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Anxiety and Mathematics Performance in Female Secondary School Students in Singapore

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ABSTRACT

This is an exploratory study conducted on mathematics anxiety, test anxiety and some interpersonal correlates with mathematics achievement of a sample of 206 Secondary Four female students from a Singapore school. Spielbergers' (1977) Test Anxiety Inventory (TAI) and the Fennema-Sherman Mathematics Attitudes Scales (Fennema-Sherman, 1976) were the instruments used. Some significant findings are: high mathematics anxiety is associated with low mathematics achievement and so is high test anxiety with low mathematics achievement. However, for the most capable students, test anxiety seems to act as a facilitator in their mathematics performance. Of the three interpersonal variables explored, students' scores on the perception of their mathematics teachers have the strongest correlation with their mathematics anxiety scores.

Introduction

It is generally agreed by most people including students, teachers and parents that mathematics is not an easy subject to learn. For some students, especially the underachievers, there is always a "discomfort component" during mathematics lessons. Dreger and Aiken (1957) investigated the presence of a syndrome of emotional reactions to arithmetic and mathematics which they designated as "Number Anxiety" in a college population. Lazarus (1974) isolated "mathophobia" as one possible cause of children's unwillingness to learn mathematics. Laurie Buxton (1981) provided a good insight into the emotions experienced by people having difficulty in learning mathematics while at school and eventually developed an affliction which he termed as "Math anxiety". Hoyles (1981) gathered stories by fourteen year old pupils that showed anxiety, feeling of inadequacy and feeling of shame were quite common features of bad experiences in learning mathematics. Also Barnes (1984) reported, "Many people experience feelings of unease about mathematics. For some, these develop into an excessive and irrational dread of the subject. When faced with a mathematical problem, they "freeze" or panic and are unable to think clearly" (p. 14).

In all reforms of mathematics curriculum, educators would have borne in mind that every mentally healthy pupil is capable of mastering the school mathematics course more or less successfully under proper instruction. They should be able to acquire knowledge and skill within the scope of the school curriculum. Yet, in most countries, the attrition rate is high and students leave schools with little or no capacity for mathematics. There has been increasing concern about the avoidance of mathematics courses in high school and in colleges, among intellectually capable students. This occurs in spite of the emphasis on the importance and necessity of mathematics in all aspects of society, especially in the scientific and technical fields.

Skemp (1970) took the view that feelings of dislike, bafflement or despair towards mathematics was not the fault of the learners but was more dependent on the quality of the teaching. He supported the belief that under certain conditions, anxiety reduces the efficiency of mathematical thinking. Given an exposition which is adequate, some pupils will be able to understand it, some may not. If those who do not understand feel over-anxious at their failure, they will, no doubt, make greater efforts to comprehend. But this over-anxiety can be self-defeating, in that it can actually diminish the effectiveness of their efforts. The more anxious the pupils become the harder they try, but the less they are able to understand, and so the more anxious they get.

It is unfair to blame the cause of a student's mathematical inability solely on the teacher, as there are many variables to consider in the learning process. It has always been a perennial question in the development of mathematics education, as to whether the curriculum or the quality of teaching should be tackled first as the weaker component. Problems of learning mathematics usually relate to either a general learning problem in the cognitive aspect or an emotional difficulty in a student, or a combination of the two. We must realise that at the same time that each student is learning a subject, he or she is also developing a feeling towards it.

The Problem

There is a growing concern among educators about the effect of anxiety that inhibits learning and limits the potentialities of students in their overall development. It is believed that most school situations create a breeding ground for anxiety in our students. The policy of streaming on the basis of academic competition through tests and examinations is most likely to foster anxiety. Students are expected to adjust to the school rather than the school adjusting to the students. Competitive evaluation which ignores varying sociological background and individual differences in ability often begins in the first grade and continues throughout school. Students are encouraged to enhance themselves by demonstrating their superiority over their fellow students which may give rise to widespread feelings of personal inadequacy. Some students may eventually convince themselves that school is not the place for them, that it is a place of threat and anxiety.

In their everyday schooling, students are exposed to common events in the classroom that in many ways are stressful and threatening, especially for the less well-adjusted. Very often teachers set tasks for the students with the explicit instruction that they are testing students' performance and intelligence on how much they have understood the lessons. This exerts a great influence over students' performance if they know or believe that the task is a measure of their abilities. It can be assumed that most teachers believe a task such as a test, must be made moderately difficult in order to separate the good from the weak who are required to do the same task as their better counterparts.

In addition, schools are generally run by the 'bell' according to the class time-tables, stressing the limited time available to students working on a task at hand. This heightens the tension. Teachers anxious to 'cover' the syllabus and pressed for time, hurry through a lesson leaving students bewildered. Grades and report cards to parents add to the part of school-life that threatens students' self-esteem and confidence.

In view of this, the present project aims to identify the degree of anxiety in students whose natural school environment bears conditions similar to those described above. Although the focus is on mathematics anxiety and achievement, test anxiety is also significant in this study since mathematics learning often involves test situations. Furthermore, in studying the affective domain of learning, the social learning variables must be considered in order to obtain a realistic account of students' performance in a classroom. Interpersonal variables like students' perception of the value of the subject they are learning, their perceptions of parents' as well as teachers' attitudes towards them, are all important dimensions not to be overlooked.

Some Predictions

In this study, we can assume that mathematics learning in the upper secondary level is to many students a complex task. This is because mathematics is a sequential and hierarchical subject, based on concepts and principles building logically from one stage to another. Hence in solving a mathematics problem, there are many competing responses within a student, that may be relevant or irrelevant to the task at hand. According to the drive theory by Spence (1964) and Taylor (1953), in a complex learning task, these many competing response tendencies are equally weak in habit strength, and anxiety would tend to hinder learning as it also energizes the habit strength of the many incorrect or irrelevant responses. So in a natural classroom situation, we may expect the performance of highly mathematics anxious students to be inferior to that of the low mathematics anxious students in the subject.

Mathematics learning in school is very much perceived by students as an evaluative process whereby they are constantly assessed by the teacher, to solve problems in front of the class or as assignments and tests. For the highly test-anxious, they may see situations regarding mathematics as threatening and we predict they would experience also a high level of mathematics anxiety. A common practice in Singapore schools is to assess students' progress by combining marks obtained from progressive testings, mid-year and final examinations which are all conducted in formal conditions with stringent time limits. Under these circumstances it would be expected that the Singapore evidence would support Wine's (1971) findings that highly test-anxious students typically perform more poorly on tests than do low test-anxious students, particularly when the tests are administered under stressful and evaluative conditions.

The sample in our study was streamed according to school policy into six classes based on previous years' scholastic performance. Students were well aware of the real basis of the division. One has to be 'good' to be in the Science stream; the rest who have little aptitude for mathematics and science will go to the Arts stream. Within each stream, classes are again divided according to overall achievement percentages. Consequently, it is predicted that those placed in the Arts stream would tend to have higher levels of test anxiety and mathematics anxiety.

It is speculated that parents' and teachers' expectations of their children's learning also have a significant relationship with students' level of mathematics anxiety. If the students believe that their parents are supportive and have positive attitudes towards mathematics, they would likewise have more positive attitudes and be less likely to be mathematics anxious. Similarly, such students would be appreciative of mathematics teachers who give encouragement and confidence to the students. As for the value of mathematics as a subject, it is predicted that students who perceive mathematics as highly important and useful would have a lower level of mathematics anxiety.

METHOD

Subjects

The students were 206 females from a secondary school in Singapore. The girls were in Secondary Four, which was the last year of their secondary education. They would be sitting for their major examination, the 'O' Level General Certificate Examination, at the end of the year. They were from six classes which were streamed according to merit into the Science and Arts Courses. They were taught by three mathematics teachers. These students were doing the 'Express' course and they generally had a high level of academic achievement. All of them had to do the compulsory elementary mathematics subject. A single-sex sample from a single school was chosen for this study which was mainly to investigate naturally occurring situations in a typical school environment. This is also to avoid the dangers and complication inherent in interpreting overall results from varying conditions and factors such as sex difference which may have significant effects on anxiety.

Instruments

Mathematics anxiety was measured using the Mathematics Anxiety Scale (MAS), one of

nine scales constituting the Fennema-Sherman Mathematics Attitudes Scales (Fennema and Sherman, 1976). It is designed to assess "feelings of anxiety, dread, nervousness and associated bodily symptoms related to doing mathematics". It consisted of 12 items and item responses were obtained on a 5-point Likert Scale. For the purpose of our study, the scores were modified to range from 1 (strongly agree) to 5 (strongly disagree) instead of the other way. Half the items were positively worded, while the other half were negatively worded. Scoring of negatively worded items were reversed so that higher scores would indicate higher mathematics anxiety.

Test anxiety was measured using the Test Anxiety Inventory (TAI), an instrument developed by Spielberger et al., (1977). The TAI consists of 20 statements pertaining to feelings and reactions while taking tests. Responses were obtained on a 4-point Likert Scale with response categories as 1 (almost never); 2 (sometimes); 3 (often) and 4 (almost always). Scores may range from 20 to 80, and higher scores indicate higher levels of anxiety. The TAI includes subscales of 8 items each for the Worry and Emotionality components of test anxiety.

Three other scales from the Fennema-Sherman package were also used to measure the 3 affective variables:

(a) Mathematics Usefulness Scale — which assess students' belief about the usefulness of mathematics as a subject they are currently learning and a perception of its usefulness in relation to their future education, vocation or other activities.

(b) Teacher Scale — which is a measure of students' perception of their teachers' attitudes towards them as learners of mathematics. It includes teachers' interest, encouragement and confidence in the students' ability.

(c) Parent Scale — which is a modified version of the actual Father-Mother Scale to measure students' perception of their parents' interest, encouragement and confidence in their learning of mathematics. It also includes the students' perception of their parents' example as individuals interested, confident and aware of the importance of mathematics.

Students' mathematics achievement scores were based on the average scores of the previous year's performance in tests and examinations. In Singapore schools, the final result of each subject in the year is made up of continual and semestral assessments. Continual assessment is through tests conducted at least once a term for 4 terms in a school year. There are two semesters in a year and semestral assessments made up of the mid-year and final examinations. A weightage of 30% was allotted to continual assessment and 70% to semestral examinations. These tests and examinations were normally conducted under formal conditions.

Procedure

The survey was conducted at the beginning of the year. The investigator obtained permission from the mathematics teachers to use their periods for administering the questionnaires. The mathematics teachers were not present in class during the survey. Students were expected to spend 20 to 30 minutes on the questionnaires and they were told that their responses would be kept confidential and be used for research purposes only.

Results

Correlation analysis showed a moderately strong negative relationship between mathematics achievement scores and mathematics anxiety scores of the students. ($r = -0.46$, $p < 0.01$).

A further analysis of mathematics achievement was made by comparing five groups of students of different anxiety levels from their Mathematics Anxiety Scale scores. Each level consisted of approximately 20% of the total sample. The lowest level of mathematics anxiety designated as level I through to the highest at level V. Table 1 shows the mathematics achievement mean scores at each level of anxiety. One way analysis of variance showed highly significant effects between mathematics achievement and mathematics anxiety level (F (4,201) = 13.8, $p < 0.001$). On the whole, their relationship depicted in Fig. 1, suggests that low mathematics anxious students perform better in mathematics than the high mathematics anxious.

TABLE 1: MATHEMATICS ACHIEVEMENT MEANS AND SD AT FIVE LEVELS OF MATHEMATICS ANXIETY WITH TEST OF SIGNIFICANCE BETWEEN LEVELS.

Mathematics Achievement			Levels of	Scheffé Test of Significance				
N	Mean	S.D.	Math Anxiety	I	II	III	IV	V
37	72.0	13.4	I ≤ 25					
42	66.8	14.2	II ≤ 31					
42	58.5	11.7	III ≤ 36	*				
44	59.8	15.9	IV ≤ 43	*				
41	50.5	14.1	V > 43	*	*			

* Significance at 0.05 level by Scheffé method.

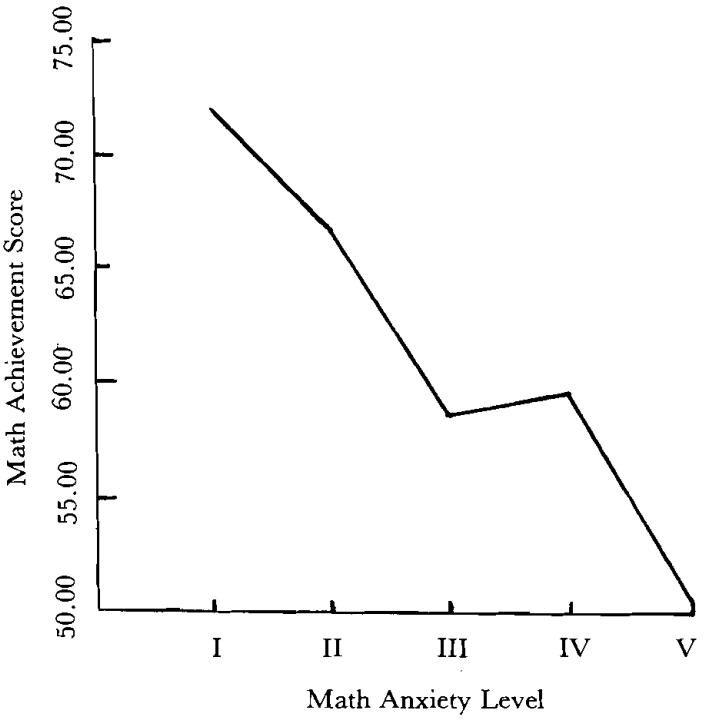

Fig. 1 Mathematics achievement mean scores against levels of mathematic anxiety.

Subdividing the students into five levels of test anxiety and plotting the mean scores of their mathematics achievement in each against the level of test anxiety, produced the non-linear relationship shown in Fig. 2. Results of a one-way analysis of variance indicated significant effects (F (4,201) = 4.28, p = 0.002) which gave an eta value, n = 0.28. Compared to the effect of mathematics anxiety, it indicated that the lowest level of test anxiety did not necessarily correlate with highest achievement, although it is true in this instance that very high test anxiety did relate to low achievement. Highest level of mathematics achievement was found to be in the middle ranges of the test anxiety scores.

There is a moderately strong positive correlation between the two types of anxieties as measured by the TAI and the Fennema-Sherman Mathematics Anxiety Scale, r = 0.54, $p < 0.01$.

Since the three scales viz. the Mathematics Usefulness Scale, Parent Scale and Teacher Scale were part of a package constituting the Fennema-Sherman Mathematics Attitudes Scales, their development and response categories were based on the same structure. Each had 12 items with a total possible score of 12 to 60 on a 5-point Likert Scale. Plotting the frequency polygons of their scores distribution under the same graph, Fig. 3 facilitates comparison. Negative skewness of the Mathematics Usefulness Scale and Parent Scale scores indicated that scores were generally high for these two scales. However scores on the Teacher Scale among the same students were much lower with a mean of 39.9 and standard deviation of 5.7.

Correlations among scores of the interpersonal variables, mathematics anxiety and achievement are shown in Table 2. Mathematics anxiety correlates negatively with each of the interpersonal scales. These three scales, however, correlated positively with mathematics achievement. The Teacher Scale scores had the strongest correlation among all the variables, $r = -0.55$.

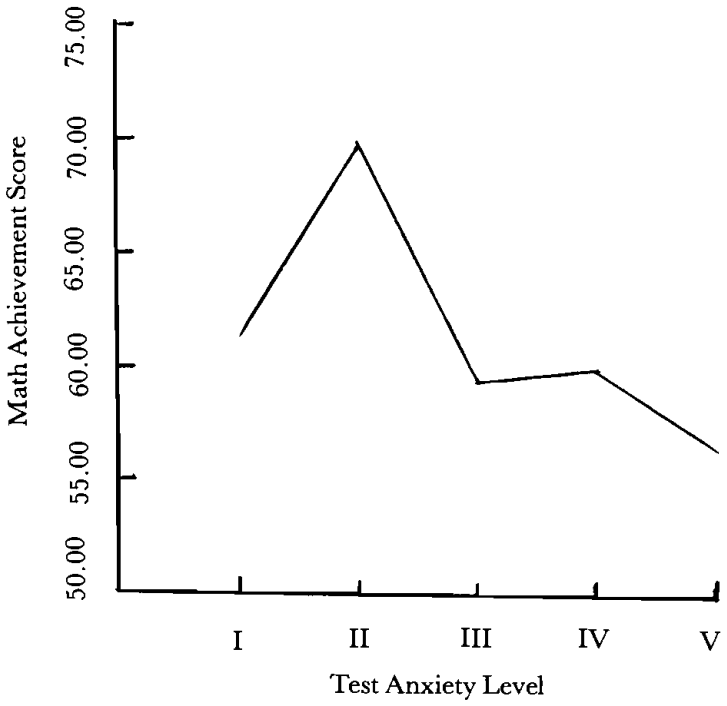

Fig. 2 Mathematics Achievement Mean Scores against levels of Test Anxiety.

TABLE 2: CORRELATIONS AMONG MATH. ACHIEVEMENT, ANXIETY AND INTERPERSONAL SCALES' SCORES OF STUDENTS.

Scale	2	3	4	5
1. Math Achievement	−0.46	0.40	0.23	0.30
2. Math Anxiety		−0.43	−0.38	−0.55
3. Useful			0.59	0.56
4. Parent				0.52
5. Teacher				—

All correlations are statistically significant at $p < 0.01$

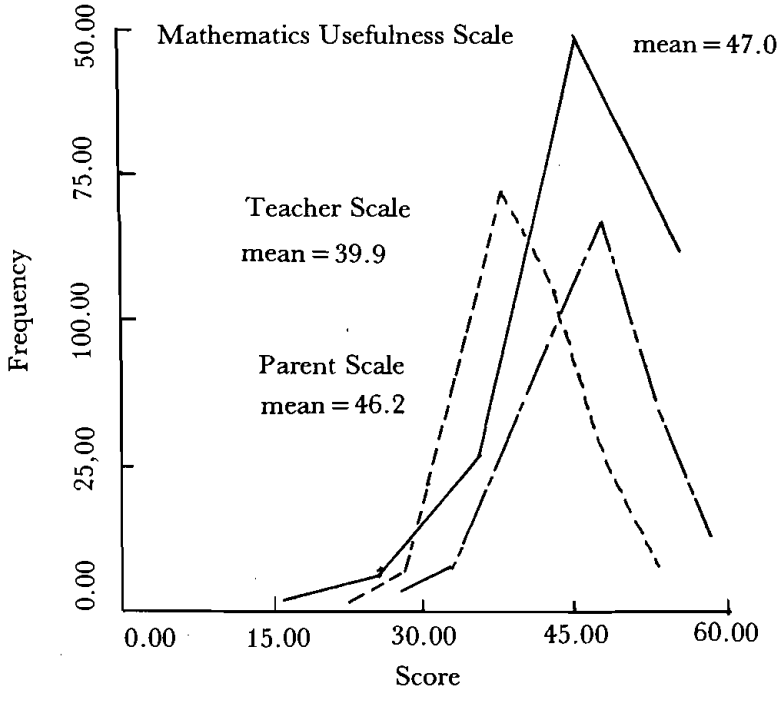

Fig. 3 Frequency Polygons of Interpersonal Scales.

TABLE 3: THE ANALYSIS OF VARIANCE OF 3 VARIABLES' MEANS BY STREAMING.

Class / Variable	Sc. 1	Sc. 2	Sc. 3	Arts 4	Arts 5	Arts 6	Total Sample	ANOVA F
	n=37 Mean	n=38 Mean	n=37 Mean	n=33 Mean	n=33 Mean	n=25 Mean	n=206 Mean	
Math. Achievement	76.7	72.2	64.0	56.6	46.4	45.8	61.3	53.0 *
Math. Anxiety	31.1	31.7	33.5	35.6	37.4	40	34.7	5.6 *
Test Anxiety	45.7	44.2	41.6	43.2	47.5	50.3	45.3	3.2 *

* Significant differences beyond p = 0.01

Table 3 gives a detailed comparison of mean scores for the 3 variables among the six classes into which the 206 Secondary Four students were streamed according to their overall academic achievement. Students in the Science stream had lower mean scores in mathematics anxiety than those in the Arts stream. It is noted that as one goes down the stream in mathematics achievement, the mathematics anxiety scores increase accordingly. Compared to the main samples' mean test anxiety scores of 45.3, the bottom two classes (Arts 5 and Arts 6) exhibited high anxiety (47.5 and 50.3 respectively) above this mean. Surprisingly the top science class also reported slightly higher anxiety (45.7). Classes in the middle range of mathematics abilities score lower test anxiety mean scores than the main sample.

Discussion

Results showing the moderately strong relationship, r = 0.54, between mathematics anxiety and test anxiety, support the hypothesis that high test-anxious students will tend to exhibit high level mathematics anxiety more frequently than the low test-anxious. According to Spielberger (1972) high trait-anxious persons tend to be anxious in a variety of situations and would frequently experience higher test anxiety for specific situations. So for our sample, the high test-anxious students would generally experience high mathematics anxiety. They may perceive mathematics as difficult especially in test situations and feel inadequate to handle the task, while accompanied by the anticipation of failure as threatening to their self-esteem. Betz (1978) using the same two scales on 652 college students, also found a moderate correlation of 0.42 between mathematics anxiety and test anxiety from which she concluded that some students reporting test anxiety might be primarily mathematics anxious and experiencing greatest difficulty with anxiety during mathematics tests.

Mathematics learning in school may be perceived by most students as an evaluative process which involved getting correct answers to mathematics problems; competing with peers; and with teachers placing emphasis on tests and examinations. Thus mathematics anxious students may be also generally test-anxious and more preoccupied with worry that generates feelings of nervousness and discomfort when working mathematics problems during tests.

That higher mathematics achievement is related to lower reported levels of mathematics anxiety as found in this study, is in agreement with previous research by Dreger and Aiken (1957), Betz (1978) and Sandman (1979) who found a negative correlation between mathematics anxiety and mathematics achievement scores among college students. Sherman and Fennema (1977) also found that high school students in the upper half of the achievement distribution reported more positive attitudes towards mathematics than did students in the lower half.

The mathematics anxiety scale in this study measured students' emotional state in mathematical situations such as lessons in class, homework and tests. The mathematics anxious students would experience more frequently higher levels of worry and emotions especially during mathematics tests, which would prevent them from giving full attention necessary for adequate performance of the task at hand. On

the other hand low mathematics anxious and capable students were not distracted by such task-irrelevant and self-deprecatory reactions and could proceed straight on to the problems at hand. Hence the linear relationship between mathematics anxiety and achievement was expected.

Test anxiety measured by TAI in our study could be seen as an A-Trait disposition which is a drive which remains latent until activated by the stress associated with a specific situation, as in a test or examination. The test anxiety scores by our students showed an interesting relationship with their mathematics achievement tests scores. It resembled the Yerkes and Dodson (1908) law, which translated anxiety as a drive and implied that when anxiety is low, the performance tends to be low. As anxiety level increases so does performance to an optimal level, after which a further increase will reduce performance. Fig. 2 depicted this relationship with the highest achievement mean scored around the middle range of the test anxiety level. The lowest test anxiety did not correspond to optimal achievement. One could explain this with cases of students especially those in the Arts Stream who had low aptitude for mathematics but were otherwise capable and not test-anxious about most other subjects in their course.

Also the relationship between test anxiety scores of each class did not show such a linear relationship with the various streams, Table 3. The top class exhibited an unusually high test anxiety score which could be explained that being the 'cream of the crop' there was motivation to keep up with the high expectations of them by teachers, peers and parents.

This relationship with test anxiety could be seen in the light of a study by Spielberger (1962) who investigated the relationship between anxiety level and academc performance for college students when the students' ability is taken into account. A detailed analysis of the performance of students who scored in the highest level of academic ability suggested that high anxiety may actually facilitate the performance of the most able students. For such students, anxiety may provide increased motivation, (Spence, 1964) which stimulates greater effort in their academic work. Hence the most capable students in our sample seemed to be able to handle high test anxiety which acted as an energizing drive. But they do not have high mathematics anxiety. This is because mathematics is a subject they have special aptitude for and it is possible for them to achieve good grades without anxiety. Most of them would enjoy doing mathematics and have positive attitudes towards it.

Findings in this study showed that streaming students according to scholastic performance was related to differetial levels of anxiety among classes between the Science and Arts Streams. As students were aware of the basis of the status of each class, such as Class Science 1 was the 'best' and Class Arts 6, the 'worst' then it is possible that the effect of streaming is to offer about as much reassurance to students' self-esteem in the higher stream as it offers threat to the lower stream. Cox and Hammond (1964) investigated levels of test anxiety in a wide range of schools in Melbourne, Australia and found that in six out of seven comparisons, the mean test-anxiety scores were higher in the lower stream than in the upper stream. Research has been inconclusive about the causal relationship between anxiety and streaming.

As these students in the present study are in the last year of their secondary education, they have to sit for a major examination (the Cambridge 'O' level School Certificate Examination). Parents are usually very concerned that their children obtain good results in order to go into post-secondary or 'pre-university' colleges. For the less academically inclined, the certificate would ensure that they can enter vocational institutions to prepare them for jobs. The prerequisites for these would be at least three credit passes in subjects including English language and mathematics. Conditions are usually very competitive. Hence it is not unusual for students to realise their parents' interest and awareness of the importance of mathematics in their education.

Most of these students also perceived quite highly the usefulness of mathematics (mean score on the scale = 47.0), probably because they saw it as a means to reach their goals for further education or a good school leaving certificate to a good job. This does not mean they would have no negative feelings, like anxiety, towards it. One would speculate that some of the highly anxious, poor mathematics

achievers were tempted to respond affirmatively to the item: "Taking mathematics is a waste of time" in their moments of frustration or resignation; but because mathematics is a compulsory school subject, they were made to believe in its importance.

Multiple regression analysis showed that 'Teacher' and 'Usefulness' did contribute to the explained variance in mathematics achievement although the percentage (about 17%) was small. 'Parent' scores did not seem to influence the levels of students' mathematics achievement. This was also true for 'Parent' and 'Usefulness' scores in relation to mathematics anxiety. They contributed only 1% and 2% to the explained variance in students' mathematics anxiety scores, much of which were attributed to the 'Teacher' Scale which also had the strongest correlation of -0.55. This indicates that of the three interpersonal variables, the 'Teacher' factor appears to have the strongest impact on students' mathematics anxiety which in turn, relates to their mathematics achievement.

Highly mathematics-anxious students tended to have a negative perception of their mathematics teachers. They felt that their teachers were impersonal and not encouraging. On examining the response data of students in the Teacher Scale, one could find many responses under the "Undecided" category to items such as: "Math teachers have made me feel I have the ability to go on in mathematics", "I would talk to my math teachers about a career which uses math". "When it comes to anything serious I have felt ignored when talking to my math teacher". This could indicate that these students were either indifferent to their mathematics teachers or it had never occurred to them that their mathematics teachers could find the time to be caring and responsive to their personal matters besides teaching them how to solve mathematics problems.

Conclusion — Implications for Teachers

Although the present study has been limited in terms of the sample being only female students from a single school situation typical to Singapore thus preventing generalization, the findings are relevant and in accord with results of similar studies on anxiety.

In general, this study supports the notion that high anxiety hinders performance especially for the less capable students. Highly test-anxious students tended to perceive mathematics tasks as evaluative and threatening, and so would react with higher level of mathematics anxiety than the low test-anxious students. High mathematics-anxious students were found to have low mathematics achievement scores.

With regard to the interaction between anxiety and achievement in mathematics, this correlational study provides no basis to conclude which is the cause or effect. Although some educators may speculate that underachievement due to factors like poor teaching causes mathematics anxiety in students, there is no conclusive evidence to prove this is so. One may look upon the relationship as a reciprocal influence: high anxiety which entailed self-centred interfering responses affects achievement negatively while low achievement which could be a threat to self-esteem, may in turn generate anxiety.

An education system that places strong emphasis upon the importance of tests and examinations to assess students' capabilities, would put the high test-anxious students at a considerable disadvantage. Anxiety at a high disruptive level impedes the potentials of many otherwise capable students in test-like situations.

A very significant finding from this study is the fact that teachers play an important role in helping students to develop positive attitudes towards the subject that they are teaching. There is unease among mathematics educators about the high rate of mathematics failures in school and increasing mathematics avoidance by capable students in college courses. Whatever the findings of research on mathematics anxiety, they are aimed at furnishing teachers with a deeper understanding of students' perceptions of mathematics learning. Mathematics teachers must persuade students that mathematics is not a forbidding subject but an attractive mental exercise. Having identified the mathematics-anxious students, how can teachers help them?

Some research has been conducted to develop programmes to combat mathematics anxiety among college and university students. Auslander (1979) evaluated the "Math Clinic"

at Wesleyan University, which aimed to help students overcome the fear and negative attitudes toward mathematics and found some of the techniques successful. Some students were less anxious and more confident after attending the clinic. Resek and Rupley (1980) also developed a programme "Math without Fear" to combat mathophobia by helping students to move from rigid reliance on rote learning to an understanding of mathematical concepts. But one is interested to know what approaches a teacher in a normal everyday classroom situation could use to combat if not to prevent anxiety in students.

Anxiety about tests is not restricted to the examination room; many students begin to feel anxious days before a test, especially if they are not well prepared. It is important that students develop good study habits. It was found in a study by Wittmaier (1972) that anxiety is probably in part the cause of, and in part the effect of ineffective study habits. Anxious students were likely to have less effective study habits and were likely to delay or avoid doing academic tasks. It also confirmed Wine's (1971) contention that high test anxious students waste a lot of time with self-centred interfering anxiety responses during task performance.

All this suggests that teachers could help by inculcating good study habits and basic skills so that students might attend to the task rather than to their own anxiety reactions. However, further study in this area could be directed to confirming that teachers can improve students' attitudes and achievements in the classrooms.

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