focus of the data collection. Boys were tasked with answering questions based on "scientific investigations" and "risk-taking within these investigations," before moving onto the action research task. This initial survey was drawn up on the survey tool, Survey Monkey, and each boy had to answer the questions individually.

This survey in question focused on how much risk-taking (if any) was involved in scientific experimentation, as well as an engagement within the subject and subject matter itself. Focus groups were set up to discuss the implementation phase and a second questionnaire was given to the boys, which focused on their approach and "failures" (if any) to launch their rocket. The boys were also interviewed in their groups via a video recorder in order to document any specific findings. I also recorded the process of the rockets launching as an opportunity for the boys to evaluate and reassess their experiment. A final questionnaire, once again using Survey Monkey focused on the how much the boys enjoyed the experimentation of this project.

Data Analysis

Before the boys began their journey to "failure and risk taking in Science", a set of pre-action questions were asked about their initial thoughts on *risk-taking*. I analysed 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

- While boys were initially apprehensive to take risks, the Maker Learning and experimentation encouraged boys to engage more, despite the inevitability of possible failure
- The collaborative nature of the project forced boys to start working together and accept failure as part of the process
- The boys felt that they were being challenged to fail, but at the same time were learning from their mistakes
- Through the use of collaboration, many boys were able to divulge their own ideas, listen with a deeper understanding and meaning, as well as problem-solve and implement strategies to aid in a common goal

We really enjoyed the collaboration, as well as the hands on learning!

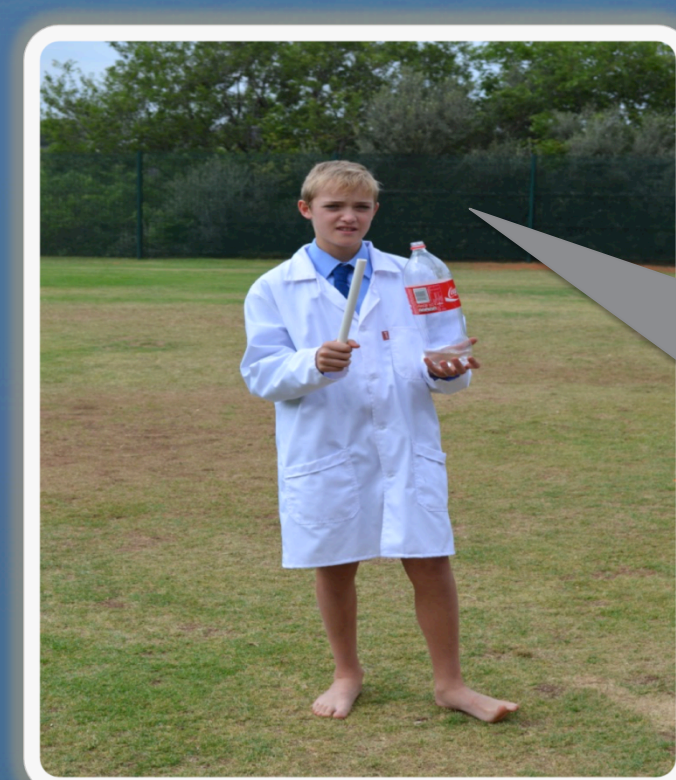


It made me feel like a songwriter learning my songs off by heart – that is the learning I experienced from this project!

I was scared to make mistakes, because I don't like to fail!



I had the freedom to fail, I learnt a lot more about myself through failing, and then failing again until I got it right!



Conclusions

Overall, participation in this action research has given the boys a sense of ownership when attempting something that may or may not fail. Through the use of collaboration, many boys were able to divulge their own ideas, listen with a deeper understanding and meaning, as well as problem solve and implement strategies to aid in a common goal.

The Maker Learning project has not only enriched my teaching, but also my approach to scientific investigations. The project too has reminded me that it is essential for students in the 21st Century to have a sense of adaptability and an EQ in which to collaborate and listen to others, as well as a willingness and ability to make mistakes, and learn from those mistakes. These skills need to be taken into account when we plan for future investigations within our Science teams at The Ridge School.



Dealing with failure in science gave the boys both fortitude and patience in which a controlled and safe environment aided in fundamental skills like problem solving, learning from failure, reflecting, building on previous knowledge as well as developing curiosity.



Key Readings

Ramírez, A. (2013). *Save our science* (1st ed.). New York: Ted.

Stringer, E. (2008). *Action research in education* (1st ed.). Upper Saddle River, NJ: Pearson, Merrill Prentice Hall

Chaille, C. & Britain, L. (2003). *The young child as scientist* (3rd ed.). Boston: Allyn & Bacon.

McWilliam, E. (2009). *Teaching for Creativity: from Sage to Guide to Meddler*. Asia Pacific Journal of Education.

Zeece, P.D. (1999). *Things of nature and the nature of things: Natural science-based literature for young children*. Early Childhood Education Journal, 26(3), 161-166.

Further Information

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This poster and further information is available at <http://www.theibsc.org/> & nickdiana.edublogs.org

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