

MAKING 3D SHAPES TO ENHANCE PROBLEM SOLVING SKILLS

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Introduction

There is a strong feeling that there is too much standardized testing taking place in our education system. This may result in educators placing emphasis on test results and teaching boys how to answer the possible test questions rather than focusing on the learning process itself – ‘teaching for the test’ as it is commonly called.

Boys’ creativity and desire to learn is being stifled by the need to be prepared for standardized tests. If we can tap into the boys’ natural curiosity and creativity, then the learning that takes place will be more fulfilling and will create a longer and lasting impression on the young minds in our classrooms.

My hope in undertaking this project was to create in the boys a love for Mathematics that will live with them throughout their high school years and beyond.

The Research Question

How can making three-dimensional shapes enhance problem-solving skills in Mathematics for Grade 8 boys?

Research Context

St Alban's College is a vibrant Anglican Boys' School located in the east of Pretoria. The College was established in 1962 and has grown to become one of the top boys' schools in South Africa. The population of the College is usually around 550 boys – approximately half of these boys live on the campus in three boarding houses.

Participants

- The participants were 25 Form 1 (Grade 8) boys, approximately 14 years old
- I chose a class of mixed mathematical ability
- I see this class every school day for one period of Mathematics

The Research Action

- The boys completed a pre-survey questionnaire and then the making of 3D shapes began
- They were given nets from which they had to make their 3D shape
- The nets increased in complexity as the lessons progressed
- Participants were interviewed whilst the making took place

Data Collection

- A pre-survey questionnaire on Survey Monkey
- Interviews
- Photos and videos
- A post-survey questionnaire on Survey Monkey
- An online assessment

Steps in Data Analysis

- **Getting to know the data** by reading through the survey answers, typing out the transcripts of the interviews, looking through the pictures and videos several times, analyzing the results of the peer assessment and the Maths Buddy assessment
- **Focusing the analysis** by looking for common themes and trends
- **Categorizing the information** using the themes and trends identified above
- **Identifying patterns and connections** amongst the various responses in the surveys, assessments and the interviews
- **Interpreting and bringing it all together** and looking for evidence that the making was a positive or negative force in the learning process

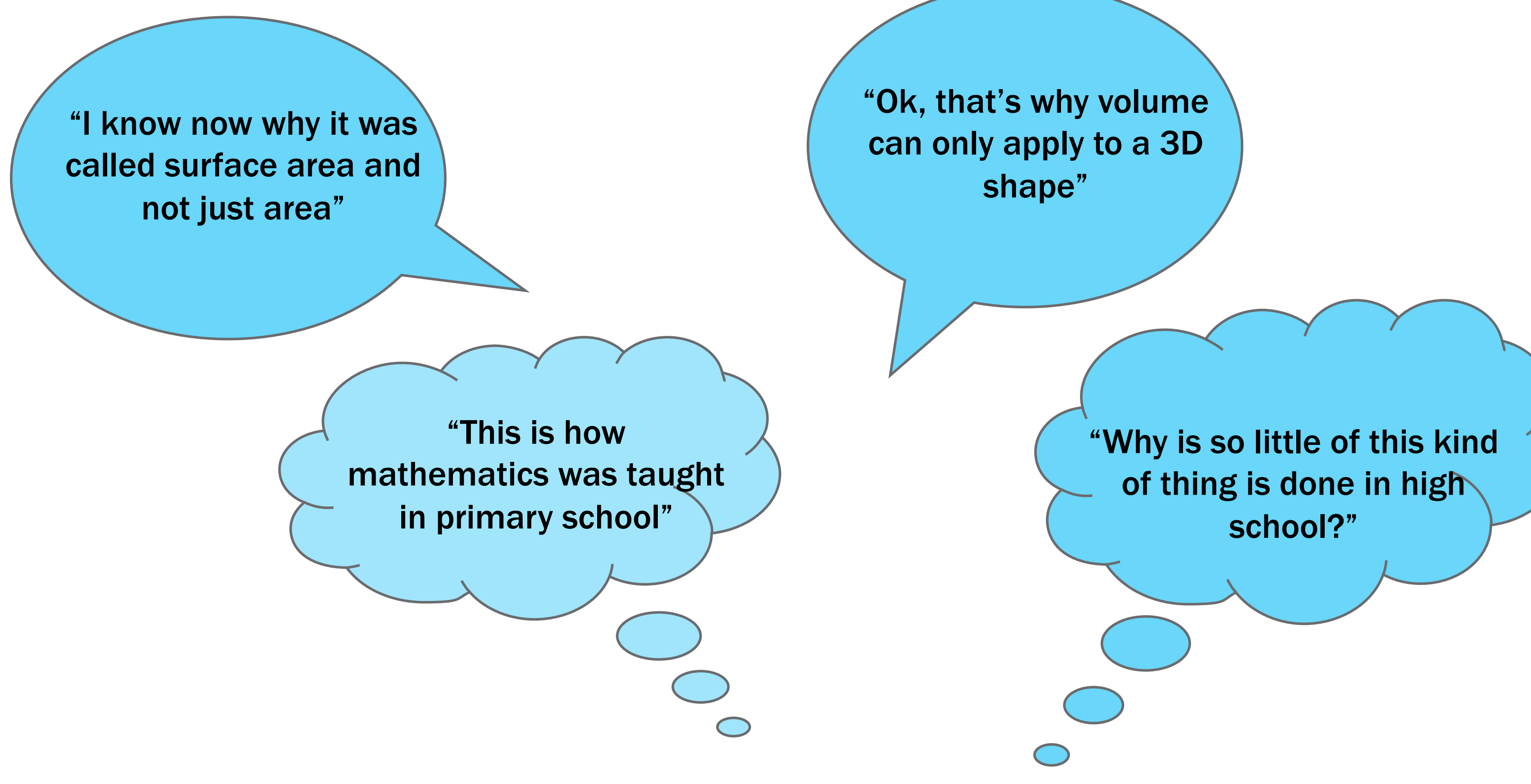
Key Findings and Discussion

Before the Making took place:

- The boys did not have a clear understanding of the concepts at hand
- The boys used formulae to describe concepts
- The boys were limited in their ability to solve problems involving these concepts

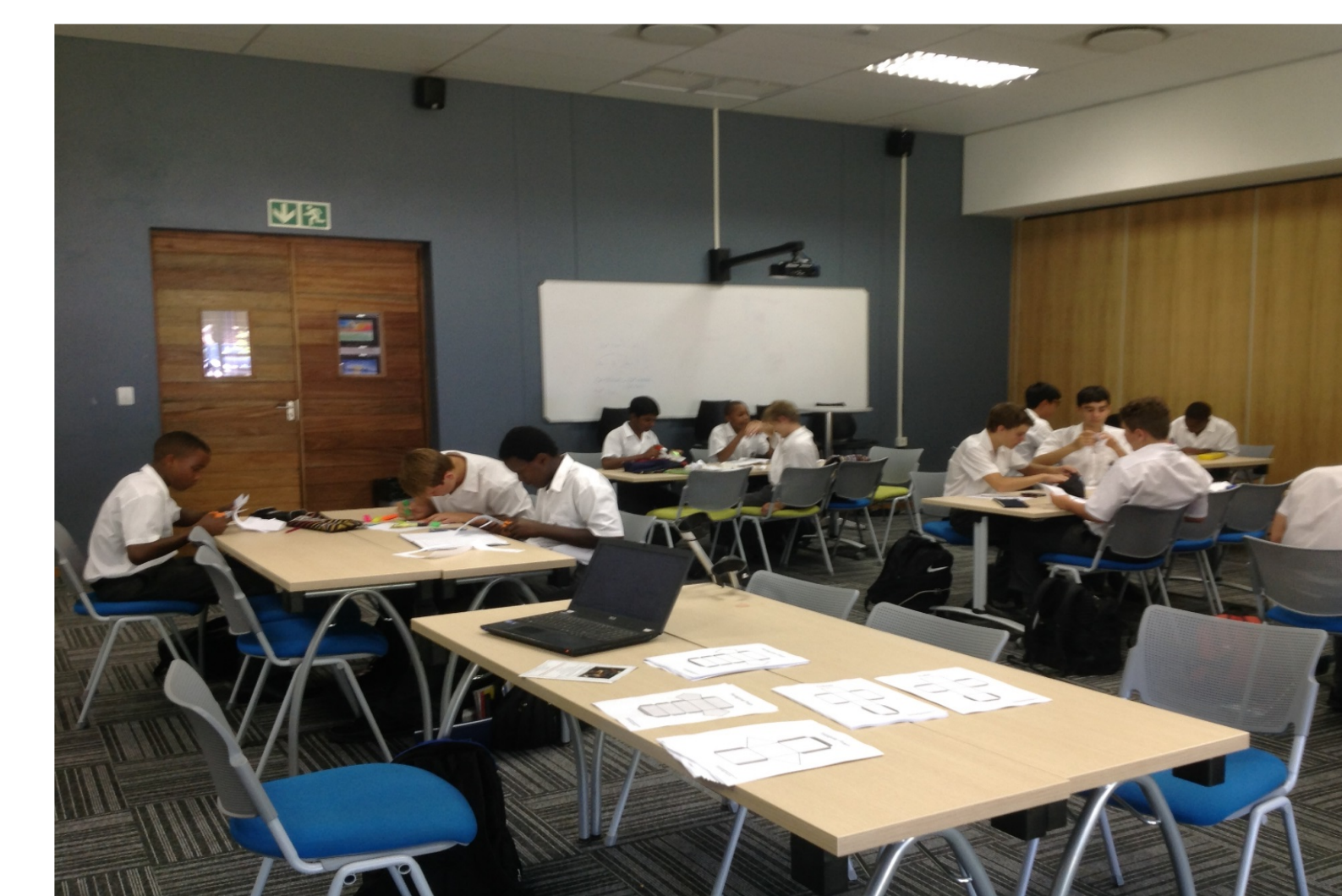
After the action:

- The boys’ understanding of the concepts became very clear
- The boys were able to visualize the different parts/shapes that made up the solid
- The boys were not dependent on formulae to calculate volumes and surface area
- The boys were able to successfully apply the concepts to more complex diagrams
- The boys’ problem-solving skills improved when it came to answering questions involving these concepts



Conclusions

- Throughout the Making process, I felt that the boys were taking dramatic strides in their quest to make use of the concrete process to consolidate their mathematical understanding.
- All evidence from the pre-survey questionnaire, interviews and assessments seemed to point in this direction. However the post-survey questionnaire and the answers given to the open-ended questions showed that there was still a long way to go in their abstract understanding of the concepts.
- The results of the worksheet completed by the boys on the Maths Buddy website showed that their problem-solving skills had moved up a level because of the concrete understanding of 3D shapes that had been developed during the making process.
- The fact that many problems of a Grade 10 standard were solved by boys in Grade 8 leaves no doubt that in this group Making has enhanced their problem-solving skills.



Key Readings

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Further Information

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