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Some Findings on the Use of Motivation Strategies in Singapore Classrooms

As Singapore has hardly any natural resources, it has to depend upon its human resources for its social development, industrial advancement, financial stability and hence survival and viability. Social development, industrial advancement and financial stability can only materialise if human resources are skilled and trained. The hand-in-glove relationship of skill training and formal education is obvious and their necessity for our development and survival is often emphasized by our leaders.

The task of enlightening students on the aims and values of a formal education rests on the shoulders of the teachers. Teachers are responsible for facilitating the active learning of students. Hence one of the teacher's duties is to enhance the motivation of his students. He is expected to provide favourable conditions for study for poorly motivated students. This leads to the inevitable fact that teachers should be equipped with the essential strategies to motivate their students in the classroom.

A number of small-scale projects on motivation strategies have been carried out by I.E. Diploma in Education (graduate) trainee teachers in schools. These trainee teachers had attended a 30-hour elective course on "Motivation in Learning" for which the form of assessment was a project on motivation or a related topic. They were allowed to hand in their projects six months after completing the course. It is not unusual for trainee teachers to undertake two projects simultaneously and so they generally have less than a semester to complete a project.

Since the samples involved in these studies were small captive ones, we cannot pretend that the findings of these projects are generalisable for the Singapore population or even representative of the school population. Hence the results are indicative rather than definite.

Motivation strategies in the classroom are mostly manipulations of incentives. Though effective methods are many and varied, we focus here on strategies which are common and can be implemented easily at most class levels. Frequent testing, grade incentives, teachers' encouraging comments, praise and reproof, competition and cooperation are methods which have been found to be effective in Singapore and can be easily integrated into the daily lessons.

There is no paucity of data on motivation strategies from researchers in the developed countries. However the element of ethnic and individual differences raises the need to verify the effects of these strategies on Asian samples, and in Singapore, on multi-racial samples. The major ethnic groups in Singapore are the Chinese, Malays and Indians. In the English medium schools from which we drew our project samples, most classes are composed of all the major ethnic groups.

Owing to space constraint, only a cursory review of the principal findings of one project is given under each method. The projects selected for presentation here are fairly representative and not chosen to support certain hypotheses.

Grade Incentives

Cullen *et al.* (1975) reviewed a number of studies investigating the motivational power of grades. His investigations show that grades used as either a positive or negative incentive secure greater assignment completion than when no incentive is offered and that grades used as a negative incentive elicit better results than when used as a positive incentive. Moreover, when grades are used as a negative incentive, the greater the intensity of the incentive, the greater is the assignment completion.

Fong (1977) chose to use grades only as a positive reinforcer to motivate 40 Secondary 3 students in Mathematics. The students were girls whose average age was fifteen. The objective of the study was to determine the effects of continuous grading of Mathematics assignments on students' progress. The design of the experiment is shown in Table 1a.

Table 1a   Design of experiment using grades as incentives

PERIOD	METHOD	ASSIGNMENTS
I. Pretreatment period – first 2 weeks of the experiment	3 assignments of Ss* were graded and recorded without Ss' knowledge	Each assignment consisted of about 4 – 5 problems. Ss* were allowed to complete them at home and hand them up the next day.
II. Treatment period – the last two weeks of the experiment	3 assignments of Ss* were graded and grades were recorded in Ss' books	

Ss* = subjects

Table 1b   Average marks of assignments attained during experiment

Pretreatment period			Treatment period		
1st assignment 6.05	2nd assignment 5.80	3rd assignment 6.10	1st assignment 6.18	2nd assignment 6.63	3rd assignment 7.75

Table 1c   Comparison of means of assignments in pretreatment and treatment periods

Period	df	Mean	Difference	t	p
Pretreatment Treatment	39	5.98 6.85	0.87	5.97	<.001

The experiment covered 4 weeks. During the pretreatment period, the assignments were marked and the grades were recorded in the teacher's record book. Prior to the implementation of the treatment, students were informed that their assignments would be graded for neatness and accuracy. Each student was told to keep a progress graph at the back of her exercise book. Each assignment was graded out of 10 marks.

Table 1b shows improvement as evident in the increase of mean scores in the assignments during the treatment period. A t-test carried out to compare the means of the pretreatment and treatment assignments gives a t-value of 5.97 which is statistically significant at the .001 level.

Students of this project appeared to respond positively to the grade incentive and were motivated to channel greater effort into their work.

In this experiment, there are factors like personality, intelligence, socio-economic status of students which could not be controlled. Though conscious care was taken to make the assignments of equivalent standard, there were no stringent means of checking. Moreover, students were allowed to complete the assignments at home. So external help might have been solicited.

Frequent Testing

In the course of instruction, feedback from the tests administered enables a teacher to reinforce what is already understood by his students and spend more time on areas which are vaguely understood or misunderstood. Feedback from tests also provides students with specific knowledge of results and information requisite for improvement in subsequent tests. Fitch (1951), Standlee and Popham (1960), Selakovich (1962), Crouse (1974), Gaynor and Millham (1976) and Reith et al. (1975) found that frequent evaluation is generally superior to infrequent testing. Besides improved achievement, Fitch noticed that frequent tests motivated students to read more extensively from supplementary sources and extend their preparation beyond routine requirements. Selakovich found that students exposed to frequent testing were more responsive and participated more enthusiastically in class discussions.

David (1978) decided to use frequent tests to motivate her weak Secondary 2 girls to better their performance in General Science. Two classes of 42 girls each participated in the experiment. Class 2K was academically better than class 2L and was used as the control class. Class 2L, the weaker

class, was selected as the experimental class.

To determine the effectiveness of weekly tests over monthly tests, the experimental class 2L was given weekly tests besides the routine monthly tests. Class 2K took only the monthly tests. A pre-experimental test was administered to the 2 classes. Both classes were tested over a period of 2 months.

Table 2a Comparison of the results of the pre-experimental test obtained
by the experimental and control classes

Class	df	Mean	s.d.	% of passes	Mean difference	t	p
Experimental (2L)	41	31	24.69	16	9.45	2.65	<.05
Control (2K)		40.45	27.91	27			

Table 2b Comparison of the results of the January monthly test obtained
by the experimental and control classes

Class	df	Mean	s.d.	% of passes	Mean difference	t	p
Experimental (2L)	41	42	18.87	35	2.26	0.57	ns
Control (2K)		44.26	17.41	33			

Table 2c Comparison of the results of the February monthly test obtained
by the experimental and control classes

Class	df	Mean	s.d.	% of passes	Mean difference	t	p
Experimental (2L)	41	53.25	20.3	57.1	9.64	2.26	<.05
Control (2K)		43.61	18.81	38.1			

An examination of the Tables 2a, 2b and 2c shows that the means obtained by the control class in the pre-experimental and monthly tests were fairly constant and the percentage of passes did not rise above 38.1 per cent (as obtained in the February tests). The experimental class showed an upward swing in its achievements. In the pre-experimental test, it scored a mean of 31 and only 16 per cent of its students passed. Mean difference between the 2 classes was significant at the .05 level. After the first round of weekly tests, the experimental class showed speedy improvement by attaining 42 marks for its mean in the January test. Its mean was lower than for the control class but the marginal difference was not statistically significant. Moreover, it secured 35 per cent passes compared to the control class's 33 per cent passes. In the February test, the experimental class achieved a mean of 53.25 marks while the control class kept closely to its previous attainment and scored 43.61 marks. The mean difference was significant at the .05 level. 57.1 per cent of the students in the experimental class passed this test, compared to 38.1 per cent passes in the control class.

The results speak for themselves and show that properly planned, frequent tests are effective in motivating low achievers to better performance.

The experiment was not without its weaknesses. Since the study lasted for two months, extraneous variables were to be expected, e.g. intervening events external to the experiment, maturation and practice provided by frequent testing. The teacher bias might also be present as the experimenter and teacher were the same person. All these factors could have contributed to the results obtained.

Teachers' Encouraging Remarks

In 1958, Page carried out an experiment of immense magnitude to show that appropriate, encouraging, informative comments by the teacher had a facilitating effect on student motivation and subsequent performance. His students were divided into 3 different groups. One experimental group had free comments which were appropriate

vis-a-vis the students' performance while the second experimental group of students received comments specified for each grade. The control group had no comments for their performance. Results showed that positive and encouraging comments of any form brought about improved performance in subsequent tests and assignments.

Koh (1977) adapted Page's experiment and simplified the design. Instead of having 2 experimental groups, only one group was used. Free encouraging remarks were used on this group. The students were drawn from 2 seconday 3 classes. One was an academic class[1] of 27 boys. The other class was a technical class[2] of 38 students, of which 8 were girls. In each class, there were an experimental group and a control group. The grouping was based on the results of 4 tests given to the students prior to the project. The students in both groups were selected in such a way that the mean scores and the standard deviations of these 4 tests were comparable for both groups.

Two pre-experimental Mathematics tests (A1 & A2) in the objective format were given to the 2 classes. During the experimental period, 2 ordinary tests (X1 & X2) were administered to classes. The X1 and X2 scripts of the experimental groups were given encouraging comments by the experimenter. After the experiment, 2 more objective tests (B1 & B2) were carried out. The tests were conducted weekly. Each objective test lasted 40 minutes while the experimental tests took 70 minutes.

Technical Class

Table 3a Comparison of the results achieved by the experimental and control groups in the pretests (A1 & A2)

Group	n	mean	sd	F	P
Control	19	67.11	18.80	1.045	ns
Experimental	19	67.63	19.22		

Table 3b Comparison of the results achieved by the experimental and control groups in experimental test X1

Group	df	mean	sd	t	p
Control	18	64.32	25.09	0.03138	ns
Experimental	18	64.05	26.51		

Table 3c Comparison of the results achieved by the experimental and control groups in experimental test X2

Group	df	mean	s.d.	t	p
Control	18	62.32	16.29	1.393	ns
Experimental	18	69.84	16.13		

Table 3d Comparison of results achieved by experimental and control groups in posttest B1

Group	df	mean	s.d.	t	p
Control	18	66.32	16.92	2.311	<.05
Experiment	18	78.95	15.86		

[1] Students in the academic class took English, Chinese as a second language, Physical Science, History, Literature and Mathematics.

[2] Students in the technical class took English, Chinese as a second language, Mathematics, Physical Science, Basic Electricity and Electronics, Geometrical and Mechanical Drawing.

Table 3e Comparison of results achieved by control and experimental groups in posttest B2

Group	df	mean	s.d.	t	p
Control	18	65.26	16.97	2.917	<.01
Experimental	18	80.53	14.32		

The difference in mean scores in the pretests between the experimental and control groups was not statistically significant, showing that the 2 groups were comparable in their Mathematics achievements before the experiment. An examination of Tables 3b — 3e shows that just after the experimental treatment had been introduced, there was an increase in the scores obtained by the experimental group but the difference between the 2 groups was not statistically different. Posttest B1 was conducted after the test X2 on which the experimental treatment was applied and Table 3d indicates clearly that the gain made by the experimental group over the control group was significant at the .05 level. Although there was no experimental treatment on B1, the difference between the 2 groups in the posttest B2 was still significant showing that the effect of the treatment was not ephemeral.

The Academic Class

Table 3f Comparison of the results achieved by the experimental and control groups in pretests (A1 & A2)

Group	n	mean	s.d.	F	p
Control	13	47.31	14.33	1.952	ns
Experimental	14	47.86	19.88		

Table 3g Comparison of the results achieved by the experimental and control groups in experimental test X1

Group	df	mean	s.d.	t	p
Control	12	28.31	21.73	0.1080	ns
Experimental	13	27.57	26.60		

Table 3h Comparison of the results achieved by the experimental and control groups in experimental test X2

Group	df	mean	s.d.	t	p
Control	12	28.84	10.95	2.152	<.05
Experimental	13	39.43	13.41		

Table 3i Comparison of the results achieved by the experimental and control groups in posttest B1

Group	df	mean	s.d.	t	p
Control	12	29.23	10.71	4.021	<.001
Experimental	13	49.27	13.87		

Table 3j Comparison of the results achieved by the experimental and control groups in posttest B2

Groups	df	mean	s.d.	t	p
Control	12	33.08	14.35	4.331	<.001
Experiment	13	59.29	15.80		

The academic class was a poorer class in terms of cognitive abilities but was highly responsive to the treatment. For the pretests and X1, in the absence of the treatment, differences in scores between the 2 groups were marginal and non-significant. After treatment was applied on X1 scripts, the experimental group showed promising improvement in X2. There was an actual increase of more than 10 points in the mean and the difference between the scores of the 2 groups was statistically significant. The trend of improvement was stable in the experimental group and the mean scores for B1 and B2 were 49.27 and 59.29 respectively. The differences between the 2 groups for B1 and B2 were both highly significant at the .001 level.

From the data, we can deduce that teachers' positive comments are effective in motivating students, especially the low achievers, to put in extra effort in their performances. It is also heartening to learn that the effects do not fade out immediately after the withdrawal of the incentive.

Though results are positive and convincing, we cannot rule out the plausible effects of history and maturation on the findings. The differences between the academic class and technical class might be more complex than with respect to just cognitive abilities alone, resulting in the differential responses to the treatment.

Praise and Reproof

Praise has been found to be a potent form of positive reinforcement in increasing students' efforts. It is regrettable that some teachers are not inclined to be magnanimous with their approval though they are quite liberal with reproof. Undoubtedly, reproofs have their share in energizing the less diligent students to perk up and to put in more than tepid interest in their work. However, negative incentives are often less dependable in their effects.

As early as 1925, Hurlock carried out a well-known experiment to determine the effects of praise and reproof on learning. Four comparable groups of students sat for Arithmetic tests on 5 successive days. Group A received praise for its performance, Group B was reproved despite good results; Group C was ignored but allowed to observe the treatments given to Groups A and B, and Group D was separated from the other 3 groups and ignorant of what was going on. The results are shown in Table 4a.

Table 4a shows that both praise and reproof motivated the students to greater effort in their second tests. On the succeeding days, the praised group continued to improve but the reproved group lost enthusiasm when their efforts met with criticism. The ignored group who observed the treatments given to Groups A and B perked up on the second day but fell off after being ignored. The control group (D) showed little fluctuation in their scores. The inference here is obvious, that praise is more effective than reproof in activating students towards achievement.

Table 4a Average scores attained in Arithmetic tests by groups working under different conditions for a period of 5 days[1]

Group	Test 1	Test 2	Test 3	Test 4	Test 5
Praised (A)	11.8	16.6	18.8	18.8	20.2
Reproved (B)	11.8	16.6	14.3	13.3	14.2
Ignored (C)	11.8	14.2	13.3	12.9	12.4
Control (D)	11.8	12.3	11.6	10.5	11.4

[1] Reproduced from Hurlock (1925)

Tay (1977) replicated Hurlock's experiment to determine the effectiveness of praise and reproof as incentives for the classroom. The objectives of her project were:

(1) to show that praise is more effective than reproof as a motivational device,
(2) to show that reproof is most effective in motivating high achievers,
(3) to show that praise is most effective in motivating average and low achievers.

80 Secondary 3 students were selected for the experiment. Selection was based on their performance in the midyear examination and an objective test in History. Students were divided into 3 groups based on the average scores obtained. High achievers obtained scores between 70 and 100 marks; average achievers had scores between 50 and 69 marks, and low achievers' scores ranged from 0 to 49 marks. These students were then put into 4 groups — praised, reproved, ignored and control (refer to Table 4b). Each group had 7 high achievers, 6 average achievers and 7 low achievers — making a total of 20 students in all.

Table 4b Summary of the types of praise and reproof given to different groups in the course of the History tests

Group Test	Praised	Reproved
Test 2	1. Good effort shown in work 2. Neat and careful 3. Keep up the good performance and try to set some records for others to follow	1. Poor results — below standard 2. Sloppy and careless work 3. Will fail if don't work harder 4. Another chance for proving yourself — try hard
Test 3	1. Better performances — many improved in marks though no records broken 2. Standard exceptionally high for your level	1. Worse results than before 2. Not much effort shown 3. Quite untidy and careless 4. Shameful of you to bring down the standard of the school
Test 4	1. Great deal of effort and interest shown 2. Showed intelligence in the way questions were answered 3. Try to break some records	1. Answers were not clear 2. Untidy — didn't follow instructions given 3. Marks deteriorated — bring down the school standard 4. Disgraceful lot — try hard to improve your marks or you will fail
Test 5	1. Fantastic performance — have proved yourselves to be the 'cream' of the school 2. Keep up the excellent work shown 3. I'm very proud of you 4. You will go far in your quest for good results	1. Results poor as before 2. Doubt if you can pass your final exam 3. Don't be lazy 4. Don't make silly mistakes 5. Final chance for you to prove that you are not that hopeless

Table 4c Scores attained by the 4 groups in the 5 tests

Group	Test 1	Test 2	Test 3	Test 4	Test 5	Mean
Praised	60.5	63.8	66.5	64.8	68.3	64.8
Reproved	60.5	60.0	64.3	61.0	58.8	60.9
Ignored	60.5	60.0	56.5	53.5	51.0	56.4
Control	60.5	56.5	52.8	47.0	48.0	53.0

Students from the 4 groups sat for 5 objective History tests, each of which was administered once every two days. Each test consisted of 26 multiple choice items, marked out of 100. Praise and reproof were based on a previous test and given before the beginning of the next test. The results are shown in Table 4c.

The ignored and control groups showed steady regression in their performance over the 5 tests. The reproved group demonstrated the least change as the test scores of subsequent tests varied very little from Test 1. The praised group showed steady progress and attained an average of 68.3 marks in Test 5. The results supported Hurlock's findings.

Table 4d Average scores obtained by high achievers working under different conditions

Group	Test 1	Test 2	Test 3	Test 4	Test 5	Mean
Praised	85.7	80.0	76.4	72.9	70.7	75.0
Reproved	83.6	70.7	75.0	80.7	86.4	78.2
Ignored	83.6	77.1	70.7	68.6	66.4	70.7
Control	8.36	75.7	69.3	60.7	62.9	67.2

Table 4e Average scores obtained by average achievers working under different conditions

Group	Test 1	Test 2	Test 3	Test 4	Test 5	Mean
Praised	59.2	60.0	64.2	60.8	67.5	62.3
Reproved	58.3	61.7	67.5	60.8	54.2	60.5
Ignored	57.5	63.3	60.0	55.8	51.7	57.7
Control	59.2	56.7	55.0	50.0	49.2	54.0

Table 4f Average scores obtained by low achievers working under different conditions

Group	Test 1	Test 2	Test 3	Test 4	Test 5	Mean
Praised	36.4	50.7	58.6	60.0	66.4	54.4
Reproved	39.3	47.9	50.7	41.4	32.9	42.4
Ignored	40.0	41.4	39.3	36.4	35.0	38.4
Control	38.6	37.1	34.3	30.7	32.1	34.6

Table 4f shows that low achievers responded best to praise and showed accelerated improvement. The average group (Table 4e) showed improvement too when praise was administered but the gain made was by no means comparable to the low achievers. The praised high achievers regressed from 85.7 marks in Test 1 to 70.7 marks in Test 5 (Table 4d). On the other hand, the high achievers fell badly in Test 2 after having been reproved but responded to the treatment and picked up in subsequent tests. The average achievers also responded to reproofs but continuous criticism appeared to undermine their enthusiasm and confidence. There was a sharp drop in their scores in Test 5. Like their average counterparts, reproofs were less effective with the low achievers. Being ignored and total lack of stimulation appeared to have negative effects on all 3 categories of achievers.

Praise and reproof have motivating effects on students of different abilities. However, continuous application of reproofs seems to have a debilitating effect on the average and low achievers. Students with low confidence and poor self-concept respond better to positive and encouraging comments. Reproofs have a facilitating effect on the better students.

One of the weak spots of the study is the arbitrary criterion used in classifying the 3 classes of achievers — high, average and low. Low achieve-

ment covered a wide range from 0 to 49 marks and the high achievement spanned the 70 to 100 marks range. The average achievers were those who scored between 50 and 69 marks. The narrow range allowed for the average group contrasts sharply with the wider range of grades used for the other two groups. This arrangement would have its effects on the results of the 3 achievement groups.

Some of the words of praise used were exaggerated and not effort or behaviour oriented, e.g. "Fantastic performance — have proved yourselves to be the 'cream' of the school." On the other hand, some reproofs could be harmful for the self-concept and confidence of the students involved, e.g. "Doubt if you can pass your final exams." "Final chance for you to prove that you are not that hopeless." The harsh comments made for weak students who are not able to better themselves can have unpleasant repercussions. Generally, positive and realistic comments are preferred to derisive reproofs as incentives, as these help to strengthen the confidence of students and their relationship with their teachers. Students usually view encouraging remarks as signs of interest and helpfulness.

No tests of significance were carried out on the results to determine whether the differences among the groups were significant.

Competition and Cooperation

Interaction among students can be classified into 3 goal structures, each of which specifies the type of interdependence existing among students (Johnson and Johnson, 1975):

1. cooperative or positive interdependence in which students work together to accomplish shared goals,
2. competitive or negative interdependence in which students work against each other to achieve a goal which only one or a few students may attain,
3. individualistic or no interdependence in which students work by themselves to accomplish goals that are unrelated to the goals of others.

In schools, all 3 types of interaction have been used in varying degrees to promote learning in different situations. Many studies have been conducted to investigate the effects of cooperation and competition on students' learning. Studies of self-rivalry, however, have been relatively scarce. These studies yield results which are in some cases conflicting. Even where overall results tend to favour a certain conclusion, it is dangerous to make a generalization from a particular study and apply it to any classroom situation.

Wong (1978) attempted to use rivalry as a form of extrinsic motivation to promote learning in Human and Social Biology. All 3 forms of rivalry, namely, interpersonal competition, intergroup competition (intragroup cooperation) and self-rivalry, were introduced to determine their effects on achievement. The students were Secondary 3 girls whose ages ranged from 14 to 16 years. They were drawn from 3 Arts classes — Sec. 3(3), Sec. 3(5) and Sec. 3(6). Sec. 3(3) had 43 students and was the top Arts class. There were 42 students in Sec. 3(5) and 37 students in Sec. 3(5). The students in Sec. 3(5) and Sec. 3(6) were heterogeneous in ability.

Six weekly tests of 15 objective questions each were given to all the 3 classes. The maximum marks for each test were 30. For the first 3 tests, all 3 classes were subjected to the same conditions, that is, no motivation was given. These tests would serve as the control. After the third test, each class was subjected to a different form of rivalry. The design for the experiment is described briefly in Table 6a.

Table 6a Experimental treatments for the 3 classes

Class	Treatment	Grouping	Incentive
Sec. 3(3)	Interpersonal competition	Nil	Top ten girls for the last 3 tests were awarded prizes.
Sec. 3(5)	Intergroup competition	4 groups of comparable ability	Members of the group with the highest average marks for the last 3 tests were given prizes.
Sec. 3(6)	Self-rivalry	Nil	Students who showed the most improvement in the last 3 tests were awarded prizes.

At the end of the experiment, the students were also given a questionnaire in which they were told to choose which of the 3 types of competition they would prefer in class.

Grouping in Sec. 3(5) was based on the results of the first 3 control tests. The students were ranked according to their average marks for the 3 tests. The top was placed in Group A, No 2 in Group B and so on. Similarly the last student was placed in Group A and the second last in Group B until all students were placed in groups.

Results

T-tests for paired data were conducted to see if there were significant differences in the test results before and after treatment.

Table 6b Analysis of variance for the pretreatment scores of the 4 groups in intergroup competition

Source of variation	degree of freedom (df)	sum of squares	variance estimate	F	p
Total	41	439.08	1		
Between Groups	3	3.73	1.24	0.11	ns
Within Groups	38	435.35	11.46		

where df = 3, 38
$F_5\%$ = 8.59
$F_1\%$ = 26.41

Sec 3(3) — Interpersonal Competition

Table 6c Mean test scores of Sec. 3(3)

Test Test score	Tests before treatment				Tests with treatment				difference in mean scores before and after treatment
	T1	T2	T3	Mean	T4	T5	T6	Mean	
	16.7	16.9	18.9	17.2	20.0	24.0	25.0	23.0	5.8

Table 6d t-test on the mean test scores before and after interpersonal competition

Treatment	df	mean difference	t	p
Interpersonal competition	42	5.8	5.36	<.01

Table 6c indicates a gradual improvement in the control test scores. Improvement was accelerated after introduction of interpersonal rivalry. There was a sharp increase from an average of 20 marks for T4 to 24 marks in T5. The mean score of 23 for the tests with interpersonal rivalry compared favourably with the mean score of 17.2 for the pretreatment tests. The difference of 5.8 was found to be significant at the 1 per cent probability level. Hence, significant improvement in academic results was evident when interpersonal competition was introduced as an incentive.

Sec 3(5) — Intergroup Competition

Table 6e Mean Test scores of Sec. 3(5)

Test	Group	Tests before treatment				Tests after treatment				differences in mean scores before and after treatment
		T1	T2	T3	Mean	T4	T5	T6	Mean	
	A	9.8	17.3	15.6	14.2	16.2	18.9	19.3	18.1	3.9
	B	12.0	13.8	12.2	12.7	15.6	18.0	16.7	16.8	4.1
	C	13.8	14.9	14.0	14.2	13.2	16.9	21.0	17.0	2.8
Test	D	13.4	13.7	15.6	14.2	16.0	20.8	19.4	18.7	4.5
score	Class	12.3	14.9	14.4	13.8	15.3	18.7	19.1	17.7	3.9

Table 6f t-test on the mean test scores before and after intergroup competition

Group/Class	df	mean difference	t	p
Group A	9	3.9	1.41	$>.05$
Group B	9	4.1	2.57	$<.05$
Group C	10	2.8	1.10	$>.05$
Group D	10	4.5	2.61	$<.05$
Class	41	3.9	4.48	$<.01$

Sec 3(6) — Self-Rivalry

Table 6g Mean test scores of Sec. 3(6)

Test		Tests before treatment				Tests after treatment				differences in mean scores before and after treatment
		T1	T2	T3	Mean	T4	T5	T6	Mean	
Test score		11.6	15.4	15.5	14.2	17.3	19.9	20.2	19.1	4.9

Table 6h t-test on the mean test scores before and after self-rivalry

Treatment	df	Mean difference	t	p
self-rivalry	36	4.9	4.71	$<.01$

All of the 4 groups showed improvement in their test performance after the implementation of intergroup competition. But only the difference in scores for Group B and Group D was statistically significant. The class taken as a whole made significant improvement in the tests during the treatment period. This shows that intergroup competition is an effective classroom motivation technique.

Under the condition of self-rivalry, there was an obvious improvement shown in the performance. T1 registered a low mark of 11.6 while T6 gave a comfortable score of 20.2 marks. The difference between the tests taken before and after the implementation of self-rivalry was statistically significant at the 1 per cent probability level. Therefore, when students were motivated to compete against themselves, the test scores improved significantly.

Preference for Goal Structure

Table 6i — Preference for the various goal structures for each class

Goal structure preferred	Sec. 3(3) (working under interpersonal competition)		Sec. 3(5) (working under intergroup competition)		Sec. 3(6) (working under self-rivalry)	
	No	%	No	%	No	%
Intergroup Competition	10	23.3	23	54.8	22	59.5
Inter-personal Competition	22	51.2	6	14.3	2	5.4
Self-rivalry	11	25.5	13	30.9	13	35.1

Certain outstanding features can be observed in Table 6i. In Sec. 3(3) (working under inter-personal competition) the majority (51.2 per cent) preferred interpersonal competition. The situation was strikingly different in Sec. 3(5) (working under intergroup competition) and Sec. 3(6) (working under self-rivalry). In these 2 classes, intergroup competition was the favoured goal structure. 54.8 per cent of Sec. 3(5) students and 59.5 per cent of Sec. 3(6) students indicated a preference for intergroup competition. Inter-personal competition was the least popular form of competition for both these classes.

An analysis is made of the preference of goal structures by students of different abilities. The students were divided into 3 categories — Low Achievers (LAs), Average Achievers (AAs) and High Achievers (HAs). The classification was based on the school's system of grading, presented in Table 6j.

For a clearer analysis of the contrast in the preference of goal structures by the students of different abilities, only the LAs and HAs in each class were considered.

Sec. 3(3) was an academically better class and had very few LAs (only 2). Both LAs in Sec. 3(3) preferred intergroup competition (refer to Table 6k). Similarly 64.7 per cent and 46.2 per cent of the LAs in Sec. 3(5) and Sec. 3(6) respectively favoured intergroup competition. 29.4 per cent of the LAs in Sec. 3(5) and 53.8 per cent of the LAs in Sec. 3(6) opted for self-rivalry. Only 1 LA (5.9 per cent) from Sec. 3(5) deviated from the norm and chose interpersonal competition. Taking the 3 classes together, it can be perceived that intergroup competition was most popular with the LAs (59.4 per cent), followed by self-rivalry (37.5 per cent).

Interpersonal competition was chosen by 57.2 per cent and 50 per cent of the HAs in Sec. 3(3) and Sec. 3(5) respectively. HAs in Sec. 3(6) were exceptional and preferred intergroup competition (58.4 per cent). Taking the 3 classes as a whole, HAs appeared to favour the more challenging form of competition — interpersonal competition (45.4 per cent). The other two goal structures attracted an equal number of supporters (27.3 per cent).

Table 6j Grading of Results

Marks	Grade	Category
75+	A1	
70 – 74	A2	HAs
65 – 69	B3	
60 – 64	B4	
55 – 59	C5	AAs
50 – 54	C6	
45 – 49	D7	
40 – 44	E8	LAs
39 and below	F9	

Table 6k Preference for the various goal structures among LAs and HAs

Category of Achievement	Goal Structure	Sec. 3(3) (working under interpersonal competition)		Sec. 3(5) (working under intergroup competition)		Sec. 3(6) (working under self-rivalry)		Total No of LAs in 3 classes	% of LAs in 3 classes
		No	%	No	%	No	%		
LAs	intergroup competition	2	100	11	64.7	6	46.2	19	59.4
	interpersonal competition	0	0	1	5.9	0	0	1	3.1
	self-rivalry	0	0	5	29.4	7	53.8	12	37.5
	Total	2	100	17	100.0	13	100.0	32	100.0
		No	%	No	%	No	%	Total No of HAs in 3 classes	% of HAs in 3 classes
HAs	intergroup competition	6	17.1	2	25.0	7	58.4	15	27.3
	interpersonal competition	20	57.2	4	50.0	1	8.3	25	45.4
	self-rivalry	9	25.7	2	25.0	4	33.3	15	27.3
	Total	35	100.0	8	100.0	12	100.0	55	100.0

In this project, each goal structure was investigated on its own. Conclusions can only be made on the effects of the goal structure on a particular class. No reasonable comparison can be made between the effects of different treatments because the 3 classes were not absolutely comparable in academic ability. Nevertheless, the 3 forms of rivalry appear to have motivating effects on the students concerned, leading to improved achievement. HAs showed a preference for interpersonal rivalry while LAs settled for group rivalry and self-rivalry, which are less anxiety arousing and threatening.

Conclusion

The studies cited above give concrete though limited evidence that Singapore students of different abilities can learn and improve under the patient guidance of caring teachers who persevere in enhancing the interest and motivation of their students.

Many factors govern a student's achievement in school and intelligence is only one of these variables. Motivation, teacher-pupil interaction, satisfaction of personality needs and positive concepts of abilities are non-intellectual variables which are considered by educationists nowadays to have considerable influence on productive learning. It is heartening to note that low achievers, who usually are not expected by their teachers to perform well, respond eagerly to incentives and show accelerated improvement. Weak students lack confidence and work better under a non-threatening social climate. This is evinced by their unequivocal preference for group rivalry and self-rivalry (Wong, 1978).

Positive incentives in the form of praise and favourable written comments work extremely well with students of different abilities (Koh, 1977; Tay, 1977). Adolescents are solicitous of the esteem of others and their needs are met by the attainment of approval.

Tests and grades are treated as accepted features of the classroom by many teachers, not realizing that the careful manipulation of these factors can stimulate uninterested students to become energetic learners (David, 1978; Foong, 1977).

The methods used by the above experimenters are by no means exhaustive and their results may not be applicable to all Singapore students. None the less, these studies can stimulate and interest other researchers. The persevering

effort of the teachers and the keen interest of students are crucial ingredients in attempting to accomplish classroom success. 🏃

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