

“VISUALISATION, MIND MAPS, RELAXATION, CONFIDENCE AND THE OUTSIDE SCHOOL TUTOR: A CASE STUDY

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ABSTRACT

In this paper I will outline firstly, my study, and secondly, some of the important findings and how they can be used positively in mathematics education. The study was carried out on a group of five students chosen at random from a large group of two hundred students who were surveyed using the Fennema-Sherman attitudinal scales. A case study approach was design was used to draw comparisons and evaluate the effectiveness of the methods.

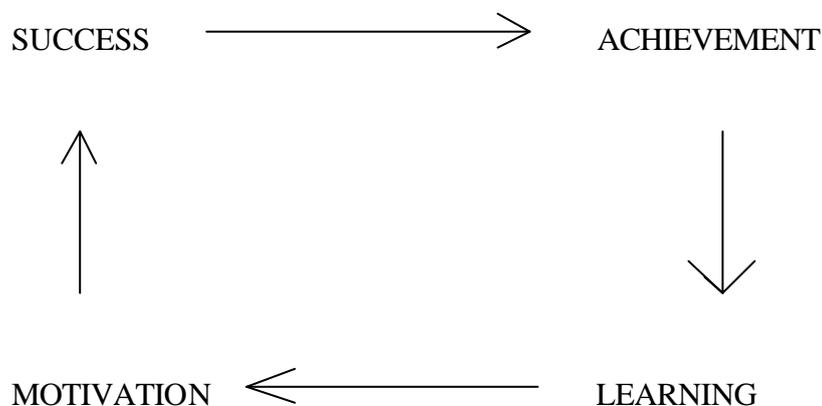
1. Background

Research suggests that as students progress through schooling, her/his perception of the difficulty of mathematics increases. Confidence is an important ingredient of success in any of life's pursuits. In an academic subject such as mathematics this is even more prevalent and therefore, the difficulty that is perceived with mathematics could be mistaken with a decline in confidence in the subject.

The study hoped to show that students improved their understanding and thus performance in mathematics with the help of the tutor, not only in an academic sense but also in building confidence generally.

It is recognized that if a person's confidence level is enhanced then not only an increased performance level will result in the particular activity, but the activity becomes more enjoyable. Academic achievement can easily be paralleled with that of a sporting venture with the teacher acting in a similar vein to the sporting coach in preparing the student: providing a good example and personal knowledge and building the self-esteem and confidence of the student so that with practice the skills will become more familiar and understanding of content will occur. Procedures such as relaxation, visualisation and mind maps are amongst tools can be used to achieve this goal.

Any discussion involving issues such as confidence requires an examination of the affective domain as a whole. The affective domain encompasses a student's feelings about a subject, the classroom environment and students as learners. Each student brings with them a set of feelings, which have an influence over their attitude and confidence level. Burton (1977) expresses the student's position in the affective domain with the following model:



It is a cyclical model because once some success is achieved learning takes place and that in turn is seen as success.

Reyes (1984) contends that confidence is the most important affective variable. It is confidence that influences student willingness to approach new material and persist with it when it becomes difficult. Reyes identified important research issues that should be noted when studying affective conditions including:

- a) The nature of the variable;
- b) The important factors in the development of the variable (e.g. student, teacher, peer, and classroom);
- c) The long-term implications;
- d) Stability;
- e) Variation of different instructional and mathematical contexts;

- f) Relationship to age, sex, socio-economic status;
 - g) Relationship to other influencing variables;
 - h) Age at which it can be measured reliably.
- (p.73)

In this qualitative study, data triangulation was used to compare the multiple sources of data used. Using Fennema-Sherman Attitudinal Scales and others and comparing the results from each source to confirm expected results. Comparing collected data from questionnaires and statistical data from Fennema Sherman and seeing the comparisons. The data sources for the qualitative part of the study were the students' responses to the Fennema - Sherman Attitudinal Profiles and the qualitative part of the study was the investigation, the observation and the questionnaires given to the students throughout the study. The following diagram (Figure 1.1) will outline the method and the types of data collection that we used in the study.

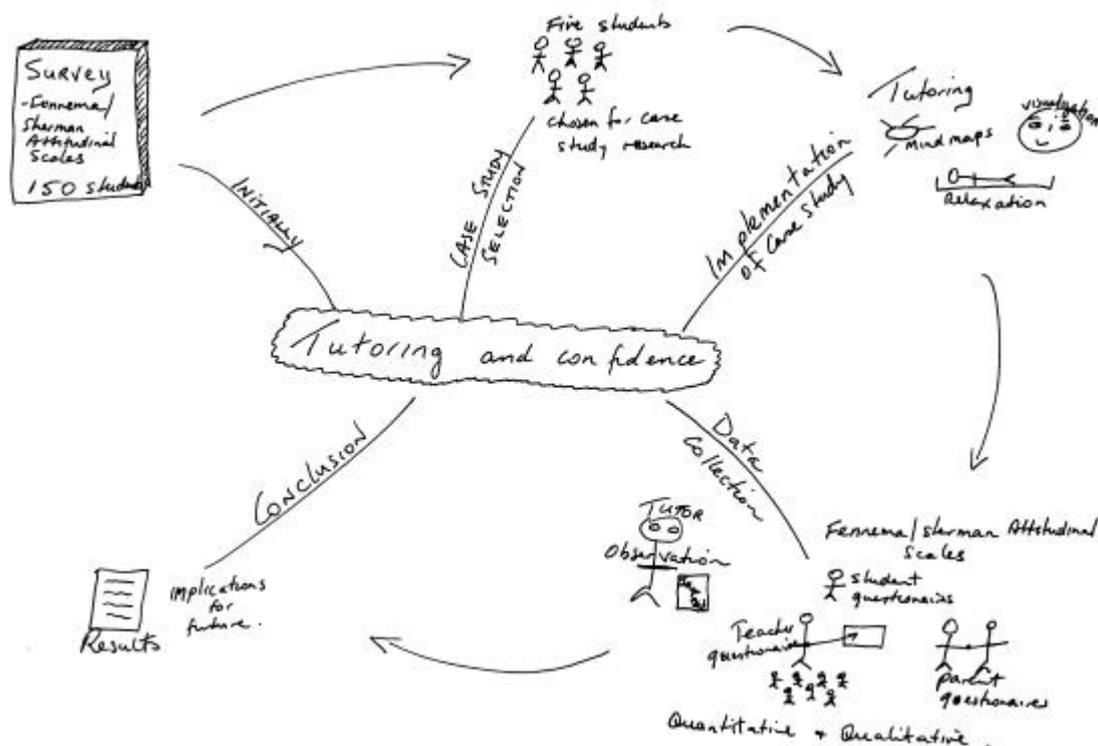


Figure 1.1 Memormap - Sources and Procedures of the study

2. Method and Procedure

2.1 Overview

The study was carried out principally on a group of 5 students picked randomly and who were at various stages of their mathematical development. A large group of High School students were initially surveyed with the Fennema- Sherman Attitudinal Scales and the results of their perception of their confidence shown in this questionnaire were tabulated. The smaller group of 5 students were then chosen from the large group and initially surveyed along with their teachers and parents. A process of tutoring was carried out over the eighteen months with student and teacher observations recorded. At the completion of the study, students, teachers and parents were again

surveyed and the results tabulated. These results, together with the tutor's observations, are used to determine the findings of the study.

2.2 Design of the intervention

1. I collected the data initially by attending a number of schools in Sydney and giving the students the Fennema- Sherman Attitudinal Scales instrument.

2. A group of five students were then selected from this group. These students were offered extra tutoring to gauge the effect this would have on confidence.

3. The group of five was given a permission slip and a screed of information about the tutoring process, the aim of the study and the expectations of the researcher. . Once the parents had agreed to the conditions, they were given the initial questionnaire. The students and teachers were also given the initial questionnaire and the researcher collated the answers and provided an overview of the perceived confidence level of each student using these questionnaires and the Fennema-Sherman scales that the students had filled in.

4. The tutoring was ready to begin. Each student was given a 1.5-hour session of tutoring per week in a group of 4 students (the other 3 were not in the study). The tutoring sessions took the following form:

a) 5 mins of relaxation

b) 10 minutes of initial easy general mathematics questions that the tutor knew that the student found easy and study of previous memory maps

c) The student is asked what they are doing at school at the moment and the tutor records this and prepares some questions from textbooks based on this topic, but at a very basic level to what they are doing at school. This way the students can get most of the questions correct. The tutor advances gradually until the student is up to where they are at school. The tutor always uses positive language when explaining mathematical principles to the students. The tutor would also use visualization techniques to help the student understand and remember concepts. If a school class test is to be taken in the next week the session will be finished with a "mock test" with the questions graded from very easy to the standard of study at the time. This is the main part of the tutoring session and takes about 60 minutes

d) The final 10 minutes is spent allowing the student to draw a memory map of what they have done in the session today - allowing them to consolidate the information in their minds. The students will answer a progressive questionnaire every third session.

e) Each session the tutor filled in a journal of their perceptions of the student progress in terms of their perceived confidence and any noticeable changes that have taken place in the teachers' observation. The students are welcome to add their own notes to this journal. Often the tutor would record observations on audiocassette and record student responses with this technology. This was found to be the most efficient method of recording.

This research is an example of qualitative interpretive research using multiple sources of data. There will also be some quantitative data collected and interpreted as part of the process. All formal and informal discussions with students, teachers and parents will be logged and used as an integral component of the study results.

2.3 Instruments used

1. Fennema- Sherman Mathematical Attitudinal Scales.

2. Initial student questionnaire. After the students completed the Fennema- Sherman Attitudinal Scales questioning they were given a more specific questionnaire about their confidence, progress in perception of themselves as mathematicians. This was used as a benchmark as to the student's

position at the beginning of the study. Each student was asked to rank himself or herself on the perception of the confidence in mathematics. This was compared with the Panama Sherman results so that the tutor can put together a profile of the student for comparison later.

3. Initial Parent questionnaire. A similar questionnaire to that given to the student. The parents gave their perception of the student's confidence level. This is important because much of the students own decision comes from parent expectation and perception. This is committed to what was written by the students so as to set up the initial profile.

4. Initial teacher questionnaire. A third similar questionnaire was given to each of the student's teachers. The teacher gives their opinion about the student's confidence and their opinion as to the ability of the student. The teacher continually works the student and therefore can give an opinion about the student confidence. Again, this questionnaire is used to set-up the original profile.

5. Student Journal. This is an integral part of the study where the student regularly (every couple of weeks) writes out the ideas about the tutoring process, their confidence level and anything that is concerning them in mathematics. A pro forma was given to each student because they enter things more exactly when all questions are asked with a section at the end where free response was allowed. The tutor used these journals to keep a record of the progress of the students.

6. Tutor observation. Each time a student completed a journal entry, the tutor would also do a similar journal entry. The tutor would compare the entries and adjust the continuing profile accordingly. This gives an on going perspective of the progress of the student in the study through the eyes of the tutor.

7. Final student questionnaire. This is the same as the original student questionnaire. It is used to draw interesting conclusions as to how the study has affected the students' perception of the confidence during the study. This is an integral part of the final profile of the student at the tutoring will seize up an idea with the original to form a coalition this along with

8. Final parent questionnaire and final teacher questionnaire, the same as the original given to the parents and teachers.

9. Final Fennema- Sherman Mathematical Attitudinal Scales. This rounds off the study well enabling a statistical representation to be compared with the findings through the initial questionnaires, journals and observations and final questionnaires. All these together give an excellent representation of the student's pre and post study results.

3. Findings

3.1 Visualisation

The students were slow to begin this process and found it the most difficult. Visualisation had the most varying degrees of success. Edward who found it fantastic and used it everywhere, to Mark used it at sport (with help of the sports coach), and Kelly couldn't really handle it because it required her to be too quiet. Alana and Carla both had positive thoughts about the visualisation process throughout the study. By the end of the study all students were quite comfortable in using the visualisation process.

3.2 Memory maps

In comparison to the others, this process was the most successful. It is practical, colourful and allows the student to use their imagination and creativity. In a subject like mathematics the use of imagination and creativity is often not encouraged, so memory maps seemed to be positively received. All five students used memory maps, again to varying degrees, but successfully. All

students in the study stated that their self- confidence had increased because of the memory maps and they could use them in other areas of their schooling. Memory maps were very easy for the students to learn to draw but sometimes they were little time consuming and provided an excuse for some students to waste time.

3.3 Relaxation

Relaxation exercises were practiced at the beginning of each session. Most of the students were self- conscious about them at the beginning of the study, but once they saw other students doing the exercises they got involved. With the exception of Mark, all other students achieved success at relaxation. Kelly used it for concentration, and even did it at home with her mother; Alana for settling her nerves in mathematics tests and Carla used it to just relax. Edward saw relaxation as part of the whole process (holistic approach) and stated it helped him as each of the other processes did.

3.4 Outside School Tutoring

The aim of the study was to discover any relationships to confidence using the above methods in an after school-tutoring situation. Much research has been done on peer tutoring and in-school based withdrawal programs, but little has been formally researched on outside tutoring.

The study showed that the students' confidence did increase markedly using the above methods in the chosen environment. I was pleased with the reports from the students, teachers and my own conclusions. Any form of extra help for students carried out in a positive way is beneficial to the students' confidence as well as helping them achieve better results in examinations. "Success breeds success." Of course the students and tutors must put a positive effort into any tutoring program.

4. Results and conclusions

The following outcomes were achieved:

- a) The use of alternative methods of teaching such as relaxation, visualisation and memory maps have a positive effect on the confidence of students.
- b) Outside school tutoring, in a small group situation, has a positive effect on a student's confidence in mathematics.
- c) Positive affirmations and positive talk increase students' awareness of their confidence and ability in maths.

In addition, the study suggested skills and strategies that can be used the generally in the classroom to increase the students' confidence in mathematics.

Each of the processes combined in forming the basis of the study in an after school-tutoring situation. I would have expected that there would be varying reactions and successes with each of the process based on the fact that the sample of students selected was vast in ability, personality and academic willingness.

Each of the processes had a degree of success with each student. With the exception of Mark, who wasn't as receptive as the others. All the processes helped improve each of the student's self-confidence. I noted at the end of the study that a traditional teaching approach would have helped each student improve their marks in mathematics, but these processes also concentrated on using more creative parts of the student's brain and did increase their self- confidence and changed the way they approached the subject of mathematics.

The implications for mathematics generally and in the classroom are varied and interesting. The students enjoyed the different approach to the subject that historically had found difficult, boring

in stereotyped by many students. Using visualisation and memory maps as part of the teacher's tool kit are very useful. The study shows that with these tools the mathematics classroom could become more dynamic and thus the confidence of the students would increase. The study also showed how important a positive approach to the teaching of mathematics is.

All students in the study reacted well to any positive approach adopted by the tutor, especially with positive self-talk and visualisation of problems and solutions in mathematics.

Relaxation also proved to be a useful tool. In all areas of education this process could be adopted to make the students feel more relaxed, positive and promote enjoyment of education in a non-threatening environment. The relaxation exercises are difficult at first for the students, but with persistence a teacher, spending five minutes at the beginning of each lesson doing progressive relaxation with the students and combining the visualisation will reap rewards similar to those of this study.

Mathematics, being a traditional subject, has a specific approach. This study suggests not to change the face of how the subject is taught, but to introduce some new tools to influence the confidence of the students.

Outside school tutoring has been a bone of contention for classroom teachers for many years. Many teachers feel threatened by the need for an outside school tutor. This study showed that an outside school tutor could have a positive effect on the approach of a student to mathematics and also a positive effect on the confidence in the subject. Success breeds success.

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