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Every Child
Can Learn

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ASSOCIATION FOR SUPERVISION AND
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EVERY CHILD CAN LEARN

contents

THE MOTIVATION, SELF ESTEEM, STUDY HABITS & PROBLEMS OF NORMAL TECHNICAL STUDENTS

Agnes Chang Shook Cheong

INTRODUCTION

In 1997, the first cohort of the Normal Technical students will be sitting for their special 'N' Level examination. From a small pilot study of the first cohort at Secondary 1, the Normal Technical students were found to have positive self-esteem and above average achievement motivation.

After three years in the Normal Technical stream, are these students still highly positive about themselves? Do they have any problems with their studies? Are their teachers and parents supportive?

A survey was carried out in eight schools (four mission and four government schools) to find out the motivational level, self-esteem, study habits, problem and anxieties and perception of classroom environment of Secondary 1 and Secondary 2 Normal Technical students in 1995. Teachers teaching these students were also asked to comments on their classroom behaviour and their own attempts in motivating these students. Altogether, 481 Normal Technical students, 91 teachers and 7 principals participated in the survey. In addition, one enthusiastic school also provided data from a small group of 76 Normal Academic students for comparison.

COMPARISON BETWEEN SEC. 1 AND SEC. 2 STUDENTS

The Secondary 1 students had significantly higher self-esteem than Secondary 2 students. Similarly, Secondary 2 students were also doing better for academic achievement motivation. The decline in self-esteem and academic achievement motivation of the Secondary 2 students concurred with the observations made by four of the seven principals from the sample schools. The initial surge of pride in being secondary students may soon be undermined by the hard truth that they were not able to follow

the lessons (see Section on Problems and Anxieties). They probably realised too that it would be quite difficult for them to take the "O" and "A" Level examinations too.

The Secondary 2 students were slightly better in their study habits. But only the difference in concentration between the two levels is noticeable. The Secondary 2 students, being older, seemed to concentrate better as a whole. The differences between Secondary 1 and Secondary 2 students for retention, time-management, studying of text, listening in class and taking tests were negligible.

COMPARISON BETWEEN NORMAL TECHNICAL AND NORMAL ACADEMIC STUDENTS

There is a large discrepancy between the sample size of the Normal Technical and the Normal Academic students. This comes about because one of the sample schools decided to collect data on the Normal Academic students as well. Hence we have to treat the findings with caution.

The Normal Technical students actually had higher self-esteem than the Normal Academic students. For the Normal Technical students, getting into the Secondary school was a bonus and teachers had also been told to treat them kindly. On the hand, The Normal Academic students are expected to strive to get into N5 in order to sit for the "O" level examination together with the Express stream students. Hence the Normal Academic students are often compared unfavourably with the Express Stream students. This would in a way have affected their self-esteem.

Though the Normal Academic students had higher scores for academic achievement. the difference margin is not too wide.

The score differences in study habits between the two groups revealed the discrepancy in academic ability between the Technical and Academic streams. For every study habit surveyed, the Academic students had a better score and the differences between the two groups were significant.

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COMPARISON BETWEEN MALE AND FEMALE NORMAL STREAM STUDENTS

The female students were more motivated to achieve than the male students . While the female students were motivated to achieve, they did not have good study habits. The male students scored slightly better for all the surveyed study habits especially in concentration.

PROBLEMS AND ANXIETIES

School

From the responses of the subjects, the most outstanding problem encountered in school was their inability to understand lessons in school. As many as 56.8% of the respondents cited this problem. Some teachers actually commented that their students were not . able to relate to some of the topics taught. About a third of the respondents complained that there was too much work (35.6%), classmates/ schoolmates were unfriendly (35.6%) and they were bullied in class (36.2%). As many as 49.7% of the respondents found the school rules too strict for them. About 30% found school life boring and 25.9% did not like the many tests imposed on them. Nineteen percent found the teachers unsympathetic and 23.5% were discouraged by the many criticisms and lack of encouragement from teachers. Having conflicts with classmates/ schoolmates upset 20.5% of the respondent. About 17% were honest about their disinterest in learning.

Home

A third of the respondents found their home environment too noisy (33.2%). Like typical adolescents, relationship problems featured quite strongly with the Normal stream students. Thirty-one percent lamented that their parents were not understanding and 27.9% had problems with their siblings. In trying to establish their need for autonomy, 25% had conflicts with parents over friends and another 22% were upset with their parents for not allowing them to stay out late. Some parents were found to impose a strict schedule for homework (19%).

About 17% of the respondents were stressed by the unrealistic demands made by their parents. The unrealistic demand was borne out by the fact that 40% of the parents expected these Normal students to complete University of Polytechnic studies. In direct contrast, only 7.6% of the respondents expected to complete tertiary education. Most of them were realistic about their abilities and 34.4% expected to attend ITE courses. On the other hand, only 9.5 % of the parents wanted their children to take ITE courses. In Singapore, the strong emphasis and high value placed on academic qualifications are reflected by the wishes expressed by the respondents to complete "O" level (24.2%) and "A" (19.2%) certificates.

It is encouraging to note that 71.3% of the parents rewarded their children when they did well in examinations. Only 28.7% of the parents did nothing to encourage their children. When examination or test results were not up to expectation, 31.2% of parents helped their children to understand their shortcomings and another 9.5% engaged a tutor to help their children. About 43% did the usual scolding and beating routine. Only 13.8% were indifferent to their children's results.

Most of the respondents studied at home (58.9%) or in school (20.5%). Eighty-three percents of the parents ensured that their children get a quite place to study at home. About 83% of the students spent more than 2 hours a day watching television while 62.8% spent less than an hour a day on their studies. Teachers had commented that their lack of language competency has resulted in their learning difficulty. This can be explained by the fact that only 17.5% spoke English at home and 27% communicated with their friends in English. Mandarin and dialects were the dominant languages used. Many of them (37.7%) spoke Mandarin at home and with their friends (53.8%). Dialect were used by 21.7% at home with family members. Twenty-five percent admitted that they had problems in their studies because of their poor English. A third of the respondents could not concentrate (33.3%) and another 32.1% could not understand their lessons. Only 17.8% confessed that they were lazy and another 24.3% admitted that they were more interested in making money than their studies. Surprisingly, most of the respondents read at least a book a month. Only 15.7% read no books at all.

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CONCLUSION

The results indicated that there was a decline in self-esteem and achievement motivation as the Normal Technical students moved up the levels in secondary schools. What is more worrying is the poor study habits they had. The average mean score for each habit was below average. The older Secondary 2 students were slightly better in their study habits, especially for concentration.

The Technical students had better self-esteem than their Academic counterparts but the Academic students were more motivated to achieve. The better academic results of the Academic students could be accounted for by their study habits though the scores were still very low.

There was not much difference in the self-esteem between the genders. The female students had significantly better scores for achievement orientation but lower scores for the study habits. The male students showed significantly better concentration over the girls.

About 50% of the respondents complained that they could not follow the lessons in class. This is related to the lack of competency in the English Language. It is not a surprising finding as only a small percentage used English as their medium of communication with family members or peers. Mandarin and dialects ruled the day. Despite special caution to teachers about treating the Normal Technical students kindly, some students found their teachers unsympathetic and critical. But less than 17% of the respondents actually admitted that they were not interested in learning.

The nature of conflicts with parents was quite common and involved a struggle for more autonomy to run their own lives concerning friends and staying out late. The finding that was worrying was the unrealistic expectation of the parents – 40% of these parents wanted their Normal technical students to attain tertiary education. In contrast, the students were more realistic and aspired to do ITE courses. However, 24% of them still hoped to do the GCE "O" Level and another 18% the "A" Level. Despite their "high" aspiration for academic qualification, they were

spending more time in front of the TV than with their books. More than 55% of the respondents spent 1 hour or less on their homework/studies everyday.

From the findings, we can see that there are a number of urgent tasks for the teachers in school to consider and take action:

1. Teach the Normal students study skills.

2. Review the curriculum to ensure relevancy for these weaker students.

3. Try to be more patient and less critical with the Normal students.

4. Help them to improve their language competency.

5. Counsel students and parents on the possible career paths for these students.

6. Guide students in their study schedule in order for them to achieve their aspiration.

The study has yielded useful information which gives educationists a more realistic and revealing picture of the needs, problems and anxieties of the Normal Technical students.

Putting Learning Strategies to Work

Sharon J. Derry

By increasing students' repertoires of tactics for learning, we can prepare them to develop their own strategies for problem solving in the classroom and beyond.

Recent research in cognitive and educational psychology has led to substantial improvements in our knowledge about learning. Researches have identified certain mental processing techniques--learning strategies--that can be taught by teachers and used by students to improve the quality of school learning. Let me illustrate.

As a professor of educational and cognitive psychology, I often begin the semester with a simulation exercise designed to illustrate major principles about the role of learning strategies in classroom instruction. For example, recently I presented my students with the following scenario:

You are a high school student who has arrived at school 20 minutes early. You discover that your first-period teacher is planning to give a test covering Chapter 5. Unfortunately, you have prepared the wrong chapter, and there is no one around to help you out. Skipping class is not the solution, since this results in an automatic "F", and you would never dream of cheating. So you open you book and use the next 15 minutes as wisely as you can.

I gave my students 15 minutes to study. They then took a quiz with eight main idea questions and two application questions. At the end of the quiz, I asked them to write in detail exactly what they did when they studied Quizzes (without names) were collected and then distributed randomly to the class for scoring and for analyzing the study strategies reported in them.

> Learning is a form of problem solving that involves analyzing a learning task and devising a strategy appropriate for that particular situation

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Few people performed well on this test. A student who did wrote the following:

There wasn't enough time for details. So I looked at the chapter summary first. Then I skimmed through the chapter and tried to understand the topic paragraphs and the summary paragraphs for each section. I also noticed what the headings said, to get the organization, and I noticed certain names that went with each heading, figuring they did something related to each topic, a study or something. I started to do some memory work on the headings, but time was up before I finished.

By comparison, most students answered only two or three of the main idea questions, reporting a study strategy something like the following.

Panic. There was not enough time! I started going over the chapter and got as far as I could, but it was hopeless. I assume you do not plan to grade this quiz, because that would be unfair!

As illustrated in these two examples, the differences between successful and unsuccessful learning strategies often are clear and striking. Whereas the successful learners assessed the learning situation and calmly developed a workable plan for dealing with it, the less successful learners were occupied with fruitless worries and vague strategies but little planning effort.

Such an exercise serves to introduce the following important principles about self-directed learning:

1. The plan that one uses for accomplishing a learning goal is a person's learning strategy. Learning strategies may be simple or complex, specific or vague, intelligent or unwise. Obviously, some learning strategies work better than others.

2. Learning strategies require knowledge of specific learning skills, or "tactics" (e.g., Derry and Murphy 1986), such as skimming, attending to chapter structure, and memorization techniques. The ability to devise appropriate learning strategies also requires knowledge about when and when not to use particular types of learning tactics.

3. Learning is a form of problem solving that involves analyzing a learning task and devising a strategy appropriate for that particular situation. Different learning situations may call for different strategies.

Further, I asked my students to determine whether any reported learning strategy had produced useful knowledge. Alas, no participant had applied the knowledge acquired in the 15-minute study session to the two application questions on the quiz. Even when learning strategies are apparently successful according to one form of measurement, the resultant learning is not necessarily usable later in problem solving. Thus, we added a fourth principle to our list:

4. In most school learning situations, strategies should be devised with the aim of creating usable, rather than inert, knowledge. Clearly, not all learning strategies will lead to the formation of usable knowledge structures.

Next I will elaborate these principles in greater detail, suggesting how they can influence classroom practice.

Strategies as Learning Plans

There is much confusion about the term *learning strategy*. The term is used to refer to (1) specific learning tactics such as rehearsal, imaging, and outlining (e.g., Cook and Mayer 1983, Levin 1986); (2) more general types of self-management activities such as planning and comprehension monitoring (e.g., Pressley et al. in press a); and (3) complex plans that combine several specific techniques (e.g., Derry and Murphy 1986, Snowman and McCown 1984).

To clarify the uses of the term, I distinguish between the specific tactics and the learning strategies that combine them. Thus, a learning strategy is a complete plan one formulates for accomplishing a learning goal; and a learning tactic is any individual processing technique one uses in service of the plan (Derry and Murphy 1986, Snowman and McCown 1984). That is, a learning strategy is the application of one or more specific learning tactics to a learning problem. Within this definition, the plethora of learning techniques (popularly called "strategies" being promoted by various

researchers and practitioners can be viewed as potentially useful learning tactics that can be applied in various combinations to accomplish different learning jobs.

This definition points to the need for two distinct types of strategies instruction: specific tactics training and training in methods for selecting and combining tactics into workable learning plans. Teachers can incorporate both types of training into regular classroom instruction by thoughtfully combining different study tactics--outlining--and assigning them along with regular homework.

Learning Strategies Employ Specific Learning Tactics

In this section I discuss tactics in three major categories: (1) tactics for acquiring verbal knowledge, that is ideas and facts fundamental to disciplines such as science, literature, and history: (2) tactics for acquiring procedural skills such as reading, using language, and solving problems that underlie various curriculum disciplines; and (3) support tactics for self-motivation, which are applicable to all types of

learning situations. (For a more through treatment of these topics, see the reviews by Derry and Murphy 1986, Weinstein and Mayer 1985, Levin 1986, and Pressley et al. in press b.)

Verbal learning tactics

Strategies aimed at improving comprehension and retention of verbal information should build upon tactics that enhance these mental processes: (1) focusing attention on important ideas, (2) schema building, and (3) idea elaboration (see fig. 1).

Attentional focusing. Two types of attention-focusing tactics are simple focusing and structured focusing. In the simple focusing category, highlighting and underlining are common examples. Unfortunately, the use of simple focusing procedures does not necessarily ensure identification of important information. I have often confirmed this point by requesting to see the textbooks of students who are having academic problems. Frequently I find almost every word in their texts highlighted,

Students, weaker ones in particular, should be taught to

Category	Examples	Some Conditions of Use	Strengths or Weaknesses
Attentional Focusing			
Simple focusing	Highlighting. Underlining.	Structured, easy materials. Good readers.	No emphasis on importance or conceptual relations of ideas
Structured focusing	Looking for headings, topic sentences. Teacher-directed signaling.	Poor readers. Difficult but considerate materials.	Efficient, but may not promote active elaboration, deep thinking.
Schema Building	Use of story grammars, theory schemas. Networking.	Poor text structure. Goal is to encourage active comprehension.	Inefficient, but develops higher-order thinking skills.
Idea Elaboration	Some types of self-questioning. Imagery.	Goal is to comprehend and remember specific ideas.	Powerful, easy to combine. Difficult for some students unassisted. Will not ensure focus on what is important.

Fig. 1 Tactics for Learning Verbal Information

A learning strategy is a complete plan one formulates for accomplishing a learning goal; and a learning tactic is any individual processing technique one uses in service of the plan.

combine simple focusing with structured focusing whereby the learner directs primary attention to headings, topic sentences, or other signals provided by the instructional presentation. The teaching of structured focusing is a well-established practice in English classes, and it can profitably be reinforced in other courses to help students identify information they need to learn. However, the success of structure focusing depends heavily on well-structured, considerate instructional presentations (as well as on considerate teachers who test for the main ideas). And the use of these tactics does not ensure that the ideas identified will actually be remembered.

Schema building. A more powerful type of verbal-learning tactic is schema building, which encourages active analysis of an instructional presentation and formation of a synthesizing framework. One well-known form of schema building is networking (Dansereau 1985, Dansereau et al. 1979), whereby a student draws a node-link map representing the important ideas in a text and the interrelationships among the, This technique is powerful, but it is difficult to teach and time-consuming to apply (McKeachie 1984). Simpler forms of schema building include the use of teacher-suggested schemas, such as the well-known tactic of

requiring students to analyze stories in English literature by identifying the theme, setting, plot, resolution, and so on. Similar assignments can facilitate verbal learning in other courses of study. For example, Dansereau (1985) improved students' performance on science tests by teaching them to use a theory schema as a study aid for scientific text.

Schema building encourages in-depth analysis and is particularly useful if instruction is inconsiderate or unclear. Schema-building strategies are generally employed as comprehension aids; however, they also aid memory through the organization and elaboration of ideas.

Idea elaboration. Idea elaboration is a memory-enhancing process whereby students link each important new idea with prior knowledge so as to connect them. These linkages can be based on an image, a logical inference, or on anything else that serves to connect new ideas to prior knowledge (Gagne 1985).

Many elaboration tactics capitalize on imagery, a powerful memory-enhancing technique . For example, the key-word method for acquiring foreign vocabulary involves creating a mental image (prior knowledge) representing the sound of a foreign word (new information), and relating that image to another image (prior knowledge) representing the meaning of the word's English equivalent. Many types of elaboration tactics facilitate

Category	Examples	Some Conditions of Use	Strengths or Weaknesses
Pattern Learning			
Hypothesizing	Student reasons and guesses why particular pattern is or isn't example of concept.	Goal is to learn attributes of concepts and patterns.	Inefficient unless feed-back given. Encourages independent thinking.
Seeking reasons for actions	Student seeks explanations why particular actions are or are not appropriate.	Goal is to determine which procedure are required in which situations	Develops meta-cognitive knowledge. Inefficient if not guided. If too guided, might not promote thinking skills.
Reflective Self-Instruction	Student compares reification of own performance to expert model.	Goal is to tune, improve complex skill.	Develops understanding of quality performance. May increase self-consciousness, reduce automaticity.
Practice			
Part practice	Student drills on one specific aspect of performance.	A few specific aspects of a performance need attention.	Develops subskill automaticity. Doesn't encourgae subskill integration.
Whole practice	Student practices full performance without attention to subskills.	Goal is to maintain or improve skill already acquired or to integrate subskills	May consolidate poorly executed subskills. Helps develop smooth whole performance.

Fig. 2 Tactics for Learning Procedural Knowledge

Category	Examples	Some Conditions of Use	Strengths or Weaknesses
Behavioral Self-Management	Student breaks task into sub-goals, creates goal-	Complex, lengthy task; low motivated students.	Promotes extrinsic, rather than intrinsic, motivation.
Mood Management			
Positive self-talk	Student analyzes, avoids negative self-statements, creates positive self-statements.	Preparation for competitive or difficult performance; presence of negative ideas.	Good intrinsic motivator; requires conscious attention during performance.
Relaxation techniques	Student uses deep breathing, counting, other clinical relaxation methods.	Text anxiety; highly anxious students.	Techniques controversial in some districts.
Self-Monitoring	Student stops self during performance to consciously check mood, progress, etc.	Goal is to increase conscious awareness and control of thinking process.	May interrupt concentration.

Fig. 3. Tactics for Developing Motivation

memorization (e.g., Bransford and Stein 1984), and these can be employed to great advantage in many courses.

Procedural learning tactics

Most learning strategies research has examined tactics for acquiring verbal information. However, some strategy researchers are developing techniques for acquiring procedural skills. Procedural learning has three aspects (Anderson 1983, Gagne 1985): (1) learning how to carry out basic actions such as performing long division or executing a tennis lob; (2) learning to recognize the conceptual patterns that indicate when it is appropriate to perform particular actions (such as recognizing that a word problem is a division situation or that a tennis lob is required); and (3) learning to combine many pattern-action pairs into a smooth overall system of response. Consider, for example, the complex combining of subskills that underlies the actual playing of a tennis match.

Based on this view, Figure 2 presents three categories of mental tactics for procedural learning: (1) tactics for learning conceptual patterns that cue applicability of associated actions; (2) tactics for acquiring the component actions (performance subskills) themselves; and (3) tactics for perfecting and tuning complex overall performance.

Pattern-recognition tactics. Pattern recognition plays an important role in the development of procedural performance; however students are probably not aware of this. Thus, developing students' procedural learning abilities include both conveying the important function of pattern recognition and helping students develop tactics for acquiring performance-related patterns.

Examples of tactics in the patterns-acquisition category include hypothesizing and seeking reasons for actions. In applying these tactics, the

learner attempts to discover the identifying features of a pattern or concept through guesswork, reasoning, and investigation. For example, while watching a tennis pro at work, the student might hypothesize about the features of play that cause the pro to execute a lob or a groundstroke. Hypotheses are confirmed or altered through continued observation, until the pattern features are known. Alternatively, the student might seek reasons by consulting the tennis pro directly. Seeking information overcomes the major weakness of the hypothesizing tactic, inefficiency. However, the virtue of hypothesizing is that it can be used in situations where expert advice is not available.

Practice tactics. Other aspects of procedural learning include the acquisition of basic component actions (subskills) and, ultimately, the development of smooth complex performances that combine those subskills. There are learning tactics that can help students derive maximum benefit from their practice sessions. One example is part practice, whereby the student attempts to improve a complex performance by perfecting and automating an important subcomponent of that performance. For example, a student might greatly improve performance on mathematics tests by memorizing and practicing square-root tables. Or performance in tennis might be improved by concentrating practice on service and smashes. Part practice should be alternated with whole practice (Schneider 1985), whereby the student practices the full complex performance with little attention to individual subskills.

Reflective self-instruction. Another class of procedural learning tactics is reflective self-instruction, whereby the student attempts to improve personal performance by studying an expert model. For example, a student might videotape her tennis swing and compare that to a tape of an expert's swing. Or the student might critically compare her homework solution for a geometry proof to the teacher's expert solution presented on the board. Reflective self-instruction can concentrate either on specific component subskills or on whole complex performances. One key to successful self-instruction is the availability of adequate performance models. By providing models of expert performance and guiding students in how to benefit from those models while learning, teachers can provide training in the valuable technique of reflective self-instruction.

Mental support tactics

Acquiring useful knowledge in school is a lengthy and difficult process demanding a great investment of time and effort on the part of the student. Thus, tactics are needed for helping learners maintain a positive attitude and a high state of motivation during learning and practice. Researches (e.g., Dansereau et al. 1979, 1985; Meichenbaum 1980; McCombs 1981-82) recommend several types of support tactics: (1) behavioral self-management, (2) mood management, and (3) self-monitoring (see fig. 3)

The behavioral self-management category includes such tactics as breaking a complex learning chore into subgoals, developing a schedule for meeting subgoals, devising a reporting procedure for charting progress, and devising a self-reward system

for completing major subgoals. Mood management tactics include concentration and relaxation techniques (useful for combating test anxiety); and positive self-talk, used to establish and maintain a positive frame of mind before and during learning and performance (e.g., Meichenbaum 1980). Finally, an example of self-monitoring is the technique of stopping periodically during learning and practice to check and, if necessary, readjust strategy, concentration, and mood.

Frequently used by professional athletes, mental support tactics can also be used by students to increase academic performance and motivation and to decrease tension associated with evaluation. They are applicable to all types of learning situations and can be combined with both verbal and procedural learning tactics in study assignments. For example, to study for a history test, a student might devise a learning strategy that orchestrates several specific tactics, such as positive self-talk with self-checking (to maintain motivation), networking (to help organize facts in a meaningful way), and

use of imagery or mnemonics (to help with memorization).

Strategy-Building as Problem Solving

The ultimate aim of tactics training is to provide students with tools that will enable them, as autonomous learners, to devise their own strategies. Unfortunately, a persistent problem in strategy training has been students' failure to apply tactics in situations outside the class in which they were learned originally.

However, several training techniques can alleviate these problems. A large number of researchers (e.g., Baron 1981, Bransford and Stein 1984) suggest teaching students to respond to all learning tasks using a general problem-solving model. For example, Derry, Jacobs, and Murphy (1987) taught soldiers to use the '4C's" to develop plans for study reading. The 4C's stood for: clarify learning situation, construct a learning strategy, carry out the strategy, and check results.

One presumed advantage of such plans is that they remind students to stop and think reflectively about each learning

Verbal information is likely to be called into service only if it is understood when learned and only if it is stored in memory within well-structured, well-elaborated networks of meaningfully related ideas.

Two distinct types of strategies instruction are needed: specific tactics training and training in methods for selecting and combining tactics into workable learning plans.

situation prior to proceeding with the task (Baron 1981). Also, such plans may serve as mnemonic device that help students recall previously learned tactics associated with each steps. There is some empirical support for the idea that problem-solving models enhance tactics transfer (Belmont) et al. 1982).

Another procedure for inducing tactics transfer is informed training (Campione et al. 1982, Pressley et al. 1984). This procedure enhances direct tactics instruction with explicit information regarding the effectiveness of various tactics, including how and when they should be used. As Levin (1986) points out, there are different learning tools for different learning jobs. With informed training, students learn that tactics selection is always influenced by the nature of the instructional material as well as the nature of the learning goal. For example, if a text is not highly structured and the primary aim of study is to comprehend and remember important ideas, a strategy that combines networking with idea elaboration would be appropriate. However, if the aim is primarily comprehension

rather than retention, a schema-building technique alone would suffice. Informed training is superior to "blind training" in producing transfer and sustained use of specific learning tactics (Pressley et al. 1984, Campione et al. 1982).

Previously I suggested that teachers can help develop students' learning skills by devising, assigning, and explaining learning strategies and by providing feedback on strategy use.

Such established classroom practices are excellent vehicles for informed training.

Learning Strategies Should Produce Useful Knowledge

Cognitive psychology has taught us much about the nature and structure of usable knowledge. Verbal information is likely to be called into service only if it is understood when learned and only if it is stored in memory within well-structured, well-elaborated networks of meaningfully related ideas. Procedural skills, on the other hand, are likely to be accessed and accurately executed only if they have been developed through extensive practice and only if

the environmental patterns that indicate their applicability are well learned. If the primary aim of schooling is the creation of useful knowledge, then strategy application should result in the deliberate creation of a well-structured knowledge base, whether verbal, procedural, or both.

It is unlikely that reliance on any single learning tactic alone will ensure the creation of well-constructed knowledge. Rather, multiple tactics are elaboration technique is applied for the purpose of enhancing individual ideas, another schema-building tactic may be needed to tie related ideas together. Or if practice is used to prefect a specific aspect of procedural performance, a pattern learning tactic may still be needed to ensure that the skill is executed only when appropriate. Thus, useful knowledge is most likely to evolve through a dynamic process requiring, first, an informed analysis of each learning problem, then selection and combining of all the learning tactics needed to produce a well-formed mental structure.

Not every learning strategy produces useful knowledge. Some strategies lead to isolated, unstructured bits of learning that will remain forever inert. For this reason, both teachers and students should be aware of the nature and form of useful knowledge and of learning strategies that are likely to facilitate its creation.

Strategy Training for Lifelong Learning

Students who receive good strategy training during their years in school can acquire a form of knowledge especially useful in coping with the wide variety of learning situations they will encounter throughout their lives. Given the amount of time that people spend in school, in job-related training, and in acquiring knowledge associated with their interests and hobbies, the ability to find good solutions to learning problems may be the most important thinking skill of all.

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What Does It Mean to Be Smart?

By Robert J. Sternberg

A Yale study, based on the premise that intelligence has analytical, creative, and practical aspects, shows that if schools start valuing all three, they may find that thousands of kids are smarter than they think.

The most widely circulated newspaper in Connecticut recently carried a story on the meteoric rise of the president of one of the major banks in the state. I might have passed over the story with a glance had the name of the bank president not caught my eye. He was someone with whom I had gone to school from 1st grade right up through high school. What especially caught my attention, though, was that he had been a C student—someone who didn't seem to have much to offer.

Were the bank president an isolated case it might not be cause for alarm. But one cannot help wondering how many such students conclude that they really do not have much to contribute—in school or in the world at large—and so never try.

The Cost of a Closed System

Our system of education is, to a large degree, a closed system. Students are tested and classified in terms of two kinds of abilities—their ability to memorize information and, to a lesser extent, their ability to analyze it. They are also taught and assessed in ways that emphasize memory and analysis. As a result, we label students who excel in these patterns of ability as smart or able. We may label students who are weaker in these abilities as average or even slow or stupid.

Students may, however, excel in other abilities that are at least

> **Students may, however, excel in other abilities that are at least as important as those we now reward.**

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as important as those we now reward. Creativity and the practical application of information—ordinary common sense or "street smarts"—are two such abilities that go unappreciated and unrecognized. They are simply not considered relevant to conventional education.

The ability tests we currently use, whether to measure intelligence or achievement or to determine college admissions, also value memory and analytical abilities. These tests predict school performance reasonably well. They do so because they emphasize the same abilities that are emphasized in the classroom.

Thus, students who excel in memory and analytical abilities get good grades. Practically oriented learners, however, who are better able to learn a set of facts if they can see its relevance to their own lives, lose out. (Indeed, many teachers and administrators are themselves practical learners who simply tune out lectures or workshops they consider irrelevant to them.)

The consequences of this system are potentially devastating. Through grades and test scores, we may be rewarding only a fraction of the students who should be rewarded. Worse, we may be inadvertently disenfranchising multitudes of students from learning. In fact, when researchers have examined the lives of enormously influential people, whether in creative domains (Gardner 1993), practical domains (Gardner 1995), or both, they have found that many of these people had been ordinary—or even mediocre—students.

Teaching in All Four Ways

At any grade level and in any subject, we can teach and assess in a way that enables students to use all four abilities (Sternberg 1994, Sternberg and Spear-Swerling 1996. See also Sternberg and Williams 1996, Williams et al. 1996). In other words, we can ask students to

- Recall who did something, what was done, when it was done, where it was done, or how it was done;

- Analyze, compare, evaluate, judge, or assess;

- Create, invent, imagine, suppose, or design; and

- Use, put into practice, implement, or show use.

In physical education, for example, competitors need to learn and remember various strategies for playing games, analyze their opponents' strategies, create their own strategies, and implement those strategies on the playing field. Figure 1 presents some examples of how teachers can do this in language arts, mathematics, social studies, and science.

When we use this framework, relatively few activities will end up requiring only one of these four abilities. On the contrary, most activities will be a mixture, as are the tasks we confront in everyday life. Notice that in this framework, instruction and assessment are closely related. Almost any activity that is used for the one can be used for the other.

FIGURE 1 : Teaching for Four Abilities
Type of Skill

Memory	Analysis	Creativity	Practicality
Language Arts Remember what a gerund is or what the name of Tom Sawyer's aunt was.	Compare the function of a gerund to that of a principle, or compare the personality of Tom Sawyer to that of Huckleberry Finn.	Invent a sentence that effectively uses a gerund, or write a very short story with Tom Sawyer as a character.	Find gerunds in a newspaper or magazine article and describe how they are used, or say what general lesson about persuasion can be learned from Tom Sawyer's way of persuading his friends to whitewash Aunt Polly's fence.
Mathematics Remember a mathematical formula (Distance = Rate x Time).	Solve a mathematical word problem (using the D=RT formula).	Create your own mathematical word problem using the D=RT formula.	Show how to use the D=RT formula to estimate driving time from one city to another near you.
Social Studies Remember a list of factors that led up to the US CivilWar.	Compare, contrast, and evaluate the arguments of those who supported slavery versus those who opposed it.	Write a page of a journal from the viewpoint of a soldier fighting for one or the other side during the Civil War.	Discuss the applicability of lessons of the Civil War for countries today that have strong internal divisions, such as the former Yugoslavia.
Science Name the main types of bacteria	Analyse the means the immune system uses to fight bacterial infections.	Suggest ways to cope with the increasing immunity bacteria are showing to anti biotic drugs.	Suggest three steps that individuals might take to reduce the likelihood of bacterial infection.

In addition, no type of activity should be limited to students whose strength is in that area. On the contrary, we should teach all students in all four ways. In that way, each student will find at least some aspects of the instruction and assessment to be compatible with his or her preferred way of learning and other aspects to be challenging, if perhaps somewhat uncomfortable.

Teaching in all four ways also makes the teacher's job easier and more manageable. No teacher can individualize instruction and assessment for each student in a large class, but any teacher can teach in a way that meets all students' needs.

Does This Work in Practice?

In the summer of 1993, we conducted a study of high school students to test our hypothesis that students learn and perform better when they are taught in a way that at least partially matches their own strengths (Sternberg 1996; Sternberg and Clinkenbeard 1995; Sternberg et al. 1996). Known as the Yale Summer Psychology Program, the study involved 199 students from high schools across the United States and some from abroad.

Each school had nominated students for the program. Interested nominees then took a test designed to measure their analytical, creative, and practical abilities. The test included multiple-choice verbal, quantitative, and figural items, as well as analytical, creative, and practical essay items (Sternberg 1993). A sample of the items appears in Figure 2.

We then selected the students who fit into one of five ability patterns: high analytical, high creative, high practical, high balanced (high in all three abilities), or low balanced (low in all three abilities). We based these judgments on both the individual student's patterns and the way these patterns compared to those of the other students.

We then placed each student into one of four differentiated instructional treatments. All included a morning lecture that balanced memory, analysis, creativity, and practical learning and thinking. All students used the same introductory psychology text

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(Sternberg 1995), which was also balanced among the four types of learning and thinking. The treatments differed, however, in the afternoon discussion sections. There, we assigned students to a section that emphasized either memory, analysis, creativity, or practical learning and thinking.

The critical feature of this design was that, based on their ability patterns, some students were matched and others mismatched to the instructional emphasis of their section. Another important feature was that all students received at least some instruction emphasizing each type of ability.

We assessed student achievement through homework assignments, tests, and an independent project. We assessed memory specifically through multiple-choice tests, and we evaluated analytical, creative, and practical abilities through essays. For the essays, we asked students questions such as "Discuss the advantages and disadvantages of having armed guards at school" (analysis); "Describe what your ideal school would be like" (creativity); and "Describe some problem you have been facing in your life and then give a practical solution" (practical use).

FIGURE 2 : Sample Multiple-Choice Questions from the Sternberg Triarchic Abilities Test

Analytical **Verbal**	The vip was green, so I started to cross the street. Vip most likely means : A. car B. sign C. light D. tree
Creative **Quantitative**	There is a new mathematical operation called graf. It is defined as follows : x graf $y = x + y$, if $x<y$ but x graf $y = x - y$, if otherwise. How much is 4 graf 7? A. -3 B. 3 C. 11 D. -11
Practical **Figural** **(Students are Shown a map)**	After attending a performance at the theatre, you need to drive to House A. If you want to avoid the traffic jam at the intersection of Spruce Avenue and Willow Street and take the shortest alternative route, you will drive A. west on Maple Avenue to Route 326. B. west on Pine Street to Hickory Street. C. east on Maple Avenue to Oak Street. D. east on Pine Street to Oak Street.

Because we assessed all students in exactly the same way, we could more easily compare the groups' performance. Had we used the more conventional forms of instruction and assessment, emphasizing memory and analysis, the creative and practical ability tests would probably not have told us much.

Some Surprises

The study yielded many findings, but four stand out:

1. Students whose instruction matched their pattern of abilities performed significantly better than the others. Even by partially matching instruction to abilities, we could improve student achievement.

2. By measuring creative and practical abilities, we significantly improved our ability to predict course performance.

3. To our surprise, our four high-ability groups differed in their racial, ethnic, and socioeconomic composition. The high-analytic group was composed mostly of white, middle- to upper-middle-class students from well-known "good" schools. The high-creative and high-practical groups were much more diverse racially, ethnically, socioeconomically, and educationally. Our high-balanced group was in between. This pattern suggests that when we expand the range of abilities we test for, we also expand the range of students we identify as smart.

4. When we did a statistical analysis of the ability factors underlying performance on our ability test, we found no single general factor (sometimes called a g factor score or an IQ). This suggests that the general ability factor that has been found to underlie many conventional ability tests may not be truly general, but general only in the narrow range of abilities that conventional tests assess.

A Clear-Eyed Sense of Accomplishment

By exposing students to instruction emphasizing each type of ability, we enable them to capitalize on their strengths while

developing and improving new skills. This approach is also important because students need to learn that the world cannot always provide them with activities that suit their preferences. At the same time, if students are never presented with activities that suit them, they will never experience a sense of success and accomplishment. As a result, they may tune out and never achieve their full potential.

On a personal note, I was primarily a creative learner in classes that were largely oriented toward memorizing information. When in college, I took an introductory psychology course that was so oriented; I got a C, leading my instructor to suggest that I might want to consider another career path. What's more, that instructor was a psychologist who specialized in learning and memory! I might add that never once in my career have I had to memorize a book or lecture. But I have continually needed to think analytically, creatively, and practically in my teaching, writing, and research.

Success in today's job market often requires creativity, flexibility, and a readiness to see things in new ways. Furthermore, students who graduate with A's but who cannot apply what they have learned may find themselves failing on the job.

Creativity, in particular, has become even more important over time, just as other abilities have become less valuable. For example, with the advent of computers and calculators, both penmanship and arithmetic skills have diminished in importance. Some standardized ability tests, such as the SAT, even allow students to use calculators. With the increasing availability of massive, rapid data-retrieval systems, the ability to memorize information will become even less important.

This is not to say that memory and analytical abilities are not important. Students need to learn and remember the core content of the curriculum, and they need to be able to analyze—to think critically about—the material. But the importance of these abilities should not be allowed to obfuscate what else is important.

In a pluralistic society, we cannot afford to have a monolithic

conception of intelligence and schooling; it's simply a waste of talent. And, as I unexpectedly found in my study, it's no random waste. The more we teach and assess students based on a broader set of abilities, the more racially, ethnically, and socioeconomically diverse our achievers will be. We can easily change our closed system—and we should. We must take a more balanced approach to education to reach all of our students. *

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Singapore teachers and their knowledge of teaching learning and thinking

Professor Agnes Chang Shook Cheong
Dr Ang Wai Hoong

Introduction

Educators abroad are often impressed by our teachers' knowledge in the up-to-date research findings on teaching and learning. Many of us had opportunities to share the multi-media teaching materials used by our Singapore teachers at overseas conferences and visits. The presentation of our secondary science teaching materials at the annual ASCD Conference held in Baltimore early this year aroused a lot of interest. Educators were impressed by the variety of teaching strategies used by our teachers. International reports on our science and mathematics teaching materials have been good. The discussion on our history teaching materials were very well received at the Ninth Asian Workshop on Child and Adolescent Development Conference held recently in Brunei. The Straits Times on November 9, 1997 reported on the visit of the Singapore Minister of Education in California. Among some of things discussed on mathematics teaching with the California's city's State Board of Education, the Singapore Minister of Education said "They had very nice things to say about our textbooks. They requested a complete set , which will be sent to them."

In Singapore, each teacher prepares his/her own lessons based on a syllabus provided by the Ministry of Education. Each prepares her/his teaching materials from a variety of sources. These materials cater best to individual teacher's own students' specific needs and most suitable to individual teacher's own teaching style. From the available books in the market, the teacher

chooses a most appropriate one and adopts it as a textbook for his/her students.

Teaching materials used by our Singapore teachers reflect that they integrate many models/programmes in their lessons and are selective in using effective teaching strategies. Some of the models/programmes used by our teachers are:

a. Bloom's Taxonomy: Cognitive Domain
b. Cooperative Learning (Johnson and Johnson)
c. CoRT (de Bono)
d. 4MAT (Mc Carthy)
e. Mastery Teaching (Hunter)
f. Tactics for Thinking (Marzano and Arredondo)
g. Brain Researched-Based Practices (Pat Wolfe)
h. Teaching with Dimensions of Learning (Marzano)

In history, the most commonly adopted textbook by teachers is produced by the Curriculum Institute of Singapore. This paper examines some of the lessons used by the teachers based on the history instructional materials produced in 1994 by the Curriculum Institute of Singapore. It is intended to show with relevant examples how the various models/programmes are integrated into lessons and how various strategies are used by teachers.

The Lessons

Lessons on each topic consists of several sections:
(Note: The letter in bracket refers to the instructional model and programme as listed above.)

Warm Up

This section aims to help students realise the value of learning a topic as well as to arouse their interest in the topic(e). This is often done by providing a concrete experience or by linking content to be learned to students' experience(d). Opportunities are often provided for students to construct meaning on what they are going to learn (h).

Examples.

1. Trigger activity.

*History of Modern Singapore Sec 1 Chapter 1 History and Us.
Teacher's Guide p2.*

Pupils are asked to think of events they can remember. This activity introduces the concept of timeline. Linking pupils knowledge/experience to the content to be learned.

2. Linking pupils knowledge/experience to content to be learned.

History of Modern Singapore Sec 1 Chapter 7 Trade and Growth of the Port. Teacher's Guide p50.

Pupils in small groups are to answer the following questions:

"What are some of the goods Singapore sell to foreign countries?
What are some of the goods Singapore buys from foreign countries?

What will happen to Singapore if foreign countries refuse to buy and sell goods to Singapore?"

The above examples link pupils' knowledge to the new knowledge to be acquired by the pupils. This makes the new knowledge meaningful.

Teach Content

This section helps students to acquire new information and understand concepts. They learn to organise and store knowledge (h,g). There is a need to make use of strategies to get students involved in the learning and not merely receiving information. Audiovisual materials are used to explain ideas and concepts. Laser discs incorporating stills, pictures and motion pictures are convenient to use.

Examples: Cooperative learning strategies (b), content that involve students making use of a variety of senses (games, songs, raps, etc.) (g) (d); deep processing (f), concept attainment and development strategies (f), etc. Students also learn SQ3R study skill.

1. Cooperative learning strategies

a. Reciprocal Teaching

History of Modern Singapore Sec 1. Teacher's Guide p13
Each pupil in groups of three examines one piece of evidence in the text on early Singapore. After understanding the text, each in turn has to teach the others in the group and together they carry out an exercise.

2. Deep Processing

History of Modern Singapore Sec 1. Teacher's Guide p16
Making use of various senses so as to remember better. Pupils learn to link mental pictures, emotions and physical sensations with what they

a. read. Pupils are asked to close their eyes and imagine to be Temenggong meeting Raffles for the fist time.

b. Poetry is also useful to depict emotion an feeling of a situation.
History of Modern Singapore Sec 1 p165.

A verse by Michiko Ogina describing the time the atomic bomb fell on Nagasaki.

3. Mnemonics

History of Modern Singapore Sec 1. Teacher's Guide p 15.
Mnemonics in the form of a word, phrase, rhyme, etc help pupils to remember a set of linked ideas.

Summarising Content

This part involves pupils to process large chunks of information and organise them into main ideas. In this way they can see the whole picture. Mind mapping, graphic and pictorial representations of information (h). system for storing information (mnemonics, rhyming pegword, number picture (f, g) are used. Subsequently they can elaborate and rehearse what they have learned so that this information can be stored in the long term memory. Discussion with peers, oral presentation or written practices are useful forms of rehearsal.

Examples:

1. Mind Mapping

History of Modern Singapore Sec 2 (Express). Activity Book p82.

2. This a skill to enable pupils to pick out main points in the text and show how they are related and then put it into a graphic form so as to remember better.

3. Pictorial representation.

History of Modern Singapore Sec 1 (Express). Activity Book p34. Pupils carrying out this activity learn the basic steps of diagramming a summary.

Build Skills

This section helps students refine their knowledge (h) and to integrate application and experience (d). They are provided with activities to use knowledge meaningfully. Students carry out critical and creative thinking activities (a, h). It is crucial that students should not be put down when carrying out these activities. They must be encouraged to say what they think. (Dignifying Errors, (e) is a teaching strategy which teacher can adopt.)

Examples: Comparing (h), Classifying(h), Decision Making(h), Plus Minus and Interesting (c), Consider All Factors (c), etc.

1. Compare and Contrast

History of Modern Singapore Sec 1 Teacher's Guide p 32

Compare the present population situation in Singapore to that in the 19^h century.

Compare the reasons and means for increasing the population between these periods.

2. Discerning Fact from a statement of Opinion (f).

History of Modern Singapore Sec 1 (Express) p86. Appendix 7. Pupils are to look out for words and phrases which are used to influence the readers. Pupils must check the facts. Pupils to look out words the modify meaning such as 'ought to , must, in my opinion' and adjectives and adverbs. These are indications of opinions.

3. Analysing Perspectives (h)

History of Modern Singapore Sec 1 (Express). Activity Book p104.
Pupils are given source materials which hold contrasting opinions. They are to examine different perspectives, analyse and evaluate these materials and link them to what they have learnt in the textbooks. They then have to take a stand on an issue and give reasons to support the stand.

4. CoRT Tools (PMI) (e)

History of Modern Singapore Sec 1. Teacher's Guide p119.
Pupils work on the 'Thinking of Merger'. In a brainstorming session they are encourage to think of the possible Plus points, the possible Minus points and the Interesting points. After this exercise, they have to compare these points they have raised with the economic and political reasons for joining Malaya.

5. Problem Solving (h)

History of Modern Singapore Sec 1. Teacher's Guide p127.
Pupils are to identify the problems related to the various aspects of building a nation, discuss the steps to solve the problem and the outcomes of action taken.

6. Decision Making (h)

The Ancient History of India, Southeast Asia and China Sec 2. (Express) Activity Book p35

Pupils are led through a process to decide whether the imperial examination in China should be open to all scholars. The process consists of :

1. Consider all the factors
2. Be clear about the objectives or main aims.
3. Think of all the possible effects (good and bad).
4. Make a decision and state why such a decision is made.

Follow Up

This section allows pupils to read beyond the text and do projects independently and creatively.

1. Project work

History of Modern Singapore Secondary 1. Teacher's Guide p10.

Stonehenge

The Rosetta Stone

Ancient City of Troy.

2. To make field trip to the Singapore River and report findings
of evidence of trade.

History of Modern Singapore Secondary 1. Teacher's Guide p53

Students have a chance to gain first hand experience and to
integrate knowledge with application. They have an opportunity
to show their initiative in discovering new ideas and reporting
them creatively.

Comments

The examples cited above are confined to history. Actually in
examining lessons used by teachers in other subjects are equally
enlightening. Teachers in Singapore are fortunate to have many
opportunities to continue learning. Workshops , conferences and
seminars are conducted by many agencies besides the Ministry
of Education and the National Institute of Education. Knowledge
in teaching and learning are growing in leaps and bounds. There
are many innovative ways which teachers are using to keep up-
to-date. With their increasing knowledge, their lessons will be
even more interesting and effective.

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Editor's Note: Many teachers have attended workshops conducted by ASCD (Singapore).ASCD has brought in many prominent educators. To name a few: the Johnson brothers, Bernice Mc Carthy, Madeline Hunter, Pat Wolfe and Marzano.

A BAKER'S DOZEN : EFFECTIVE INSTRUCTIONAL STRATEGIES

The instructional strategies outlined here reflect a baker's dozen of the most exciting and determined efforts to change the way America educates its citizens. These "ideas at work" range in complexity and magnitude. They represent concepts that cuts across content areas. None of them is totally new to education. Rather, they are presented as generic. All are adaptable.

Why ideas at work rather than ideas that work? Because nothing works everytime, everywhere, for everyone. No single strategy, approach or technique works with all students. Rather, these are ideas that encourage newer perspectives on ways of bringing about increased student learning.

The Baker's Dozen of Effective Instructional Strategies are summarized thus:

1. **First, provide opportunities to work together** - students learn to work in a variety of flexible social configurations & setting - in co-operative learning groups, in pairs and alone - thus developing proficiencies, skills and knowledge while at the same time accommodating individual differences in strengths, backgrounds and interests.

Teachers must be aware that children as learners can differ in critical ways. For example, there are those who learn best working

these are ideas that encourage newer perspectives on ways of bringing about increased student learning.

alone while others are strongly oriented to working with a peer. Still others learn best with adults or authority figures. In planning the use of various teaching strategies, teachers must be prepared to make adjustments according to the needs and learning styles of their students.

David and Roger Johnson (1990) have noted that people in general do not know instinctively how to interact effectively with others. So if cooperative efforts in the classroom are to succeed, students must first learn to know and trust one another, communicate accurately and unambiguously, accept and support one another, and resolve conflicts constructively.

Other advocates of collaborative learning have suggested that students should be periodically regrouped to enhance small-group participation in various contexts for various purposes. Such teaming not only encourages self-esteem but also engenders general appreciation of how individuals differ from each other in attitudes, abilities, points of view, and approaches to problem-solving.

Futhermore, where there is one-to-one peer tutoring, there is immediate feedback, clarification, extension and modification - usually in a non threatening social relationship.

2. **Use reality-based learning approaches** - teachers provide students with real purpose and real audiences for reading, writing, speaking and presenting mathematical and scientific hypotheses or calculations. When students write and speak to intended purposes and audiences, they are more likely to be motivated and to obtain valuable feedback on their efforts.

Schema theory firmly undergirds the strategy of reality-based learning. It outlines the belief that individual facts and phenomena are the larger contexts of structure or process.

3. **Encourage interdisciplinary teaching** - thematic, interdisciplinary teaching helps students connect what they learn from one subject to another, to discover relationships, and to see in every pebble a universe.

Even a well-executed shopping trip to the supermarket is an interdisciplinary experience! Scheduling, timing, planning, measuring, counting, reading, identifying, describing, comparing, assessing, affording, budgeting - not to mention spatial orientation, nutrition, and considerations of quality of life - all come into play within a single trip. Consciously or unconsciously, by the time we have negotiated our way from home through traffic to parking lot, then aisle to aisle to the checkout lane and home again, we have routinely called on the skills and content of every basic academic discipline school has to offer.

Six Options in Curriculum Design

• **Discipline-Based** : The traditional approach, with subject taught in separate, discrete time blocks.

• **Parallel Disciplines** : Teachers from two or more related subject areas teaching related material simultaneously.

• **Multidisciplinary** : Two or three subject areas are combined in a single course or unit that focuses on a theme, issue, problem, topic or concept.

• **Interdisciplinary** : Combines all subject areas to focus the full array of disciplines on a theme, issue, problem, topic, or concept.

• **Integrated Day** : Begins with a question, problem, or issue that students want to address, then leads to learning from various disciplines.

• **Field-Based** : Students go outside the school to see how real-world tasks combine skills and knowledge from various subject areas.

Source: These six options are based on the work of Heidi Hayes Jacobs (1991)

Interdisciplinary projects promote thinking strategies that cross content areas and transfer solidly into real-life application - analytical observation, for instance, or critical thinking,

comparison and contrast, evaluation, perspective, and judgement. The teacher's role includes supporting those processes and helping students, through practice, to become aware of them and comfortable in using them.

4. **Involve students actively** - teachers give students ample opportunities to experiment actively and directly with oral and printed language, to write and apply mathematics to the experiences of daily life. There are several other reasons why students should be allowed to construct their own understandings, generate their own analyses, and create their own solutions to problems:

• It is neither engaging nor authentic to understand a fact or situation exactly as someone else understands it. In real life, we build our own understandings to supplement, change, or confirm for ourselves what we already think we know or what others offer us in knowledge or ideas.

• Teachers promote interest and engagement when they let students address problems for which answers do not exist or are not readily apparent. Students then have real purposes for discovering and applying information and for using all the strategies that might possibly apply and that are available to them.

• Students who are intrinsically motivated and substantially engaged because of interest in meaningful learning activities are more likely to achieve high levels of performance than those for whom the completion of learning activities is simply a means of avoiding punishment.

5. **Analyse students' learning/reading styles** - teachers consider students' individual learning preference in designing and recommending complementary instructional methods and materials.

David Kolb (Boyatzis and Kolb 1991) identifies four predominant learning styles. Imaginative learners, he says, excel in watching, sensing, and feeling; analytic learners, in watching and thinking; common-sense learners, in thinking and doing; and dynamic learners, in doing, sensing, and feeling.

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Anthony Gregorc (1982, 1985) identifies four basic processes by which individuals differ in their learning patterns: (1) a concrete-sequential process characterized as structured, practical, predictable, and thorough; (2) an abstract-sequential process - logical, analytical, conceptual, and studious; (3) an abstract-random process - sensitive, sociable, imaginative, and expressive; and (4) a concrete-random process - intuitive, original, investigative, and able to solve problems.

Howard Gardner (1983) suggest at least seven different aspects (what he calls "multiple intelligences") by which individuals can come to know the world : linguistic, logical / mathematical, musical, spatial, bodily / kinesthetic, interpersonal, and intrapersonal.

Whatever the ultimate taxonomy of learning styles, it seems obvious that while all children can learn, each concentrates, processes, absorbs, and remembers new and difficult information differently.

According to Rita and Kenneth Dunn (1988), the factors involved include:

• immediate environment - for example, noise level, temperature, amount of light, furniture type, and room design;

• emotional profile - for example, degree of motivation, persistence, esponsibility, and need for structure and feedback;

• sociological needs - for example, learning alone or with peers, learning with adults present, learning in groups;

• physical characteristics - for example, perceptual strengths (auditory, visual, tactile, kinesthetic), best time of day for learning, potential need for periodic nourishment and mobility; and

• psychological inclination - for example, global and analytic strengths.

Thus, instruction that attends to learning or reading styles capitalizes on an individual student's strengths and preferences while simultaneously removing barriers to learning.

6. **Actively model behaviours** - teachers model behaviours they would have their students assimilate and practice. Modeling enables teachers to furnish appropriate cues and reminders that help students apply particular problem-solving processes or complete specific tasks - in storytelling, for instance, or inquiry, or evaluation. Among such techniques, scaffolding is one of the most generic and useful approaches. Scaffolding is a device by which the teacher builds on the point of reference at which a student hesitates or leaves off - in telling a story, in explaining a process, in seeking an answer, in any moment of discourse, analysis, or explanation. In scaffolding, the teacher simply suggests the nest step, both reinforcing what the student has already achieved and guiding the student to greater understanding or accomplishment.

More generally, Costa and Marzano (1987) identify seven starting points by which teachers can create a classroom "language of cognition":

- using precise vocabulary;
- posing critical and interpretive questions, rather than simply recall;
- providing data, not solutions;
- giving directions;
- probing for specificity;
- modeling metacognitive processes; and
- analyzing the logic of language.

Robert Burroughs (1993) outlines specific preferred techniques among those he has seen teachers use to guide learning processes and thus structure growth in understanding and appreciation. The techniques are adaptable to discourse, inquiry, or discussion in any subject area:

- Focusing - refocusing students' efforts at refining their own responses if, for instance, they begin wandering from the specific content at hand.

- Modifying or shaping - rephrasing a student's idea in slightly different language; for instance, if a student suggests that a character in a novel is resisting change, the teacher might add a word or two to encourage consideration of other explanations

Modeling enables teachers to furnish appropriate cues and reminders that help students apply particular problem-solving processes or complete specific tasks

for the character's behaviour.

• Hinting - calling attention to passage in the text that challenges a student's view.

• Summarizing - restating ideas to bring them to everyone's attention and to spur discussion, or summarizing various positions students have taken along the way (Burroughs 1993, pp. 27-29).

7. **Explore the fullest dimensions of thought** - teachers provide all students with meaningful opportunities to develop and apply the fullest dimensions of thinking, helping them become critical thinkers and creative problem solvers while engaging them in their own learning.

"Thinking cannot be divorced from content," writes Carr (1988) "In fact, thinking is a way of learning content. In every course, and especially in content subjects, students should be taught to think logically, analyze and compare, question and evaluate. Skills taught in isolation do little more than prepare students for tests of isolated skills."

8. **Use a multicultural teaching approach** - teachers recognise and explore multicultural perspectives in all areas of the curriculum, emphasising through example and instruction the strength and value of a unified society forged from cultural diversity.

Teaching muliculturally cultivates a school culture that celebrate diversity, support mutual acceptance of, respect for, and understanding of all human differences; and provides a balanced view point on key issues involved in such teaching. It provides students with a global, international perspective on the world in which they live. It seeks to eliminate racial, ethnic, cultural and gender stereotypes and to resolve or ameliorate problems associated with racism and prejudice. It underscores the importance of teaching ethics, values and citizenship.

9. **Use alternative assessments** - because they recognise and understand its multiple roles, teachers demonstrate positive attitudes toward assessment and use various modes to evaluate

student achievement and behaviour, as well as all other aspects of learning and teaching.

Various modes of assessment yield critical and useful information to inform and shape tools and methods that promise to improve academic achievement.

"Why do we evaluate students?" ask Rasbow and Hernandez (1988). Among the answers are to determine:

- if objectives have been achieved;
- the knowledge and skills that students have acquired;
- areas in which the curriculum needs improvement;
- the effectiveness of a teaching process or methodology;
- student responses to specific aspects of the curriculum; and
- students' ability to use knowledge and skills.

Evaluations are also used to:

- design instruction for individuals, groups, or entire classes
- diagnose a student's level of understanding before recommending further instruction on a given topic;
- gather information on the quality of the learning environment;
- guide the direction of future study;
- summarize an activity, topic, or unit of work;
- provide a basis for extra help where needed; and
- identify the most useful information to communicate to students and parents.

In general, trends in alternative assessment tend to:

- use a variety of progress indicators, such as projects, writing samples, interviews, and observations;

- focus on an individual's progress over time rather than on one-time performance within a group; and

- bring teachers into conference with students about their work and progress, helping students to evaluate themselves by perceiving the results of their own work.

Finally, more and more teachers are recognizing the value of multiple assessments in analyzing and reshaping their own instructional delivery skills, and in serving as a catalyst for change.

10. **Promote home/school partnerships** - through well-planned, comprehensive, long-lasting programmes, parents are involved in a variety of meaningful school roles, including decision making and participation in activities as well as in the educational development of their children.

Having abstracted and reviewed almost fifty studies of home/school co-operation, Henderson (1987) concludes:

• The family provides the primary educational environment.

• Involving parents in their children's formal education improves student achievement.

• Parent involvement is most effective when it is comprehensive, long- lasting, and well-planned.

• The benefits of family involvement are not confined to early childhood or the elementary levels of schooling; there are strong effects from involving parents continuously throughout high schooling.

• Involving parents in their own children's education at home is not enough. To ensure the quality of schools as institutions serving the community parents must be involved at all levels of schooling.

• Children from low-income and minority families have the most to gain when schools involve parents. Parents can help, regardless of their level of formal education.

• We cannot look at the school and the home in isolation from one another; we must see how they interconnect with each other and with the world at large.

11. **Use accelerated learning techniques** - teachers recognise and base instruction on the fact that accelerated learning

techniques can be effective with students at every level of ability and performance.

Colin Rose (1985) declares in Empowering the Spectrum of Your Mind that most of us are probably using only four percent of the enormous potential of our brains. "The more you use your brain," he maintains, "and the more facts and experience you store, the more associations and connections you make. Therefore, the easier it is to remember and learn yet more new material."

How does one "accelerate learning'? what is the theory behind the phrase? Rose (1985) begins with a seemingly obvious fact : no learning can take place without memory. How does one best encode things into memory? By creating concrete images of sights, sounds, and feelings, and by strong association of one image with another. The stronger the original encoding, the better the ultimate recall. "To achieve good memory," Rose (1985) writes, "you need to link a series of facts of ideas together, so that when one is remembered, it triggers recall for a whole series of others."

Thus, an ideal learning pattern becomes:

• Immediate rehearsal of new facts in the short term.
• Repetition or testing of the facts a few minutes later.
• Review of the facts a few minutes later.
• A short recap of them after a night's rest. (Sleep appears to help memorization; new information is reviewed during REM - Rapid Eye Movement - sleep.)
• Short review a week later.
• Short review a month later.

Rose claims that such a schedule of learning can enable the recall of up to 88 percent of the new information an individual receives - four times better than the usual rate of recall.

Among other techniques recommended by advocates of accelerated learning:

• Chunking, that is, reducing new information to manageable bits - a "chunk" no longer than seven words or seven digits, for instance.

• Use of music and rhyme as aids to memory

• Peripheral learning and the use of memory "maps" to encourage association and thus recall.

• Encoding as specifically as possible by principles rather than through isolated examples by rote.

12. **Foster strategies in questioning** - to engage students in more active learning and response, teachers encourage them to generate their own questions and lead their own discussions. Lehr and Harris (1988) suggest how even that age-old classroom practice of questions from teacher can be adapted to elicit individual involvement rather than passive response. They also show how to follow through for even greater student participation and response. Their advice, in part (Lehr and Harris 1988, pp. 43-44):

• Structure questions so that students can succeed.

• Encourage students to respond. (Most teachers answer two-thirds of their own questions.

• Ask questions in all modes. (Most questions are asked at the level of basic recall or recognition. More complex questioning increases student achievement.).

• Pause. The number and quality of student answers increase when teachers provide "wait time" of three to five seconds after asking a question. Appropriate wait time is particularly important in teaching low achievers. Some higher-level questions might require as much as 15 to 20 seconds of wait time.

• Call on students randomly, but be sure not to forget the low achiever.

• If a student's response is vague, call for clarification or elaboration - for example, "Tell me more." Probe students to higher levels of thinking.

• Encourage students to develop and ask their own questions, thus increasing their opportunities for thinking.

• Use techniques that require students to pose their own questions and to make discoveries on their own. For example, ask students in a science class to make predictions, based on their own experiences, before a demonstration or experiment. The processes of observing, comparing,
and describing are as important as the product.

To stimulate student discussions, Dillon (1984) suggests a three-step process:

• Carefully formulate one or two questions to get the discussion going.

• From then on, ask questions only when perplexed and genuinely in need of more information.

• Then make more statements that present facts or opinions, that reflect students' opinions to them, that register confusion, or that invite elaboration and student-to-student exchanges.

Student-generated questions and student-led discussions give students a higher stake and interest in their classroom activities and learning. Framing their own questions requires young people to interact with the meaning of content or text from a variety of perspectives. Generating their own questions, they support and challenge each other and recognise the social aspects of exploring the meaning of what they encounter in reading or in other learning activities.

Teachers need to model effective questioning and discussion strategies, including how to interact with others as well as how to think about and discuss text or content.

Touch a raw nerve now and then - not to aggravate, but to stimulate!

13. **Emphasise brain-compatible instruction** - teachers develop programmes and techniques that built on the full and complex functional capabilities of the human brain.

Drew Elementary teachers developed their own "seven

principles"; the principles serve as focal points to guide teachers in designing and implementing brain-compatible instruction:

- Create a nonthreatening climate.

- Input lots of raw material from which students can extract patterns - a vast array of activities, aided by an ample supply of materials, equipment, and print and audiovisual resources.

- Emphasize genuine communication in talking, listening, writing, and reading as ways to interact with other people.

- Encourage lots of manipulation of materials. Students need to be in command and able to push things around, encouraging them to work toward goals and explore a range of means.

- Emphasize reality. By using problems, examples, and contacts drawn from the "real world" rather than contrived exercises, texts, worksheets, and basal readers, students can see the real value of their own learning.

- Address learning activities to actual, productive uses.

- Respect natural thinking, including intuitive leaps, a grasp of patterns (as in number tables or good writing), and aesthetic and nonverbal interests and activities.

"Brain-based instruction," Caine and Caine (19911) warn, "stems from recognizing that the brain does not take logical steps down one path like a digital computer, but can go down a hundred different paths simultaneously like an enormously powerful analog computer."

Finally, Caine and Caine (1991) add, "Each brain is unique. Teaching should be multifaceted to allow all students to express visual, tactile, emotional, and auditory preferences. Proving choices that are variable enough to attract individual interests may require the reshaping of schools so that they exhibit the complexity found in life."

HOW CAN WE HELP N(T) STUDENTS LEARN?

MOO SWEE NGOH

INTRODUCTION

"Normal (Technical) students are less academically inclined. They are not motivated to study, and they present many disciplinary problems to teachers. In short, they are impossible to teach!" These words sum up the general perceptions held by many teachers of our N(T) students. These assumptions may well become self-fulfilling prophesies for teachers if left unquestioned. Are our N(T) students impossible to teach? Can they be motivated? Are they impossible to manage? How can we help them learn?

ARE N(T) STUDENTS DIFFERENT ?

A recent study of N(T) students (Chang et al., 1996) has shown that the behaviour problems they present their teachers are typical of our secondary school students in general. These include talking, being restless and inattentive, disrupting lessons, disturbing each other, moving about the classroom, not bringing the required books and materials, handing in assignments late, playing truant, using vulgar language, and being rude to teachers.

In other words, N(T) students are our typical, normal teenagers even though their learning abilities may be relatively weaker than their counterparts in the other streams. The study has also shown that while they may not appear to be very interested in academic pursuits, they are not an unmotivated lot. That is, they *can* be motivated to learn. Teachers who teach N(T) classes agree that the students do respond to teachers' motivational moves. However, teachers will have to understand what motivate their N(T) students.

ESSENTIAL TEACHER ATTITUDES AND BEHAVIOURS

Successful N(T) teachers whom I interviewed have these tips to share. To begin, it is important to have a positive attitude towards N(T) students. They are students who need more help in their learning. Their self-esteem may not be high, and they certainly need much motivation from teachers. As such, teachers need to be more patient and less critical. Our expectations will have to be reasonable, realistic, and flexible. Successful N(T) teachers work hard at interpersonal relationship building in their classrooms. They get to know their students, and let their students know them. Hence, they are warm, but not over friendly, firm, yet not harsh, and they relate positively to their students.

IMPORTANT FIRST ENCOUNTER

a. Begin on a clean slate

These teachers also share that our very first meeting with our N(T) class is crucial. If we want their cooperation for the rest of the year, start it right by not giving them the impression that having to teach them is some kind of bad luck for us. Neither do they need to be reminded of how they were a pain in the neck for previous teachers, or how poor their academic performance was.

However disappointing their past might have been, all students deserve a second chance. As their new teacher, it is within our power to give them that second chance; and when we do, the students will appreciate it. Chances of their responding to our attempts in motivating them will thus increase.

b. Establish teacher expectations, and rules and procedures

Beginning on a positive note is thus essential. Successful N(T) teachers share their positive and reasonable expectations with their students at the start. They make clear some of the basic rules and procedures to follow, and take time to explain why these are necessary for the kind of classroom environment which is conducive to learning.

Making clear your expectations and laying down the ground rules from the outset will help make the students feel secure as they know where the boundaries are. And, if the teacher is consistent in his or her handling of rule infractions, the classroom environment will also be a predictable one. All students [and N(T) students no less] need a secure and predictable environment in order to learn and function successfully.

c. Uncomplicated first assignments

Beginning on a positive note for the successful N(T) teachers also means making sure that the first assignments and learning activities for the students are uncomplicated tasks which have a good chance of being successfully completed by the students. It does not help to have them fail in their first learning tasks. Instead we need to enable them to experience success even in their initial tentative attempts so as to help build up their self-confidence.

KEEP THEM ENGAGED IN LEARNING TASKS

N(T) students, according to their teachers, tend to be more restless, and have a shorter attention span compared to students from the other streams. It is thus important for teachers to ensure that there is no dead time in their lessons, and they need to plan their lessons such that the students will be kept occupied all the time. As one effective N(T) teacher told me, "They do not know what to do with their free time after finishing their work. That's when they can cause problems for teachers. We have to make sure they have enough work to keep them busy all the time we are in the class." That is another useful tip.

MOTIVATING AND ENCOURAGING

All teachers of N(T) classes agree that these students need much motivating and encouragement, yet many have found this difficult to achieve. What can be learnt from those who have been successful in motivating their N(T) students? For a start, such teachers set clear, short term, and achievable goals for their students. The latter know what they have to work towards, and

they can see that there is a reasonable chance for success. Therefore, they are willing to have a go.

As the students need much encouragement, it is important for teachers to give recognition, and praise the students for what may seem small achievements. Praise them for the effort made, for the progress achieved, and not just the product. Sometimes, even giving some students a gentle, reassuring pat on the shoulders while they are working at their desks can send an encouraging message. These students also need to be given clear, constructive feedback on their work, such as grades and simple remarks in all their written exercises.

Most teachers agree that students enjoy doing group work and this is often used as an incentive to motivate them. These students also like to have the chance to make visual work presentations to their classmates. More such opportunities could be provided by teachers. Some teachers have also found the giving of small tokens and rewards, and even the telling of occasional ghost stories useful in the lower secondary classes.

RAISING SELF-ESTEEM

In order to succeed in motivating the N(T) students it is necessary for teachers to help them raise their self-esteem. Effective N(T) teachers see this as a clear goal to work towards. They share that it is important to treat their students with respect, and not humiliate them. They guard against making comparisons among their students; neither do they compare them with other classes or students from other streams. They encourage suggestions from their students, and are willing to accept their ideas.

To help instil confidence, experienced N(T) teachers provide opportunities for their students to show what they can do. They are assigned responsibilities, and are provided adequate guidance and support by the teachers to accomplish the tasks. These teachers develop a heightened awareness of strengths shown by their students, and give recognition whenever appropriate. Students' good effort, progress, and achievements are often highlighted in class.

Teachers who have worked successfully with N(T) students also constantly encourage them to have dignity, self-respect, and a sense of self-worth. They have found that through such encouragement and the experiences of success (no matter how small), the students are able to gradually develop a positive self-concept, and have a higher self-esteem.

CONCLUSION

Helping N(T) students learn has to begin with the teacher's acceptance of these students as normal teenagers who need a little more support and guidance in their learning. The teacher's positive attitude and behaviours towards these students will go a long way in enabling them to succeed in learning. To many, they may not seem a highly motivated lot, but experienced teachers have shown that N(T) students can be motivated to work and learn if the right approaches are used. It is also of fundamental importance that teachers help raise the self-esteem of N(T) students, for it is only when the latter's self-concept, and sense of self-worth is enhanced, and they believe that they can succeed that our efforts in helping them learn will bear fruit.

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