REVIEW

Vol. 11 No. 2 Nov 2002 MITA(P) No. 007/1/2002

ASCD SINGAPOR
E ASCD SINGAPO
RE ASCD SINGAP
ORE ASCD SINGA
PORE ASCD SING
APORE ASCD SIN
GAPORE ASCD S
INGAPORE ASCD
SINGAPORE ASC
D SINGAPORE AS
CD SINGAPORE A
SCD SINGAPORE
ASCD SINGAPOR
E ASCD SINGAPO
RE ASCD SINGAP
ORE ASCD SINGA
PORE ASCD SING
APORE ASCD SIN
GAPORE ASCD S
INGAPORE ASCD
SINGAPORE ASC
D SINGAPORE AS
CD SINGAPORE A
SCD SINGAPORE
ASCD SINGAPOR
E ASCD SINGAPO
RE ASCD SINGAP
ORE ASCD SINGA

Learning Differently

The ASCD (Singapore) REVIEW Committee seeks original articles on teaching and learning...

Manuscripts should be between 2000-2500 words, typewritten (Microsoft Word document) and submitted in the form of a hard copy together with a 3½" inch diskette or CD. Submissions may also be done via e-mail. Photographs would be appreciated. These visuals may also be e-mailed as jpg files. Contributions by regular mail may be addressed to:

Mrs Soo Kim Bee
Editor, ASCD REVIEW (Singapore)
c/o ASCD Secretariat Office
Tele-Temps Pte Ltd.
1002 Toa Payoh Industrial Park #06-1475
Singapore 319074 Tel: 6250-7700
Or E-mail: kbee@gmt.com.sg

The themes for the forthcoming issues are:

Vol 11 No.3: **Nurturing the Young Entrepreneur**
Deadline for articles: 31st Jan 2003

Vol 12 No.1: **Life Sciences in Singapore Schools**
Deadline for articles: 31st Mar 2003

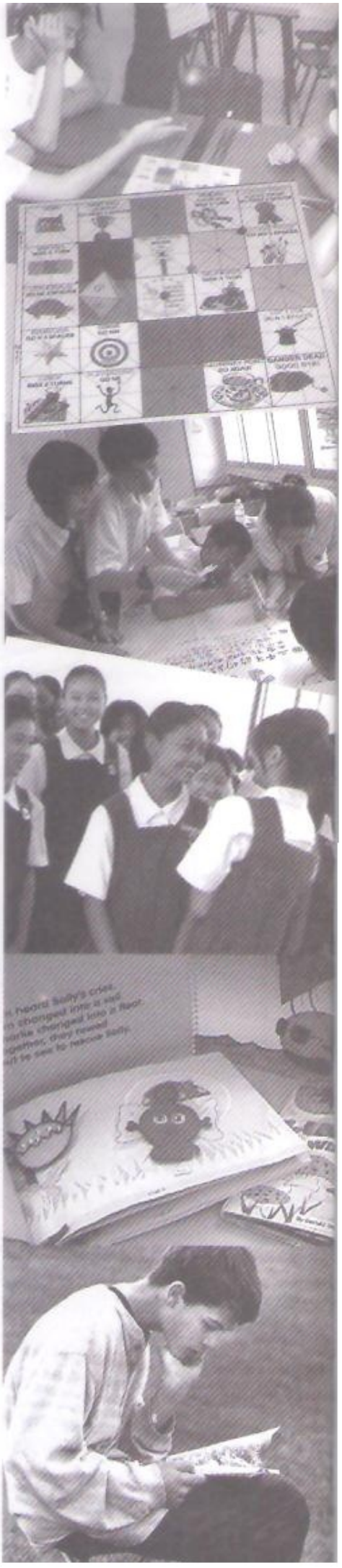
ASSOCIATION FOR SUPERVISION AND CURRICULUM DEVELOPMENT (SINGAPORE)

Learning Differently

Learning Differently

Vol. 11 No. 2

PAGE CONTENTS



Editorial

We are very encouraged by the collection of articles in this issue – a real bumper crop. We have tried to ensure that the range of articles selected discuss as many issues as possible that concern both educators and parents when they think of children who learn differently in the Singapore classroom.

There are many ways of learning and many ways of teaching. There must also be congruence between the two for the learning to stick and bring a pupil from point A to point B, wherever that child's point B may be. We need to be mindful of the fact that there are as many point B's as there are children in a particular classroom. We are also reminded by George Evans that,

"Every student can learn, just not on the same day, or the same way."

How prepared are our teachers to handle such diverse abilities among their pupils? How do you motivate and stretch the very bright but bored pupil? How do you motivate and help the very weak or learning disabled pupil to help him make it through school for another day? Where can these teachers and parents turn to for information, for help and support? With these questions swirling about in their heads, teachers are out there drafting lesson plans and making decisions everyday that will affect how their pupils learn and which in turn, affect themselves as educators. We hope that these articles shared by our contributors go some way towards answering some of these questions.

*The forthcoming issues of the **ASCD REVIEW** will be exploring the themes of **'Nurturing the Young Entrepreneur'** and **'Life Sciences in Singapore Schools'**. We would also like to look into the many changes that are taking place in **pre-school education**. As educators and parents, if you have any thoughts, ideas, research and initiatives in schools and classrooms to share with our readers, do write in to the REVIEW. We look forward to hearing from you. Happy reading and sharing!*

Soo Kim Bee

The ASCD (Singapore) Review is published three times a year.
The views expressed in this journal do not necessarily reflect the official position of ASCD (Singapore)

Published by

The Association for Supervision and Curriculum Development (Singapore).

Designed and Printed by ColorMagic Pte Ltd.

Children Who Learn Differently in Singapore

Laura Cockburn

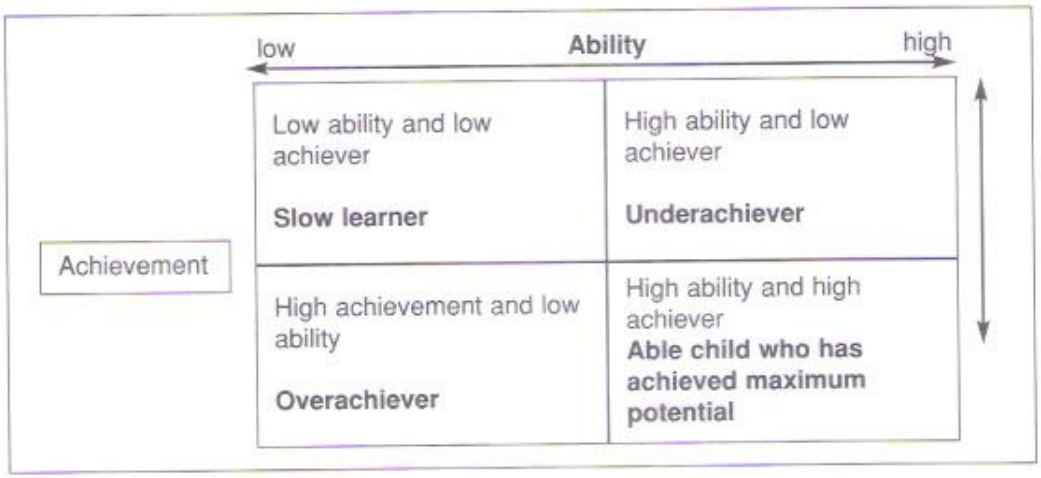
As an expatriate and 'foreigner' in Singapore, I have had the pleasure and privilege of working here for nearly 10 years in the field of supporting children and young people with a wide variety of special educational needs in both the local system and within the international schools. Singapore has changed tremendously since I first moved here and the field of 'Children who learn differently' has also been seen to evolve rapidly. We have come a long way but there is still a lot to be done! This article has been drawn up following a request. The aim of the article is to provide an overview of children and young people who learn 'differently' specific to Singapore.

Special education and support continues to develop around the world and a range and variety of educational provision has been set up in the different countries fortunate to have the resources to ensure that all children are provided with good educational opportunities. Singapore will introduce compulsory education in 2003 and this is likely to continue to improve the resources provided for students who learn differently. The Internet and other improved communication modes have assisted in improving the knowledge base in this area in Singapore.

Support and understanding of children and young people who learn 'differently' in Singapore has changed tremendously in the past 10 years. Following initiatives as developed by the Ministry of Education, the area of special education and support has developed in many different organisations including Family Service Centres, schools and the field of private enrichment centres and tutors. Parents and teachers can be seen to have developed in their knowledge and skills and to have become much more empowered in their ability to support students.

Defining and understanding the problem

In order to be able to support and to take action to assist young people who learn differently, it is important that a full understanding of learning needs and differences is developed in the context of Singapore, specific to the needs of Singapore. Singapore is moving closer to defining what are learning differences in



the mainstream educational context. Academics and practitioners in a number of organisations have developed a range of provision and understanding during the past few years.

As a result of being in the privileged position of being open to many dominant influences from the main Western powers such as U.S.A., U.K. and Australia, Singapore can be seen to continue to experience difficulties in the area of nomenclature in the area of special education. Labels such as 'learning disabilities' and 'autistic spectrum disorder' are often taken from a particular school of thought and from certain countries; consequently professionals in Singapore tend to use the label as learnt from their training experiences. Many labels are used and not necessarily understood. The skilled professional needs to assist parents, teachers and other professionals to have an understanding of this issue since it has become central to our ability to define and understand children who have learning differences.

It also needs to be understood that defining 'learning differences' is always a comparative concept and that this is highly dependent upon how the 'normal distribution' is defined. For example, a truly Singaporean issue is the understanding and definition of the 'underachiever' where a great deal of emphasis is placed upon attempting to ensure that such students are able to maximise their learning potential.

The Singapore education system can be seen to place a lot of resources towards assisting the underachiever as defined in the matrix as above. Determining how able and skilled a pupil is carried out by teachers as early as K1 and the examination system throughout the primary years continues to be used as a guide to teachers and schools with regard to the student's achievements. The Ministry of Education also provides additional support through the school psychologists who assist in determining those students who are underachieving.

Teachers, parents and educational psychologists need to work closely together to fully understand the learning needs of the students in Singapore and thereafter providing an appropriate label. Alongside other developed nations, it can be seen that the more improved the system of identification becomes, the more students who have learning differences can be assessed and identified. Consequently there is a pressure upon schools and resource teams to provide the appropriate support according to the specific needs as defined through specialised assessment.

Assessment – static versus dynamic

Teachers around the world continue to seek support from professionals with regard to how best to support students with a wide range of needs. The traditional assessment provided by the specialist, often the school psychologist, is usually reported in 'static' terms. That is, a definition of how able the pupil is, may be provided together with a summary of learning skills. Improved links and communications have meant that some of the more dynamic assessment methods are now being developed in Singapore. Such assessment techniques were originally developed by Feuerstein and colleagues (Schneider 1987); the main aim being to provide an interactional approach to evaluating learning potential – something that fits well with the Singapore culture in the education system. Children and young people who learn 'differently' benefit from being fully understood and a full assessment of their individual needs (static and dynamic) is usually very helpful. The role of the school or educational psychologist is crucial here and the MOE is building up a full team to support the schools.

Parents and Parent Support

Parents are now becoming more equal partners in the whole process of education in Singapore. Many schools can now be seen to be encouraging parents to participate more fully in their child's education.

There is a delightful story that many of us use when working in the area of understanding children who learn differently. It is very relevant for Singapore as it really tries to highlight to both parents and teachers how the process of having a 'different' child might be difficult particularly in a 'kiasu' culture where everyone is striving for excellence. The story includes the analogy of going on holiday (as compared with having a child) and preparing oneself thoroughly for a trip to Italy however for some reason, the trip ends in Holland and whilst expectations are dashed, it is pointed out that one just needs to readjust and to get used to a new idea and new information. Undoubtedly this only serves to demonstrate some of the difficulties that parents in Singapore may experience but it is a good beginning to assist other professionals and parents to empathise.

Children who learn differently need the full support and understanding of their parents and other family members. Where parents choose to ignore their difficulties and make efforts to force them to be the same as other children, significant problems usually occur.

It is exciting that in the past few years several parent support groups have evolved. These support groups hopefully provide the support and encouragement to those parents who are struggling to deal with the problems that are faced when having a child who learns differently. Parent support groups such as SPARK who have developed support for students with attention deficit hyperactivity disorders (ADHD) often offer to go to schools to assist in teacher training and they provide useful information on their website. The humble professional needs to accept that parents will spend a lot of time researching their children and that they may become more knowledgeable than the professionals.

Specific issues for Singapore

Class sizes and the need to recognise the importance of a differentiated curriculum

Children who have learning differences do benefit from extra attention and focus, consequently it is often difficult to support such students within a class group of 40 plus students. The learning support coordinators within the primary schools play a crucial role in assisting teachers to develop a differentiated curriculum; this needs to be recognised and built upon. Class size issues continue to be wrestled within the main forum of education; research is not clear since class size is a difficult factor to control for in any qualitative research. However, it needs to be acknowledged that the more that we endeavour to support the main class teacher in her daily teaching, the more likely the child with learning differences is to experience success. Research from other countries continues to demonstrate that where teachers improve in their skills in working with children with learning differences, the more that this knowledge can actually be found to be useful in assisting all children.

Behaviour

Overall Singapore is a well-behaved and controlled society, which means that within the schools there are relatively few discipline difficulties as compared with other countries. In 1994 some small-scale research carried out by the current author and colleagues within the schools, revealed

that the main discipline issues were usually linked to school work not being handed in and school bags being poorly prepared. This has the adverse effect of causing students who have ADHD and behaviour difficulties to stand out in a highly significant manner since their difficulties present as a lot more obvious. This in turn causes the student more problems as he is seen to be the cause of many issues. Behaviour management is an emotional issue and teacher training needs to continue to develop a range of methods in supporting the student who struggles to maintain his attention and focus within a classroom. Children have traditionally been expected to 'behave' and to do what they are told alongside respecting their teachers. Parents who have children who behave differently often need to seek understanding and sympathy from teachers and Principals as they are often seen to be the cause for the child's misbehaviour. Full analytical and diagnostic assessment is required to assist in the management and understanding of such children. Multi modal methods of intervention are recommended rather than simply sending him for medication and a supposed 'cure'.

The language demands and expectations

Singapore is a multiracial society and whilst the main language of education is English, all students are expected to learn an additional language from an early age. Currently admission to the National University depends upon the acquisition of a second language. Whilst research around the world continues to demonstrate the advantages of learning a second language there are also reports about how much of a struggle this is likely to be for many children who have learning differences. Some key research in Canada (Cummins, 1984) indicates that whilst able students benefit and improve in their abilities as a consequence of learning a second language, students who learn differently are likely to be caused additional difficulties and to actually attain poorer results. This is a significant issue for Singapore and one, which is now being tackled through the Ministry's efforts in developing exam accommodations and specialist support for specific students.

The demands of the system

The Singapore Education System is the envy of many governments around the world as the standards tend to be high and efforts are made to maintain these. However, many of the factors that are crucial to these high standards can be seen to be causing problems for pupils who have learning differences. Students are expected to complete a great deal of homework and to attend extra classes within and outside school. Stress and anxiety have built up and the provision of counselling is now a key factor in schools. Students need to develop good independent study skills. Whilst these can be sent to be key components in any good education system, teachers need to be supported to be encouraged to be flexible and supportive particularly with those students who are struggling to cope. Parents and teachers need to work closely together to develop structured methods of developing good study skills. Areas such as 'scaffolding' writing frames are important to develop across curricula areas as the student with learning differences tends to require more imposed structure.

Teachers and parents need help to recognise that all students are different and that diversity needs to be valued for what we can learn from each child. There is a constant need to review 'quality' versus 'quantity' as students are likely to learn a lot more from quality worksheets as compared to a large number being presented. Matching the needs of the student environment requires flexibility and good teacher training. The importance of ensuring

that an appropriate educational environment is developed needs to be stressed but particularly for students with learning differences. Where students who have such problems as ADHD or autism can be supported through specific strategies within an educational context, success is likely and progress and educational achievements can be developed over time.

Self esteem

We cannot underestimate the role that self-esteem and confidence plays in the lives of all children; this becomes particularly significant for children who learn differently. Parents and other family members have to work extremely hard to find ways of encouraging the child to keep making an effort and to believe in herself. This is often very difficult in Singapore where the curricula demands become increasingly demanding as the students move higher up the school and where a great deal of homework and remedial classes are presented. Unfortunately many parents and teachers assess the children's progress according to their exam results rather than using any other specific measure. Self esteem and feelings towards learning opportunities can be the make or break for many students and we need to avoid the students giving up. Affirmation and understanding is needed for all students and this is where we need to ensure that teachers are supported in their endeavours.

Conclusions

Supporting a student with learning differences within the Singapore education system remains a challenge although huge changes have taken place within the system during the past few years. The points as outlined above provide insight into the many challenges that are within the highly developed education system in Singapore for the child with learning differences.

Greater efforts need to be promoted towards supporting the class teacher to cope with the expectations made of him or her with regards to working with children with learning differences. In this author's experience teachers require good support and encouragement in order to be able to carry out their roles effectively and to remain working as teachers. This acts as a cascade and they consequently provide support to the pupils and their families. Teacher trainers and professionals need to improve collaborative efforts with regard to improving the support of teachers. Professionalism needs to be valued more by all in order that all the children and young people of Singapore are able to achieve their maximum potential.

Survival Tips for Teachers and Parents

When reviewing any child's difficulties it is important to keep the following points in mind:

1. Teachers and parents need to review all current educational support in order to decide how to maximise their learning potential.
2. Students often need to be supervised and guided with regard to improving their basic study skills particularly in the area of writing and reading. They may need some specialised support if they continue to struggle. Skills in

mathematics also need to be analysed with regard to the specific problems being experienced. Error analysis is useful.

3. Children may benefit from being given extra support from teachers in the area of social skills and group work. They often need to learn to share and to understand other children's points of view.
4. Children need to be managed through being given a very firm, specific and consistent management behaviour programme. They benefit from knowing exactly what the rules and expectations are, and the use of rewards and cost response may well be effective, together with time limits being imposed. A daily routine needs to be established where the child is encouraged to follow some imposed limits. They may also need to build up time on task.
5. Building up attention and concentration through the use of such activities as jigsaw puzzles and timers can be helpful.
6. Developing self-confidence and self-esteem in educational and new tasks is usually very important; students need to be encouraged by achieving success and by feeling that they are able to cope with the demands made of them.
7. Many children would benefit from developing their language skills through using books and by being encouraged to look at the pictures to assist comprehension skills. They should practice retelling stories and be assisted by thinking through what happens in the beginning, in the middle and at the end.
8. Children often need to be assisted to develop improved organisational skills in work and in attitudes towards their own lives. They should learn to slow down and to think out a plan before carrying out any instructions.
9. Students' benefit from improving their listening skills both within a 1 – 1 situation and within small groups. They should be encouraged to restate information that is presented to especially when new information is being given. It is helpful for students to be required to be actively participating while they are listening.
10. Students may require some support in improving writing skills, as they get older. They need to learn to use the word processor on the computer at a speed that achieves both a level of accuracy and satisfaction.
11. Students' benefit from developing self-questioning techniques. They need to develop an internal language of covert speech and to be taught to answer the questions: 'What is the problem? What am I supposed to do? What is my plan? How can I go about doing this? Am I using my plan?'

Learning Support Centre Website with links to many useful organisations here in Singapore.

http://mscweb.np.edu.sg/lsc/

Excellent USA based website for overall understanding of learning disabilities.

http://www.ldonline.org/

Specific References

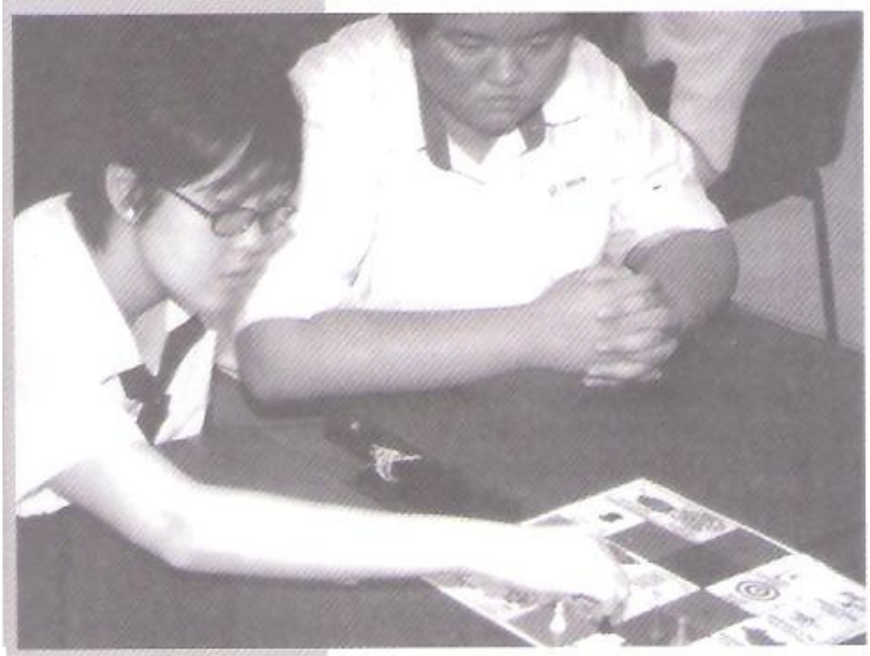
Cummins, J. (1984). Bilingualism and Special Education: Issues in assessment and pedagogy. San Diego, CA: College Hill Press.

Schneider Lidz, Carol. (1987). Dynamic Assessment. An Interactional Approach to Evaluating Learning Potential. The Guilford Press, New York London.

Laura Cockburn *is a Chartered Educational Psychologist and she worked in the Ministry of Education from 1992 to 1997. Laura transferred to working as a Consultant and Senior Educational Psychologist for the 'Association of Persons with Special Needs' in April 1998. She is now running her own private consultancy – P.A.C.T. Support Services (Psychological Assessment, Consultation and Training) for families, organisations and schools in South East Asia. Laura works as a volunteer at the Down Syndrome Association and she is currently the Vice President of the Singapore Psychological Society. Contact pact_ss@yahoo.com*

Motivating Underachievers in Mathematics

Pushparani Manoselvam



Students playing bearing game at cluster level

The greatest challenge professional educators face is how to package their subject attractively so that their customers (students) will buy the product eagerly. A teacher should be enthusiastic and passionate about the subject she teaches so that this enthusiasm and passion will eventually rub onto the students. She should constantly look out for ways to inject interest into the topics to inspire the students to excel. Students of today are exposed to a wide and interesting variety of entertainment such as cable vision, internet and mobile phone. Looking from the students' perspective (in most cases) such attractions are far more interesting than their studies. As teachers we should try our best to work from the interest of the pupils and try to incorporate their interest into the learning process. How then can a teacher tailor the learning package to include interesting activities and games so that students will enjoy the learning process.

The second greatest challenge a teacher faces is how to modify the learning package to suit the different learning abilities within a heterogenous class or across the streams. The learning process within a heterogenous class should have activities to challenge the potential of the top students as well as activities to inspire the underachievers.

We have students who cannot visualise life without computers and internet. In the Straits Times (Nirmala, August 9 2000), Nirmala wrote "Enter the world of today's teens. Wired up from their kindergarten years, used to surfing the Net for lessons and as comfortable with a mouse as with a pencil."

Teachers therefore, have to make the effort to continuously upgrade to keep up with the changes. Change is the only constant factor in education. Thus, they should infuse Information Technology, Thinking Skills , National Education and Cooperative Learning Strategies into their lessons because teens of today are very different from teens of yesterday. They love to work and interact in groups. They enjoy exploring rather than absorbing knowledge and they love to surf the Net for information or to support their research with data. They are comfortable with verbal arguments and presentation. Thus teachers have to develop teaching and learning strategies that tap on these attributes of today's teens.

Students should guided slowly up the success ladder. Repeated failures only serve to lower the self-esteem of the students and destroy their interest and motivation in the subject.

I strongly believe in humour in the classroom. Humour is a very powerful tool to stimulate the interest of the students. I feel lessons should be lively and students learn best in a relaxed environment. It is very important that teacher sets the firm tone right at the beginning. Once this tone is established, then humour could be incorporated into the teaching and learning process without undermining class discipline. Humour enriches the learning environment and encourages the development of rapport and class spirit. Furthermore, activity based lessons need not be confines to the classroom. Where appropriate lessons could be conducted in the school hall, basket ball court or dance studio. Educators should try wherever possible to make the connection between theory and practical applications so that learning becomes more meaningful. Our focus should always be on student learning, rather than teaching. We cannot expect our students to think outside the box, if we ourselves remain within the box.

It is our profound responsibility to our students that we should be creative and effective and do our best at all times. In order to be an effective teacher, we need to be competent in the subject matter as well as the teaching and learning strategies we use. We are not born with expertise in teaching and managing students. The NIE training, although helpful in acquiring useful skills and knowledge, is not sufficient for us to be experts in our chosen area. We have to take complete responsibility for our own learning process and continuously enhance our portfolio of teaching, learning and class management strategies. Thus, we should look at constructive feedback proactively and develop the habit of keeping reflective journals. This will give us invaluable input and sets the stage for continuous improvement. Journal entries will be more beneficial if it includes entries from students, oneself and from supervisors. Teachers can then have better perspective of strategies that went well, what could be improved and what could be done away with.

Stephen Covey in his book "The Seven Habits of Highly Effective People" emphasizes that we have the freedom to choose our actions but not the consequences. Being aware of the consequences before decision making will enable us to make better choices in our profession. He never fails to emphasise on the many advantages of proactive people. He said that proactive people accept the problems and negative factors in the circle of influence but will chose to remain in the circle of influence. Very often, teachers who have been assigned difficult pupils tend to spend a lot time moaning and groaning about the class and attribute all failures and problems to the perceived inherent nature of the class. Pro-active teachers will seek to understand the class and search high and low for the hidden positive attributes of the class. The students for the first time, find themselves being recognised and appreciated for their positive attributes and

they would then be more willing to cooperate with the teacher. Such a teacher works on her circle of influence where she has the ability to influence. This circle emits positive energy which will eventually expand the circle of influence and more and more students will join her. Teachers should strive to be transitional professionals where they work to change negative attitude and culture to the positive. After all, every cloud has a silver lining so do every class of students. More often then not, only a few students are problematic pupils in the class and these key leaders influence the others to create problems. If teachers can identify these key leaders, work on them and win them over, they would have won half the battle.

Changing attitudes require a lot of energy and effort. Very often you need the cooperation of the parents and at times, counsellors. Teachers should view teaching and learning as a tripartite partnership of teachers, students and parents. Students spend more time outside school than within school. Thus underachievers tend to face other problems which may include family, social and time management problems. Getting the cooperation of the parents will help greatly in turning these students around.

In many instances, underachievers have been receiving negative feedback constantly. The teachers also have formed mental models about them and in the process lowered their expectations on their performance and improvement. These two factors only serve to further de-motivate the pupils and lower their self-esteem. It will lead to self-full filling prophecy where both the teacher and a student are happy with his below expected results.

I would like to highlight a real case whereby the cooperation of the parents helped to change student dramatically. In 1997, I had a student in Sec 3 who had a strong phobia against Mathematics. He had been constantly failing Mathematics since Sec 1 and he, as well as his mother, have formed strong mental images about his hopelessness in Mathematics. He hated the subject terribly. Since our school offered Additional Mathematics to all classes, he had to take both Mathematics and Additional Mathematics. He kept on saying that he is stupid and that he cannot do Mathematics. I could not reach him to bring down the mental model. So, I called his mother who works in a factory. She told me she was aware that her son cannot do Mathematics and that she did not understand why the school must offer Additional Mathematics to all classes. She added that her son was not smart and she would be happy if he could become a mechanic. She did not understand why I must insist that all my students should pass Mathematics when the lower secondary teachers understood her and left her son alone. I talked to her for almost an hour and pleaded with her to cooperate with me by encouraging her son and raising her expectations of him. In school, I started off giving easier tests initially to boost the confidence of the pupils and to allow them to taste the sweetness of success in Mathematics.

This year, this particular boy came for the school carnival. He told me he came not for the carnival but to personally thank me for making that phone call to his mother which changed his whole life. Of course I asked him for his results – what made the change? He scored A1 in Mathematics and A2 in Additional Mathematics. He went on to do both Mathematics C and Further Mathematics at "A" levels and he scored A for both of these papers. He has been given a place in Computer Engineering. He told me my faith and confidence in him as well my unique and creative teaching methods made him re-look Mathematics again. He began to love the subject which he hated for years and this motivated him

to excel. There are many other success stories like him and we have the power as well as the ability to make the critical difference in the path a child takes.

Every teacher should first be a teacher of humanity and then a teacher of his own subject. As a teacher, I am the decisive element in the classroom.

I have tremendous power to motivate the child. My personal approach and creativity creates the rich learning climate for my students to excel.

I would now focus on creativity in mathematics. How do we then generate ideas that will stimulate interest and understanding in Mathematics.

As teachers we have to first observe the students we are teaching. Find out what their interests are and then we have to try to understand their learning styles. We must know where we are presently with our students before we can chart their progress to excellence. Mathematics can be incorporated into music, games, newspapers, TV programs and skits. Teachers teaching that level can identify areas of concern and brainstorm for ideas. You can also form mini Learning Circles within the department to come up with creative teaching strategies. I will focus on the following topics and highlight some of the teaching strategies that have been successfully implemented in my school. I have also shared these strategies at cluster level and at Teacher's Network with very positive feedback.

- Polygons
- Algebra
- Bearing
- Trigonometry Card Game

Polygons

This topic is taught at Lower Secondary Level. Instead of just asking students to memorise the given properties of the various polygons we could incorporate thinking skills and cooperative learning strategies to allow the students to explore the properties themselves. Print the various polygons as shown in Worksheet **(Appendix 1)** on at least 120g paper. Students may use their mathematical instruments to explore the properties according to the guide given in **(Appendix 2)**. The students may cut out the polygons, fold them or cut them in parts in order to verify the properties. This student-centred approach will enable them to remember the properties better and in case they forget, they would know how check on the properties.

The next activity is to compare triangles and quadrilaterals. They are given 7 straws of about 4 cm each and 2 pieces of string. They are to string the straws to make a triangle and a quadrilateral. They are asked to stretch the 2 figures and to check on the firmness of the shape. Through exploration, the students will realise that the triangular structure is definitely firmer. They are asked to look around or recall common structures which are built based on this fact. Examples include windows, roof ladders. Show them the further illustrations in **(Appendix 3)**.

You may use the CD ROM "Geometry Blaster" which has tangrams and matching game on properties of polygons. The climax of this activity is in the "Dog and Bone Game – The Polygon Way." Depending on the size of the class the game can be played by 2, 3 or 4 teams comprising of 10 members each. They stand facing each other (if 2 teams). The ten polygons in P1 are enlarged on colour cards and laminated. A hole is punched at one end and a loop is formed using a

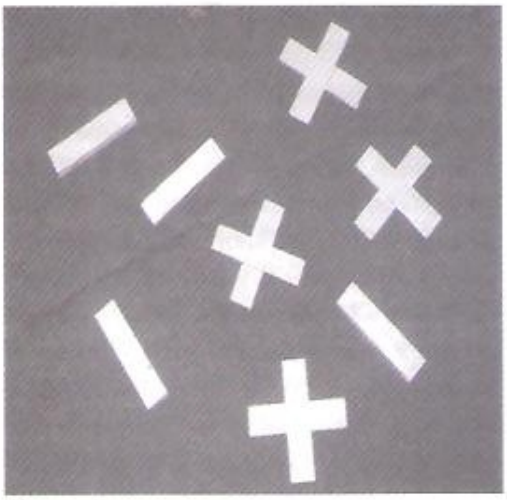


Figure 1

string. Members of each team wear these polygons round their necks. It will be easier for judging if each shape is printed on a different coloured card. The bone which can be made by crushing old newspapers and wrapped in aluminium foil is placed in the centre. Again it will help you if you could draw a small circle at the centre to avoid any disputes between teams. If the school hall is slippery, then you could play at the basketball court or the field. Any students that are left out could be asked to be recorders, referee or linesman (to place bone at the centre after each round). The referee will call out the properties of the polygon and the correct shape(s) from each team should run forward and take the bone back. Points are awarded for correct shape and retrieval of bone. Some examples of properties are given below:

- 3-sided polygon with base angles equal.
- All 3 sides of the polygon are equal.
- A 3-sided polygon.
- A polygon with only 1 pair of parallel sides.
- A quadrilateral with all sides equal.

In order to avoid any form of violent play or body contact, penalise those teams that display rough play. Students love the challenge of winning and they will learn the properties because they want to win. Thus we have created a fun and enjoyable way to learn this topic and the students will remember this activity for a very long time. How often do they get to learn Math through outdoor activities?

Algebra – Die Game

Algebra is a major topic in Secondary Schools. There is a great need to set a strong foundation in Lower Secondary so they can better cope with the "O" and "N" Level Syllabuses. We also need to move them from model approach to Algebra approach smoothly. Many of the weaker students may face problems with basic Mathematical Operations involving + and – (e.g. –7 + 6, –7 – 7, –14 + 4 etc). If using existing methods still do not work for some students, then you may try this method which worked well with the Normal and Normal Technical students. With the help of the Technical Department, make plus and minus signs from plywood **(Figure 1)**. You may ask your students to colour and lacquer them. We made 200 sets and we prepared a worksheet with basic operations starting from numerals to Algebra. The students are to work in pairs and each team is given 20 "+" and 20 "–" tiles. They are to use these to solve the questions on the worksheet. Once they are good at it then they could proceed to solve without the use of these tiles.

Once the students have understood the basic concepts of algebraic manipulation you could make the traditional approach of drill and practice an enjoyable experience for the students. You may inform the students a few days earlier that they are going to play the Algebra Die game in groups and the winner in each group will get prizes and they will represent the class in inter-class competition. Singaporeans basically love such challenges and they love to win. It will serve as a great motivating factor for them to practice hard to master algebraic manipulation. The guidelines on how to play the game are listed below.

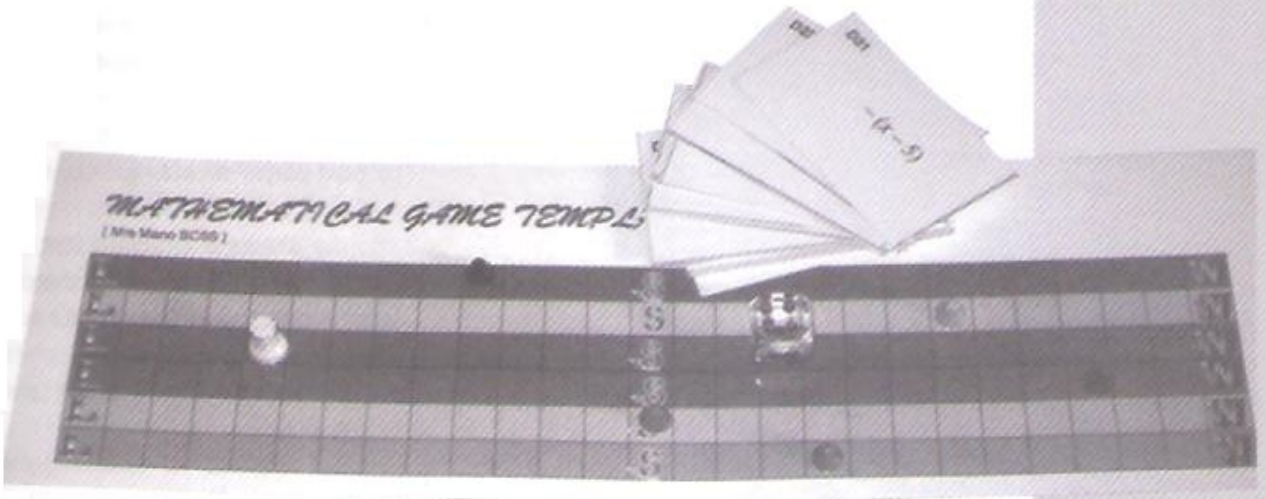


Figure 2

- Number of players 2-6

- Each player has a unique counter. The game comprises of a playing template as shown in **Figure 2**, a set of 36 or more cards containing algebraic expressions, a die and counters.

- All the counters are to be placed at the Start "**S**" position.

- The first player to roll a six or 1 will start first. The player takes a card from the source pile and places it facing upwards. Then he rolls the die. The number on the die is the x value. He evalutes the expression using this value.

  Example: If the Algebraic expression on the card is **x – 4**. If the player rolls a 2 on the die, then he will get an answer of –2. He will move his counter 2 spaces to the left. On the other hand if he rolls a 5 he will move the counter 1 space to the right.

- The next player on his right will take another card and rolls the die and continues with the game.

- The winner will be first person to reach the winning square '**W**' or the one nearest to the '**W**' square (if time set for the play is up).

- If the player hits the '**L**' square. He has lost the game and his out of play.

- The player is to record the question number and his answer on the record sheet.

- Any time the team is not sure of the answer, a member can raise his hands for the referee who can verify the answer using the answer key.

- Each player is given a maximum of 1 minute to answer the question.

- If the player is 1 space from the '**W**' position, he needs to roll a one to win. If he rolls a four he moves forward one space and backwards three spaces (1 + 3 = 4) so that he will now be 3 spaces from the '**W**' position.

- Once all the cards have been used, reshuffle the cards and continue playing.

- The level of difficulty is controlled by the expressions on the cards. Thus this game can be easily modified to cater for the differing abilities across streams and within streams. The element of luck inherent in the game not only injects fun but also enables students with slightly

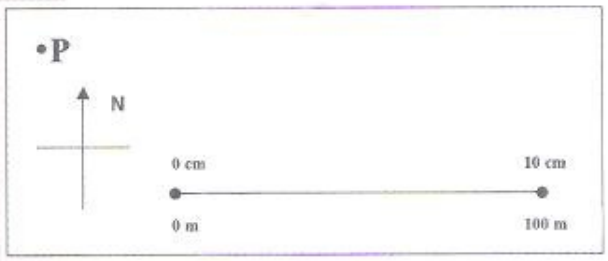


Figure 3

differing abilities to compete on more level grounds.

- To challenge the really good students or in the final round of inter-class competitions, you could replace the six-sided die with eight or ten-sided die.

Trigonometry – Bearing Activities and Games

The normal and normal technical students find the concept of bearing difficult to grasp. If as teachers we don't create a learning strategy to enable them to grasp this concept, the students may just give up on this topic. To reinforce the eight basic directions, we have created the Bearing Board Game. (Appendix 4). **Figure 3** illustrates the board game. The guidelines on how to play the game are given below.

- The game comprises of a playing board with certain places around our school. The objective is to start from school and to reach home. You have pitfalls that may delay your journey or bonus boosters that will help you to reach home faster. It come along with an octagonal die with the eight directions on its surfaces. Counters are placed in the centre of the school's logo.

- The first player to throw or spin a '**N**' starts.

- The first player to start throws the die and moves one step in the direction shown on the die. One step means the length of the side or diagonal of the smallest square on the board. The North direction is indicated at the extreme side of the board.

- The next player on his right continues.

- If the die shows a direction that would take the player off the board, the player cannot move and misses the turn.

- The winner would be the first one to reach "Home".

- If any player lands on "Danger" Square, he is out of play.

- Players must land in the centre of the 'bonus' or 'pit fall' squares before they are affected positively or negatively.

- Incentives can be given to winners to motivate them and this game can be extended to inter-class competitions.

- What is more important is that after playing this game the constant reinforcement of the 8 cardinal points in an enjoyable way will help the students to remember them easily.

Activity 1

Once they have mastered these eight directions, the students are ready to proceed to the next activity. This activity is suitable for all streams. The activity can be easily modified to cater for differing abilities. In the concept of bearing the angle is always measured from North in a clock wise direction. This activity constantly reinforces this concept as this is another area of concern faced by students in mastering this topic. Cooperative Learning strategy is used for this activity. Each group is given a Vanguard sheet with the scale, North Cardinal point and the starting point pasted on the bottom left hand corner (Fig 4), a set of stick on pictures (Appendix 5), scissors, protractor and long ruler.

In this activity, students are to use the given bearing guide to help Cindy to find her way home. It requires students to measure the bearing and mark the distances. They then stick on the given pictures and proceed to move to the next location according to the bearing guide given below.

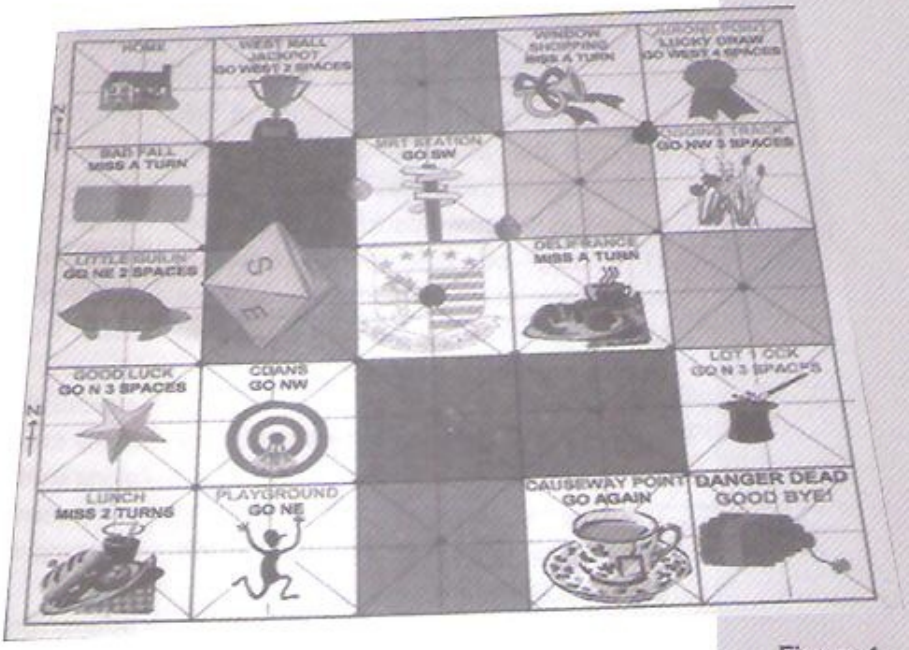


Figure 4

Bearing Guide to Cindy's Home

- From P, Cindy should walk due North for 100m to the piano shop.
- Then she should walk for 150m on a bearing of 050° to the tortoise farm.
- From the tortoise farm Cindy should walk 220m to the port such that the bearing of the port from the tortoise farm is 080°.
- Cindy then should walk 200m in the direction of 160° to reach the football field.
- From the football field she could reach the haunted house which is in the direction of 075° and a distance of 75m.
- She should then walk in the direction of 340° to reach the beach which is 350m away.
- Finally, Cindy should walk in the direction of 065° to reach home which is 190m away.

The completed group product could be displayed on the class notice board. Thus students are reinforcing the concept of bearing as they work together to chart Cindy's journey home on the vanguard sheet. To make this activity more challenging for the more able students, we could change the scale and distances and even extend the journey and use majong paper instead.

For the express and the more able normal students, we could ask them to do the following activity which showcases their creative ability in creating an original bearing guide for another situation.

Activity 2

Select at least six of the remaining pictures and create your own bearing guide for another situation. If you are not happy with the remaining pictures you may choose your own from the clip art gallery. The angles and distances should be different from the above. Marks will be awarded for accuracy, creativity and originality.

Activity 3

Practical applications and infusion of National Education

The groups could be assigned to surf the net to find out the importance of bearing for the pilots who navigate ships and aeroplanes as well as for air traffic

controllers. The teacher should allow active discussion and steer the discussion towards the recent airline crashes of Silk Air and the SQ 006. The economic implications of these crashes to the nation as well as terrorist attacks on September 11 should be discussed. Thus the importance of racial harmony, political stability and National Security could then be discussed and emphasized.

Activity 4 (Bearing Battleships)

The chart to play the game is given in Appendix 6. The guidelines to play this game are given below.

- This game can be played in groups of four.
- Each game sheet has 2 navigational charts.
- Each team should mark the locations of 10 ships (S1 to S10) on their own chart.
- The 'war' begins by the first team (Team A) calling the bearing ('shoot') of a certain location (eg. 140°). If there is a ship on this location, the second team (Team B) should say "hit" and crosses the ship that has been destroyed on his chart. Otherwise he says "miss". The first team should record this in his spare chart so that he can keep track of the locations, misses and hits.
- It is now the second team's turn to 'shoot' by calling a location in terms of the bearing. This game goes on and the winner is the first team that has destroyed all (or most if time is up for play) his "enemy's" ships.
- This game could be made more challenging by including the distance as well. Thus teams have to specify the bearing as well as the distance.

The activities illustrated so far shows clearly that teaching and learning can be enriching and enjoyable. Educators are given the freedom to create exciting and creative teaching strategies to inspire students' passion for the subject. We should constantly read and explore new teaching strategies that will enable us to make learning attractive and meaningful. We can expect more changes in the education system and we should be always ready to take up any challenges that come along so that we are better able to prepare our students for the new expectations of a changing world.

References

The Skillful teacher (Jon Saphier and Robert Grower)

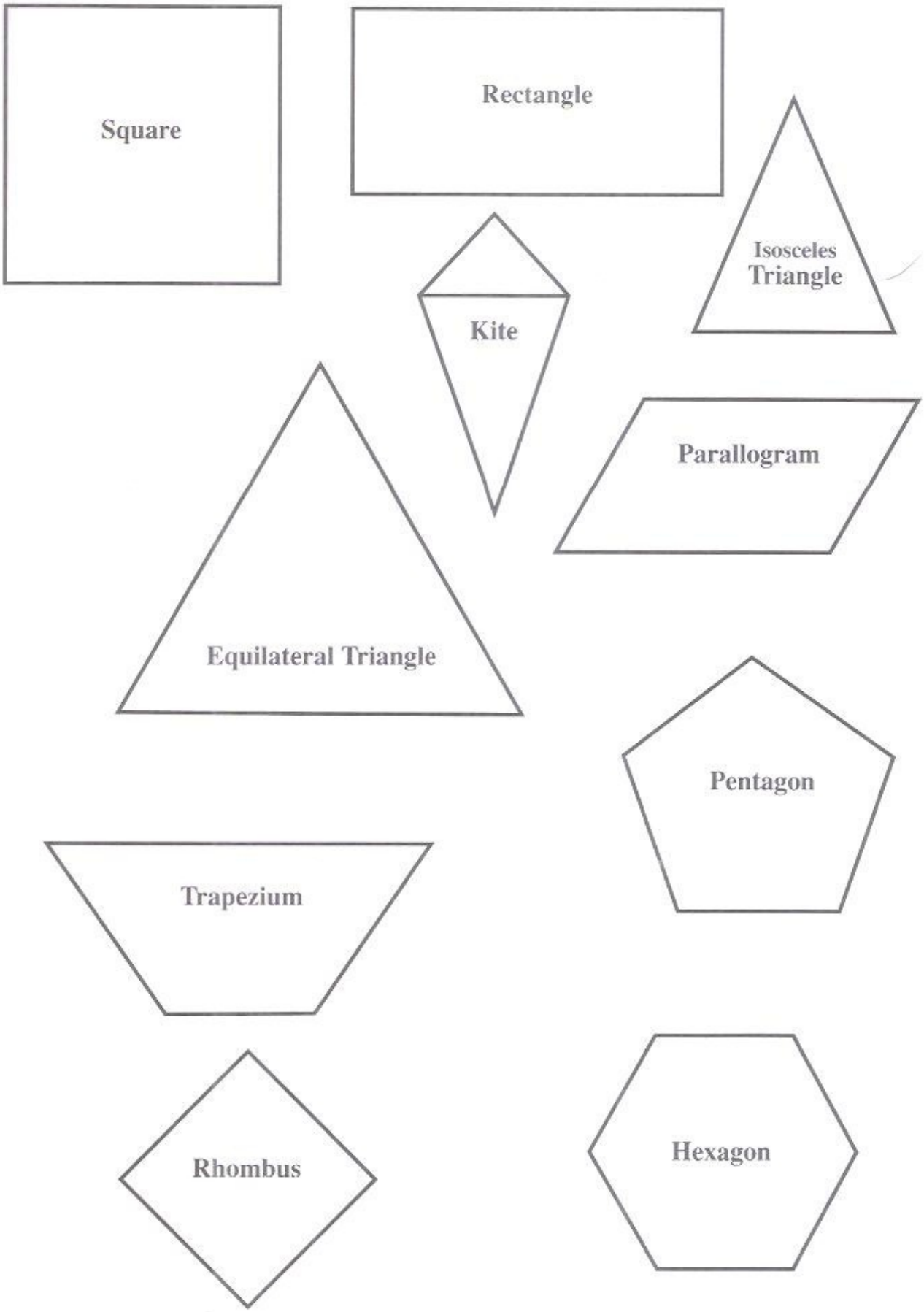
Classroom Management (Barrier Bonnett and Peter Smilan)

Problem Based Learning: Educational Innovation Across Disciplines (Tan Oon Seng, Penny Little, Hee Soo Yin and Jane Conway)

The 7-Habits of Highly Effective People. (Stephen Covey)

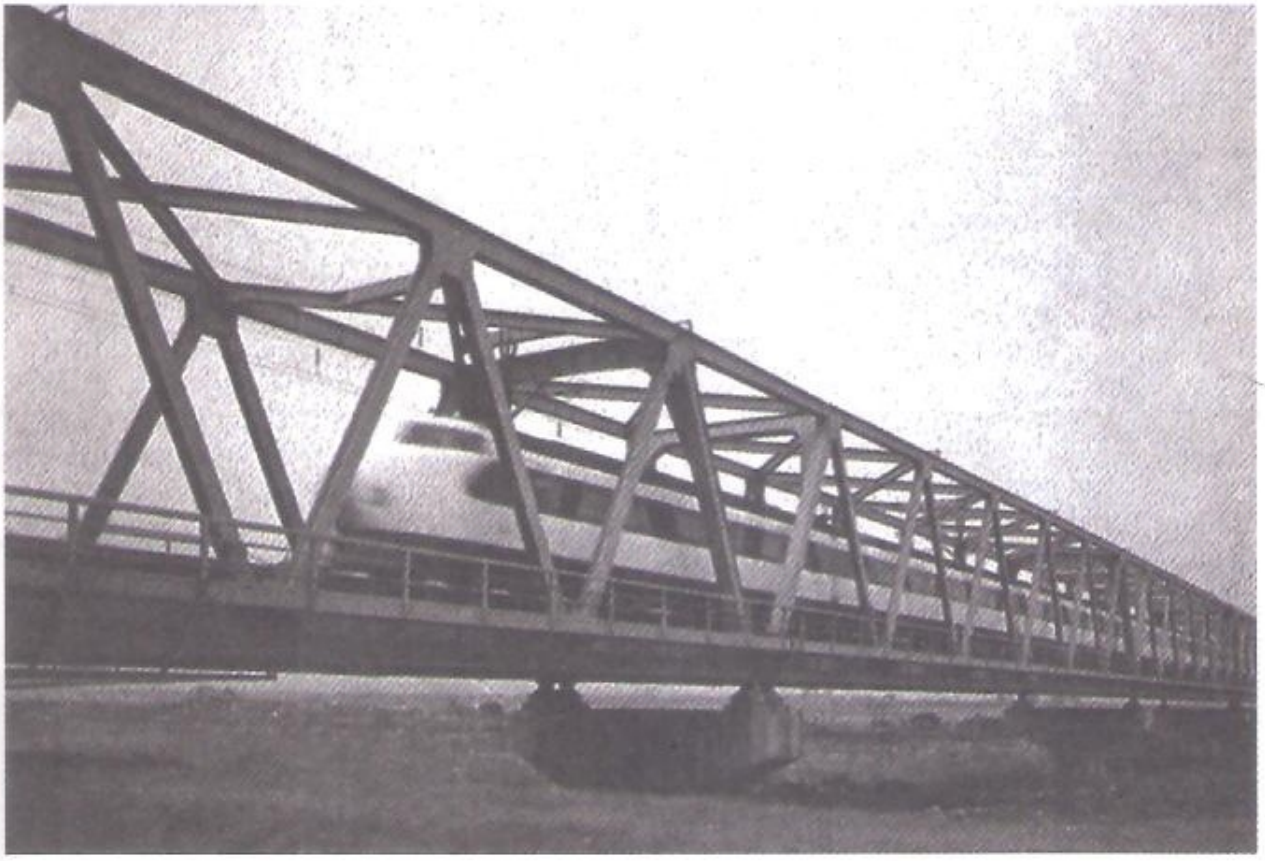
Infusing the Teaching of Critical and Creative Thinking into Content Instruction

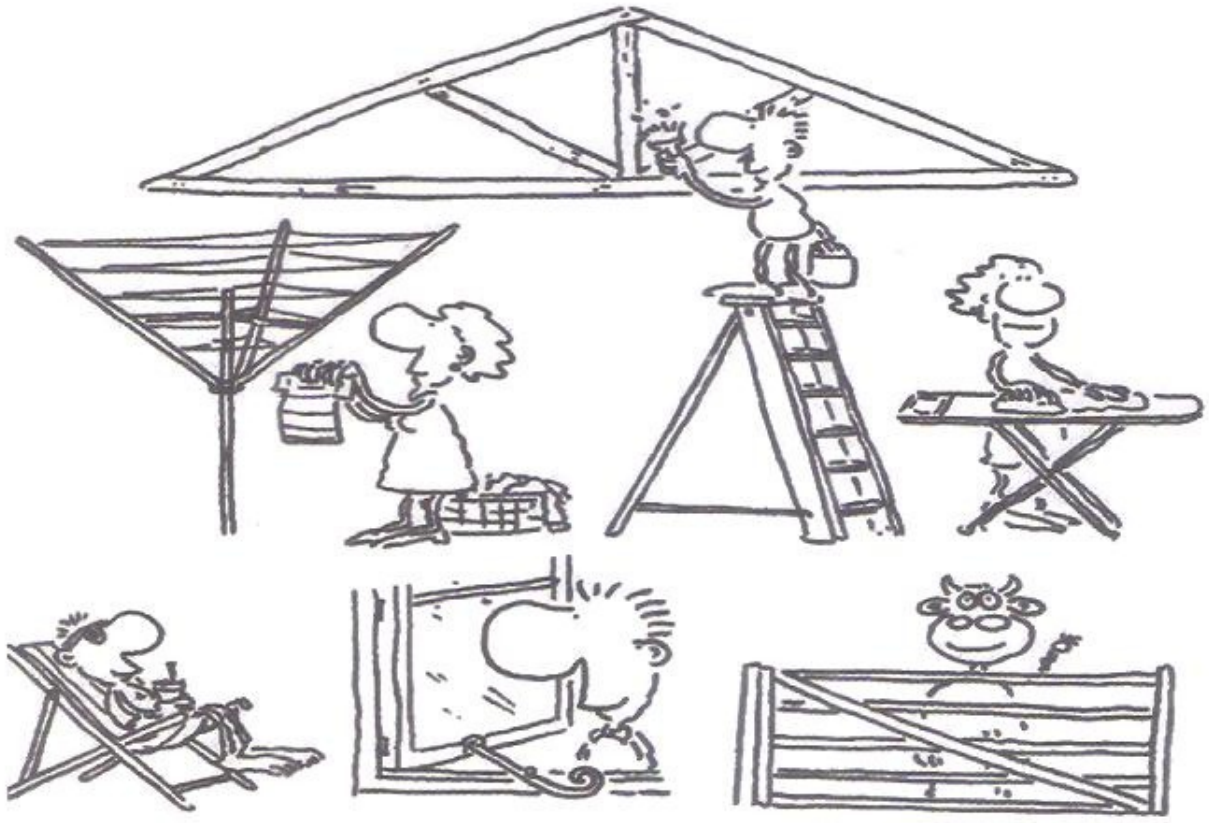
Mrs Manoselvam *is the Head of Department for Mathematics in Swiss Cottage Secondary School*

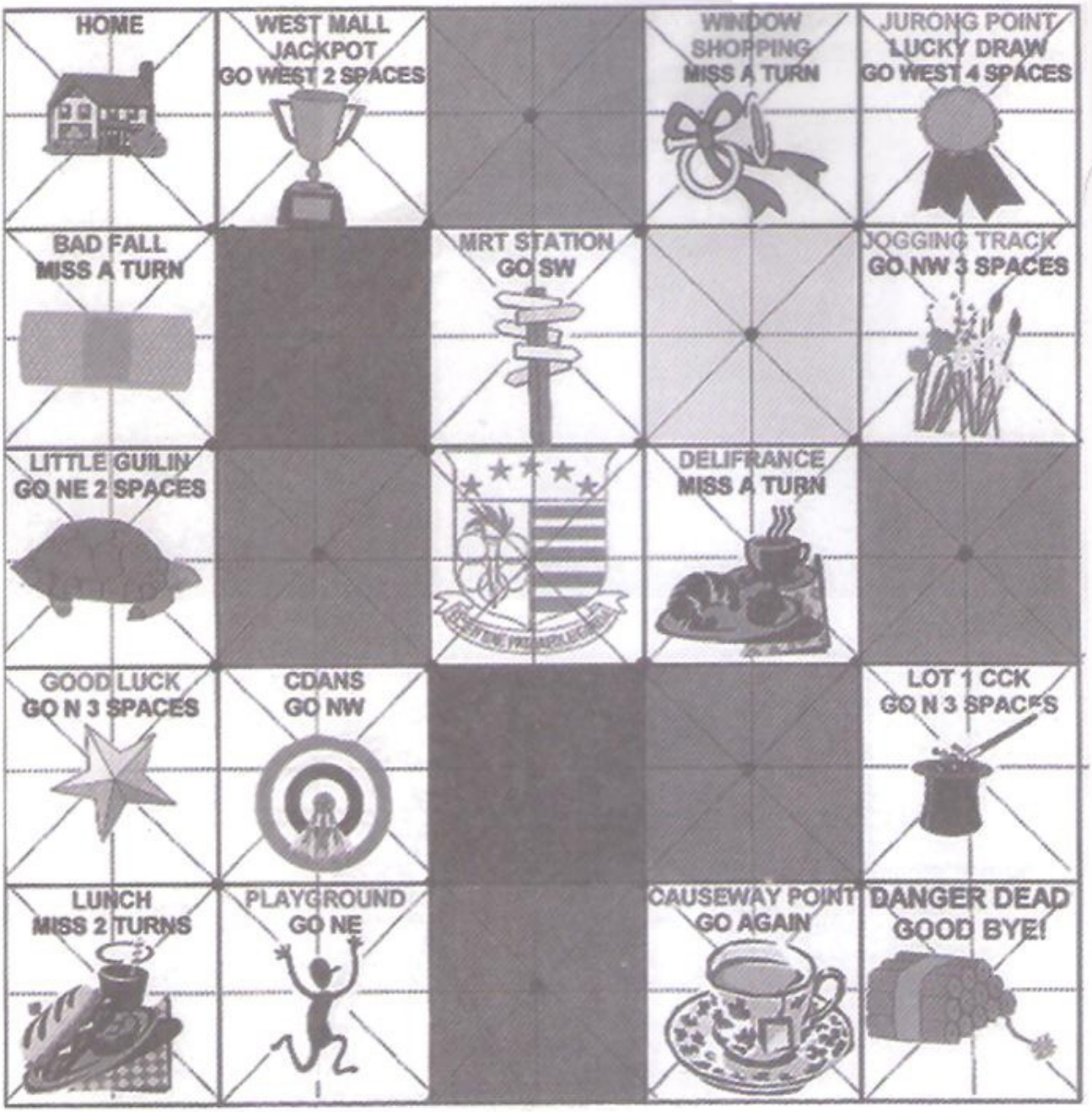

Square
Rectangle
Isosceles Triangle
Kite
Parallogram
Equilateral Triangle
Pentagon
Trapezium
Rhombus
Hexagon

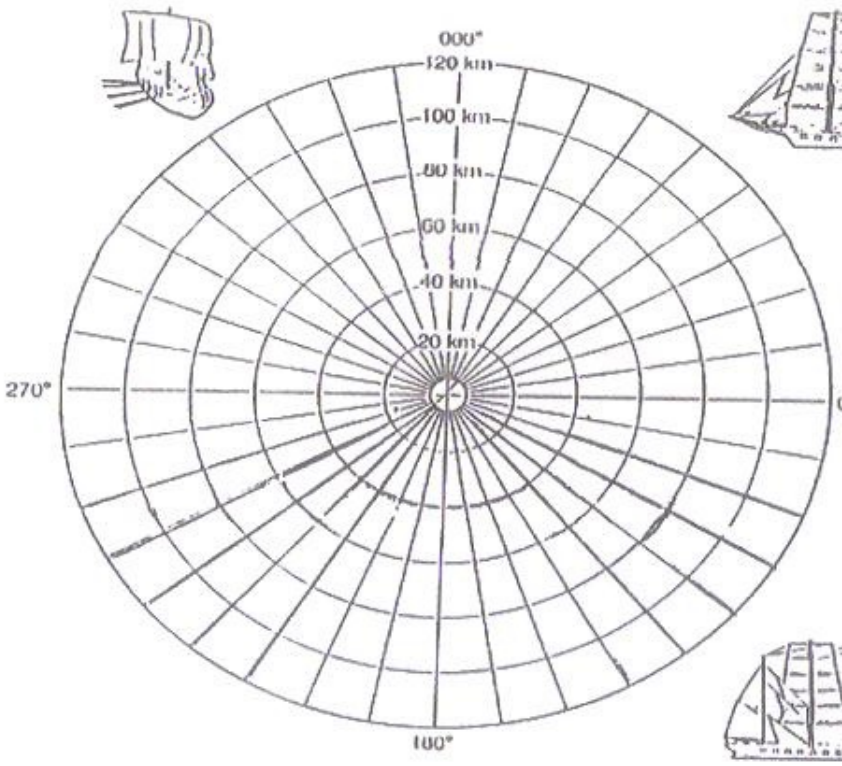
PROPERTIES OF POLYGONS

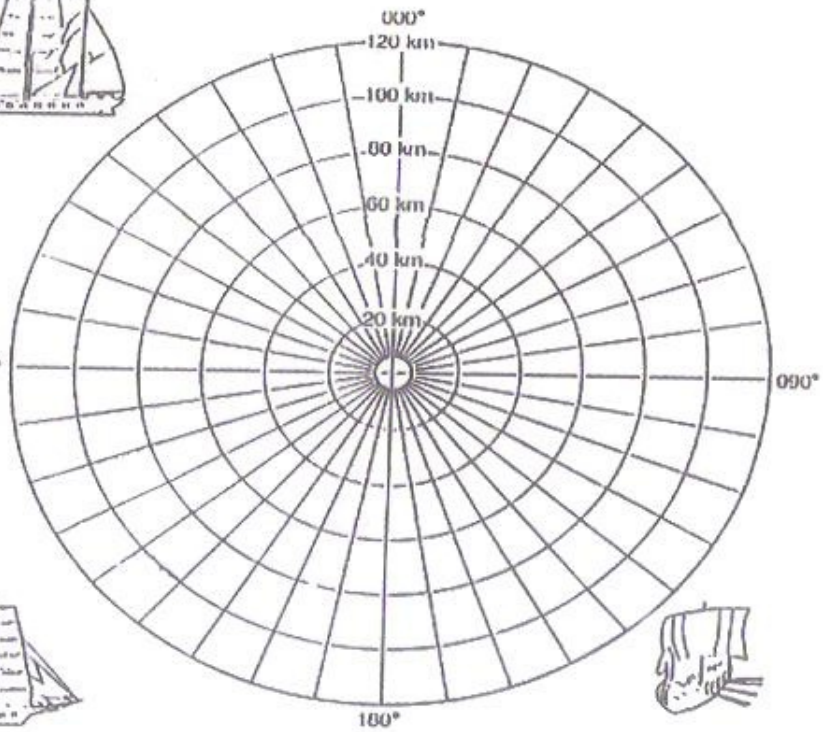
No	Polygon	Are opp. ∠s = ?	Are adj. ∠s =?	Are all ∠s =?	Do diags. Bisect each other?	Are the diags. = ?	Are diags. ⊥ to each other?	Are all sides = ?	Are opp. sides // ?	Are opp. sides = ?	Sum of int. ∠s.
1	Parallelogram										
2	Square										
3	Rectangle										
4	Rhombus										
5	Trapezium										
6	Kite										
7	Isosceles △										
8	Equilateral △										
9	Reg. Hexagon										
10	Reg. Pentagon										






HOME
WEST MALL
JACKPOT
GO WEST 2 SPACES
WINDOW
SHOPPING
MISS A TURN
JURONG POINT
LUCKY DRAW
GO WEST 4 SPACES
BAD FALL
MISS A TURN
MRT STATION
GO SW
JOGGING TRACK
GO NW 3 SPACES
LITTLE GUILIN
GO NE 2 SPACES
DELIFRANCE
MISS A TURN
GOOD LUCK
GO N 3 SPACES
CDANS
GO NW
LOT 1 CCK
GO N 3 SPACES
LUNCH
MISS 2 TURNS
PLAYGROUND
GO NE
CAUSEWAY POINT
GO AGAIN
DANGER DEAD
GOOD BYE!





My (Our) ships : • [S1 - S10]
Destroyed : X

My (Our) enemy's ships
Miss : •
Hit : X

This is a game for two players. Each player will need a copy of this sheet.
Mark the positions of ten ships which will make up your fleet. Your opponent should do the same.
Take turns at trying to guess the position of your opponent's ships.
(Guesses are made by giving a bearing and direction.)
You and your opponent must say whether a guess has been a hit or a miss.
The first to hit all the opponent's ships is the winner.

Enhancing the Learning of Underachievers in Mathematics

Foong Pui Yee & Jessie Ee

Abstract

This article will provide a short overview of the characteristics of underachievers in mathematics and suggest general instructional strategies that develop their strategic approach to learning as well as understanding of mathematics, with some reference to assisting them in self-regulation.

Introduction

There is a need for educators to be constantly conscious of understanding not only how pupils process and construct mathematical knowledge but also the difficulties that they face. The quality of instruction is vital for each stage of a pupil's mathematical development. Pupils may improve or deteriorate in their capacity to retain what they have learnt. As mathematical learning progresses from concrete to complex and abstract structures, greater individual differences are likely to be observed as pupils perform mathematical tasks. There is a need to help pupils acquire and integrate new knowledge pertaining to mathematics within and across each developmental level. As instruction is elaborated at each stage, pupils need to be made more aware of their mathematical declarative, procedural and conditional knowledge so that they can gain better control of their mathematical learning. The first step toward realizing this challenging task is for teachers to have an understanding of the difficulties encountered by pupils when they learn mathematics.

Who are the Underachievers in mathematics and how can teachers identify them?

An underachiever is one who is not achieving to his/her potential. There has been research conducted to find possible causes of poor performance in mathematics and they have identified categories of children being labeled with terms such as "slow learners", "low attainers" or "underachievers". Haylock (1991) prefers to use the term "underachievers" for those pupils outside special schools who fall, for whatever reason, into the bottom 20 per cent of mathematical attainment in their age group in national assessment. Haylock believes that these pupils have the potential, given the right encouragement and appropriate curriculum, actually to achieve very much more than they are achieving at present. Much research including a local study by Foong (1999) have shown that the underachievers in mathematics do not form a homogenous group as there is a diversity of characteristics that might explain why pupils are not successful in the learning of the subject. Many studies on pupil's low attainment in mathematics tended to focus on diagnosis of children's errors and misconceptions which are inadequate in addressing the question on why some pupils are underachieving in mathematics. There is a need to analyse the problem using an ecological framework that describes the relationship between the child and the whole learning environment, in order to obtain more useful insights to the characteristics of underachievers' difficulties in mathematics. These characteristics will be discussed under the

following four categories: 1) the nature of mathematics, 2) language problems, 3) information-processing deficits and 4) motivational problem and maths anxiety. Not every underachiever with learning difficulties in mathematics will exhibit all these characteristics. Nevertheless, teachers need to observe carefully to what extent their pupils show signs of relating to these "deficits".

1) The Nature of Mathematics

Some Characteristics of Mathematics which make it particularly difficult a subject for underachievers are:

a) Mathematical symbols and abstract relationships

Mathematics deals with abstract concepts and relationships between these abstractions. From Primary One onwards, the symbols and language of mathematics are used to represent abstractions and their relationships. For example, the mathematical statement of "7 – 4 = 3" is a relationship between the abstractions 7, 4 and 3, and itself represents many ideas, such as "taking away" one set of 4 things from a set of 7 things; it can also mean the difference between two sets of things or to represent the concept of "more than" and "less than". Unlike addition, this relationship in subtraction is non-commutative. A teacher may tell Primary Two pupils that "you cannot take 7 from 4" but later on in the upper grades the pupils are told they can "subtract 7 from 4" to get "–3". Another difficulty is the learning of place-value concept in a multi-digit number, e.g. a child with no concept of place-value would write "2002" for "two hundred and two". A multi-digit numeral is a number sentence that encodes relationships among individual digits by its position or place-value to represent a number. A child can be said to have understood large numbers if he or she has grasped for this instance, the place-value relationships of the two digits of "2" and "0" in the number "2002". Hence such characteristic of mathematics, using the same symbol to represent different meanings and the unstable "truth" of certain relationship can be confusing for many pupils.

b) Sequencing

Many of the processes and routines involve the learning of a sequence. In the traditional classroom, mathematics learning is usually a highly procedural activity. Teachers often transmit patterns of activity to students by presenting mathematical problems whose solutions involve these patterns. This could be due to a feature unique to mathematics that is the logical organisation of its contents. It involves a hierarchical structure where learning has to proceed as such. To reach any particular branch, it is necessary to go a long way along the whole mathematical tree. For instance, it is impossible to learn percentages and their calculations without mastering part-whole concepts and decimal fraction conversions, the arithmetic of fractions, and fractions with knowledge of multiplication tables and so on.

c) Accuracy and Concentration

Accuracy is a significant feature of school mathematics. Pupils realize that they need to concentrate on their task and exercise care to ensure accuracy. Unlike other subjects where answers to questions can be open-ended, in mathematics it often demands "right" or "wrong" answers. Pupils need self-discipline and perseverance to do mathematics. Low attainers with poor memory and attention span often have difficulty in mental shifting from one response to another according to different requirements in the learning task. If one arithmetic process e.g. addition is concentrated on for any length of time, the transfer to another process say subtraction

is difficult for the child. Often children have no problem counting coins within each denomination group but have great difficulty in counting coins in mixed denominations.

2) Language Problems

It is frequently the case that underachievers may also have poorly developed language and reading skills. It is clearly not appropriate that such pupils still find themselves struggling to learn mathematics through the medium of textbook and workcard schemes. Deficit in conceptual understanding may be responsible for children's inflexibility in the use of comparative terms like "fewer than" and "more than" especially in word problems that are loaded with semantic structures. Solving word problems requires a higher level of thinking on the part of the primary pupils who are at the same time trying to master the English language that is not their mother tongue. A pupil might very well be able to read and understand each of the individual words in a word problem, but putting them together can become a complex task. For example, a word problem like

> *"Mei Ling has some sweets. Her teacher gave her two more sweets. Now, she has seven sweets. How many sweets has she at first?"*

Very often, the pupil may associate 'more' with addition, although in this context, subtraction is required. A pupil must be able to abstract the relationships in this statement and model it with the appropriate mathematical statement. In the learning of the four operations in lower primary mathematics, pupils are exposed to a variety of word problems which may be regarded as having additive, subtractive or multiplicative structure that are not easily discernable to them. A recent error analysis study on mathematics questions with various semantic structures by Clements and Ellerton (1996) involving students in Malaysia and Australia, suggest that semantic structure in the language of mathematics was the crucial factor contributing to the difficulty of understanding in mathematics. In Singapore schools, English language is the medium of instruction for mathematics and all other subjects except mother-tongue languages. Foong (1999) found that all of the underachievers in her study expressed dislike for and experienced failure in solving word problems. On the other hand even though a child may have no particular language disturbance, his mental apparatus must become geared and adapted to the special language of mathematics, which is abstract and symbolic, coded language with its own peculiar shortcuts and abbreviations. Foong also found that this observation is supported by half of the underachievers who were actually quite strong in their oral and written English language.

The English language, even in its standard form, is full of features that may result in misunderstanding. Grauberg (1998) observes that words have one meaning in everyday use and another in mathematics that can cause confusion as indicated in the four types of lexical ambiguity in Figure 1. Words can also change their meaning depending on their context within the mathematics lesson. See anecdotes in Figure 2.

Figure 1. Word ambiguity in mathematical context.

Four types of lexical ambiguity:

1. Homonymy: same form but different meanings.
   E.g. *table* as with chairs and *table* as multiplication table;
   volume as in tuning up radio and *volume* as in volume of a box

2. Polysemy: words with two or more different but related meanings.
   E.g. *product* as in things we make and *product* as a quantity obtained by multiplication;
   takeaway as in fastfood but *take away* as in subtraction

3. Homophony: different words same pronunciation.
   E.g. *two/to/too, four/for, sum/some, pi/pie*

4. Shifts of application:
   E.g. *number 5 as cardinal number, as ordinal number,*
   equal sign = can mean makes, leaves, the same as, gives, results in etc.

Figure 2. Some Anecdotes

Teacher: *Let n be a number.*
Pupil: *But Miss, n is a letter, not a number.*
Teacher: *What's the difference between 24 and 9?*
Pupil: *One has two numbers in it and the other has one.*
Teacher: *Do you know what volume means?*
Pupil: *Yes*
Teacher: *Could you explain to me what it means?*
Pupil: *Yes, it's what is on the knob on the TV set.*

3) Information-Processing Deficits

The learning of school mathematics is marked by a variety of activities such as in the learning of early number concept formation through modeling with concrete objects, mastery of computational and measurement skills, mental calculation, spatial thinking and problem solving. Underachievers with information-processing deficits would have difficulty in mentally shifting from one mode to another according to the requirements in the learning task. When pupils acquire knowledge with understanding, they can apply that knowledge to learn new topics and solve new and unfamiliar problems.

a) Making Connections

Instruction that relies heavily on verbal and textbook explanations and relatively abstract written symbolism through drill exercises overlooks the importance of children's informal knowledge and readiness to learn. This can give rise to a fairly common difficulty experienced by underachievers. It is the inability to connect the abstract or conceptual aspects of mathematics with reality. Understanding what symbols represent in the physical world is important to how well and how easily a child will remember a concept. By only briefly using physical models to introduce arithmetic algorithms without giving pupils sufficient time to make the connection through hands-on activities will not help the pupils to conceptualise the procedures. For example, textbooks commonly illustrate base-ten grouping with bundles of 10 or 100 sticks, but many underachievers are just baffled by these illustrations and ignore such diagrams. Pupils lacking conceptual knowledge of multiple digit subtraction with renaming often make errors like subtracting the top smaller digit from the bottom larger digit, even with the help of base-ten illustrations. In another example, holding and inspecting an equilateral triangle, for example, will be much more meaningful to a child than simply being told that the triangle is equilateral because it has three equal sides. Children like most people are prone to forget information that is not personally meaningful.

b) Difficulty in Transferring Knowledge

Transfer is essential for mathematical competence because new problems need

to be solved using previously learned strategies. Many children do mathematics mechanically and this is evident in their inefficient problem solving and nonsensical answers. For example, pupils would laboriously use the standard long multiplication algorithm to calculate 110 x 0.5, even though they have learnt the 0.5 x 110, is half of 110! In a study by Davis and McKnight (1980), they explored third and fourth graders' treatment of the problem 7000 – 25. They identified six kinds of knowledge that students might connect with this problem: approximate size of quantities, making change with money, representing with base-ten blocks, strategies for solving similar problem with smaller numbers, mental computation strategies, and the standard written procedure. They found that not all students possessed all kinds of knowledge, but most importantly when the knowledge was available it was not connected. If this kind of connection is not made, mathematics skills may not be anchored in any meaningful or relevant manner. This makes them harder to recall and apply to new situations. So when presented with abstract, complicated, and uninteresting instruction such pupils usually would ignore, misconstrue, forget, or at best memorise the new information by rote.

4) Motivational problems and Maths Anxiety

Hagg (1994) found that children underachieve in mathematics when they come to depend upon others to do their thinking for them. In his study, most of the children identified as underachievers used avoidance tactics. What seems to happen with these children was that they have responded to new mathematical situations by depending on others to resolve the conflict for them, to make it easy. When this proved unrewarding they avoided the conflict altogether. It seems apparent that more children depend upon others to do their thinking for them in mathematics than in other subjects. Hagg (1994) attributed this deficit in mathematics to the way children have been taught to do in school. From primary one onwards, mathematics is usually being taught using structures and teaching routines that foster dependence, for instance, ten to twenty mental sums given in highly threatening atmosphere. Underachievers are usually left feeling "lost" or "stupid". The sums are usually marked quickly and orally with no or little time left for corrections. The avoiders either copy, guess, or fill in the correct answers as they read. This approach reinforces the idea that memorization and being able to disconnect one-step computations quickly is what mathematics is about.

In Foong's (ibid) study, many of the primary six underachievers were apparently afflicted with mathematics anxiety due to the years of accumulative failures since lower primary. The teachers observed that some of them lack confidence and were always seeking teacher's attention and assurance in their work. For the lower primary children, anxiety could be aroused from the pressure of completing worksheets and tests with no understanding and for some of the upper primary pupils the impending failures could lead to avoidance with misbehaviour like not handing work or truancy.

Underachievers who experienced difficulties in mathematics often also experience greater difficulty than their peers without disabilities. Many of them have encountered frequent mathematical failures that result in the development of learned helplessness in mathematics (Ee & Chan, 1994). Their repeated failure and lack of mathematical understanding lead to dependency on the teacher or their peers for help. Ee, Moore and Atputhasamy (2001) and Ee and Chan (1994) indicated that pupils with learning difficulties are more likely to have work avoidance

tendencies and attributional beliefs that things are not within their personal control. Their maladaptive motivational orientations, attributing success to luck and failure to lack of ability, and work avoidance tendencies are detrimental to learning. This may also result in mathematics anxiety at a later stage.

How Can Underachievers' Learning be Enhanced? Some Possible Solutions

1) Connecting Mathematical Representations

With underachievers, there is a temptation for the teacher to drill them in the mastery of routine mathematical processes. Frankly, if pupils cannot interpret the result of a mathematical task then it has had little value for them even if they mastered it through mere drilling. For example, if they can perform successfully a multiplication involving two numbers but are unable to say, if challenged, when that operation might be used, or to say whether the answer is a reasonable one or not, then there is something seriously wrong. Activities need to be devised to help children build up connections and make sense of their learning. This involves experience with manipulatives or concrete aids followed by the use of language concepts and word problems and recognizing the problem as represented in pictures as in number lines, charts and graphs etc., followed by the representation in symbols. Thus, children must be able to manipulate **concrete materials**: for example, moving blocks, rods, counters, fingers, coins. They manipulate **symbols**: writing digits on pieces of paper, arranging them in the prescribed fashion, copying exercises from the workcard, numbering the questions, crossing out some symbols, carrying one, filling in boxes, pressing keys on their calculator etc. They manipulate **language**: reading workcards, processing the teacher's instructions, interpreting word problems, saying out loud the words that go with their recording, discussing procedures with other pupils in a group, and so on. And finally they manipulate pictures: for example, number lines, set diagrams, arrow **pictures** and graphs.

It is helpful to think of understanding the concepts of number and number operations (e.g. number, place value, addition, subtraction, multiplication, division, equals) as including the building up of networks of cognitive **connections between** these four types of learning experiences: **concrete experiences, symbols, language and pictures**.

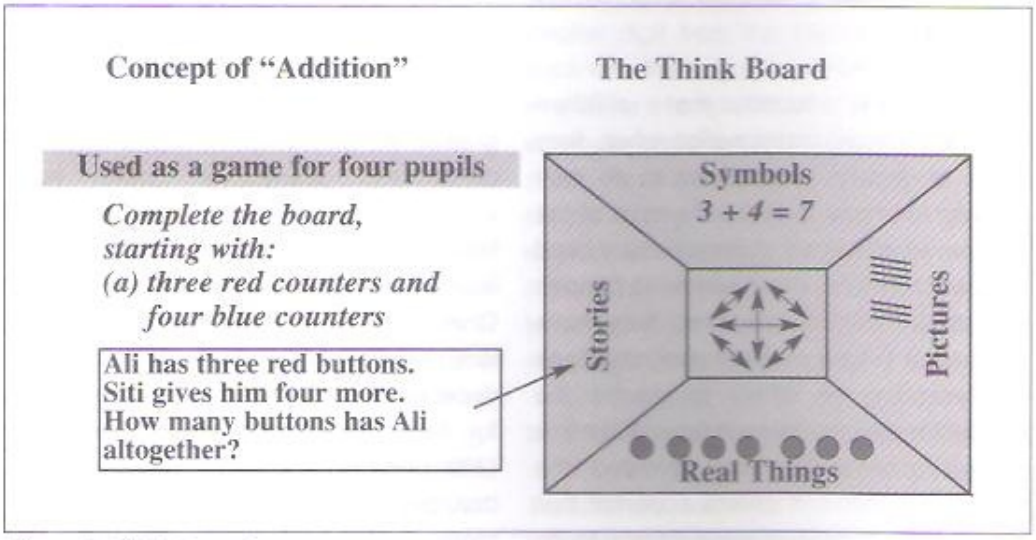


Figure 3. Think Board

Pupils can be given the **think board** (Figure 3) as an activity to promote connections between the representations of mathematics, that is, written and spoken words, pictures or diagrams, real things (concrete situations) and symbols. The think board (Herrington, Wong & Kershaw, 1994) is made up of a large piece of card divided into four sections. Each section displays the same mathematical idea using a different representation. To use the board pupils need paper, graph paper, pencils and a variety of concrete materials such as counters, blocks, coins, and strings. Four pupils can play and arrange themselves around the board. For instance, they are given a starting point, say, three red counters and four blue counters which they have to place in the correct section of the think board. Then they have to discuss and complete the board by writing stories, drawing pictures or diagram, use the correct symbols in the form of a number sentence, as shown in figure 3. Different starting point may be used and pupils have to complete the other representations in the board. In using the think board, pupils develop the strategy of forming their own meaningful elaborations of the mathematical concept and their connections with different modes of representation.

Translate from one mode of representation to another

2) Extending and Applying Knowledge in Real-life Situations

Children will have fewer problems if they perceive the relevance of the mathematical activity. It may be difficult for children to make the necessary connections with abstract problems unrelated to real life situations and the challenge to the teacher is therefore to relate the mathematics activity to meaningful and purposeful situations that are related to real life situations. For example, children may have difficulty in ordering three objects according to their weight. However, if they are provided with hands-on experience where they weigh ingredients and arranged them in order for a combination in a favourite recipe, there may be a more likelihood of success opportunities. Other examples include use of money in purchasing, measuring heights and weights, depicting information in pictorial form, and finding one's location in maps. More challenging applications include using mathematics to play strategic games, creating beautiful designs using geometrical shapes, and using real-life data for project work (Bishop, 1988).

Other real life situations could focus on the following contexts and involve the following activities e.g. contexts such as school, classroom, television, video, home, shopping, cooking, travel and sports whilst, the activities may involve planning events, competitions, construction, small group games, solving real life problems and role plays. The tasks to be given must be age-appropriate and preferably related to national education issues in Singapore.

Using real-life context can provide opportunities for pupils to use their intuitively acquired knowledge to solve problems even before they have been taught the basic skills. For example, in a project by Carpenter et.al. (1999), children started out solving problems involving joining, separating, and comparing even before they had learned about addition and subtraction. In the project, mathematical tasks were set in a problem context drawing on experiences that the class had shared such as a field trip, a science project, and a book they have read. Citing a typical lesson, Ms K's first grade class was preparing for a field trip to a restaurant owned by the parents of one of the children in the class. They were comparing prices of items on the menu. Ms K read the following problem several times and wrote the numbers on the overhead projector:

At Bucky's Burger Barn, a hamburger costs $3.65, and a steak sandwich costs $4.92. How much more does a steak sandwich cost than a hamburger?

The children were set to work on the problem at their desks. A number of tools, which the children could use to solve problems, were stored in one corner of the room, and some children went to get these tools such as counters of various kinds, plastic coins and base-ten blocks. Children worked individually or in groups to solve the problem. After the problem is solved, pupils share their strategies. Strategies are then discussed by encouraging pupils to ask questions if they do not understand, to comment or to compare the others' strategies. Such problem-based approach enables pupils to develop flexibility and creativity in applying mathematical ideas. Teachers need not have to spend majority of their time explaining and demonstrating while the pupils are engaged in a real life situation and thinking independently on their own.

3) Use Language Learning Ideas to Learn Mathematics

Children must make sense of what they learned. Activities and experiences must focus on developing the language of mathematics so that the connections may be understood and reinforced. Such language concepts include those of comparison e.g. more, more than, less, less than, same, same as, few, fewer, as big as, taller, shorter, longer, heavier, lighter etc. Teachers should develop meaning for such comparison concepts and the four operations by modeling and discussing a rich variety of problem situations. And teachers must recognize that a wide variety of problem structures can be represented by a single operation. For example, teaching inappropriate generalization regarding operational choice due to the use of key words without reading problem text may be disastrous. Recipes such as words like 'more' or 'times' tend to imply addition or multiplication may not hold true in some situations e.g.

John has 27 apples. He has 3 times as many apples as Frank. How many apples does Frank have?

The above sum is not a multiplication sum but a division sum. Language teachers generally give sufficient time for students to listen, read, speak and write, but this is not the case for mathematics lesson when students are introduced to mathematical terms and are expected to use such terms immediately. In mathematics instruction, time should also be given to students to learn a new terminology by listening to, as well as speak, write and read the new word. The reason for the difficulty of underachievers in learning mathematics could be the premature learning of symbolism coupled with excessive mechanical practice. Just as understanding and communication are important in language learning, so too, in mathematics where understanding mathematical concepts and procedures are linked to communicate through a range of activities from oral explanation, journal writing to written explanation and student-generated word problems. Menon (1995) translated some language learning ideas that can enhance mathematics learning, some suggestions are:

a) Introduce, discuss and reinforce new terminology

When a new term is introduced, write it on the board, spell it, pronounce it and let students listen and repeat after the teacher e.g. perimeter — "peri," means "around", and "meter" meaning "to measure". So perimeter means "measuring aound". Assist children to connect everyday language with mathematical language, as well as with context and multiple meaning and ask "Does a 'right' angle mean there is

also a 'wrong' or 'left' angle?

b) Meaning, pronunciation and context

The concept "square" as a shape compared to the "square" of a number and the everyday use of the word as in a "square" meal.

c) Encourage student-generated question or word problem

As in the process approach in the learning of language, mathematics students could write their own word problems based on their own experiences, and refine their questions and solutions through peer discussion, explanation and justification. e.g.

Given the number 25 and 5, prepare a two-step word problem involving addition and subtraction and solve it. Show how you worked out the answer. Exchange your problem with your neighbour and work out each other's problem. Be prepare to explain to the class how you work out the problems.

4) Metacognitive Strategies – Encouraging Reflection Through Experiences

Groteluschen, Borkowski and Hale (1990) maintained that, besides strategy-based instruction, pupils require attributional retraining. Borkowski (1992) stressed that teachers need to focus on using success-oriented dialogues aimed at coping failure, such as dialogues that link attributions to performance (effort) or strategy. Thus, pupils would be more likely to attribute their success to effort, strategy use or improved ability, rather than to luck or easy task, and to attribute their failure to lack of effort or strategy use, rather than to lack of ability, bad luck, or task difficulty. Teachers can also provide opportunities for success to enhance pupils' self-competence and self-esteem.

Metacognitive strategies are processes that require pupils to become aware of their own thinking processes and through such awareness, take steps to set goals, plan, monitor and regulate their thinking. Underachievers are likely to have not only ineffective strategies but also metacognitive deficits. They fail to monitor and regulate their learning as they perceive themselves not in control of their learning. However, Montague (1997) maintained that this is a promising approach for pupils with learning difficulties especially those who have learned basic mathematical knowledge but cannot apply them successfully when solving mathematical problems.

Some metacognitive questions relevant to mathematics problem solving are given below.

a) What information is given and what is to be found?
b) What strategies do I have and how are they relevant to the problem?
c) Can I carry out these strategies?
d) Does what I am doing bring me closer to the intended solution?
e) How do I know I have found the correct answer?

In introducing such strategies in primary mathematics teaching, the teacher needs to make these strategies explicit. One way is to display posters that describe these self-monitoring questions. Pupils can also be encouraged to make their own note cards consisting of these questions. Teachers must also model the application of these strategies by thinking aloud as they solve problems in front of the class. They can also encourage peer evaluation by getting pupils to ask questions like "What do you think of Jane's answer, John?" or "Why do you say he is right, Mary?" Pupils must be given time to think and respond. In the event when no one has the correct answer, the teacher will provide supportive and constructive feedback on pupils' attempts. During discussion,

teachers can brainstorm and help pupils to see that there are many solutions to a problem as well as encourage pupils to clarify their answers for the benefit of the entire class, using prompts such as "Please tell us how you get this" or "Please tell us more about ..." Pupils' feedback on these questions will provide clues about their understanding as well.

Teachers may also assist pupils to visualize or draw diagrams to encourage understanding and retention. This is related to the iconic mode suggested by Bruner (1964). A series of small goals can be set to help pupils reach the final goals. In ensuring that pupils monitor and self-regulate their learning, they must be taught to use various ways to check their answers and to consider alternatives strategies. A good example is the "restaurant" problem given on page 135 of the Singapore primary mathematics syllabus (shown in Figure 3).

A square table can seat 4 people. How many such square tables, arranged to form a long table, are needed to seat 30 people?

These underachievers in mathematics should also act it out by arranging desks and sit according to the problem situation. As the pupils are doing this, explain to them that the purpose is to understand the problem (monitor the thinking). Subsequently, allow them to count the number of desks and pupils and put these values on a given list. Pupils may be encouraged to answer the question "Why do we want to make a list?" This can be followed by one of the three methods given, with questions at each key step. Once the problem has been solved, ask for alternatives. In the recapitulation phase, pupils may be encouraged to suggest similar problems that can be solved using the methods learned. For example, "what if we wish to seat 98 people or 100 people?" For each extra question, encourage pupils to check by asking, "How do we know we have the correct answer?" The context of the question can also be changed, for example, instead of "seating people" change to "How many toothpicks are required to make these patterns?" and so forth. For this extension part, probe with a question such as, "What is the purpose of doing problems similar to this one?" Through these questions, pupils perceive the steps that are modeled and will be encouraged to emulate the skills learnt in their own problem solving.

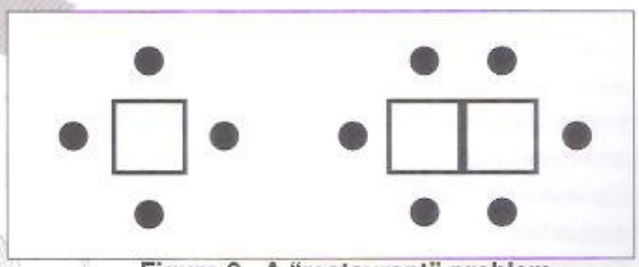


Figure 3. A "restaurant" problem

As Singapore primary pupils spend more time learning mathematics in computer-based lessons, metacognitive questioning should be included as suggested by Healy (1999). The thinking process should be made explicit when demonstrating the use of a software through questions such as, "I need to make a copy and this icon shows a double page. What does it suggest?" or "What do I need to do first after highlighting the data if I am to draw a chart?" When pupils are practising, teachers need to observe what they are doing, and quietly probe them to access their level of understanding with questions such as, "I wonder what that icon does?" or "I noticed sometimes you got answers with a few decimals and sometimes answers with many decimals, could that be important?" According to Healy (1999), "children of any age can eventually begin to internalize this sort of dialogue from which they gain self-control and problem-solving skills" (p. 248).

This metacognitive approach to learning can also be integrated with games and hands-on activities. When used in this way,

it supplements the predominant practice of drill and practice. This type of learning will take more time. The literature in cognitive strategic instruction emphasizes explicit instruction in these strategies through careful modeling, guided practice, corrective and positive feedback, which are desirable in most forms of teaching practice. Other cognitive strategies include mnemonic skills (Wood, Frank & Wacker, 1998), mind-mapping, organizational skills, and elaboration strategies (Herrington, Wong & Kershaw, 1994).

In Conclusion

This brief paper attempts to understand some of the difficulties faced by underachievers in mathematics and ways to reduce their learning difficulties. However, for effective teaching to take place, it is imperative that proper diagnosis be undertaken to understand more about the individual underachiever's difficulties as each child is unique and no one method or approach may be suitable for everyone. Teachers must understand their students and consider their prior experience and knowledge before implementing remediation plans and approaches.

References

Bishop, A. J. (1988). *Mathematical enculturation: A cultural perspective on mathematics education.* Dordrecht: Kluwer.

Borkowski, J.G. (1992). Metacognitive theory: A framework for teaching literacy, writing and mathematics skill. *Journal of Learning Disabilities*, 25, 253-257.

Bruner, J. S. (1964). The course of cognitive growth. *American Psychologist*, 19, 1–15.

Carpenter, T. P., Fennema, E., Fuson, K., Hiebert, J., Human, P., Murray, H., Olivier, A. & Wearne, D. (1999). Learning basic number concepts and skills as problem solving. In E. Fennema & T.A. Romberg (Eds.) *Mathematics classrooms that promotes understanding*, pp. 45-62. LEA: London.

Clements, M.A., & Ellerton, N.F. (1996). *Mathematics education research: Past, present and future.* UNESCO, Bangkok.

Davis, R.B., & McKnight, C. (1980). The influence of semantic content on algorithmic behaviour. *Journal of Mathematical Behaviour*, 3(1). 39-87.

Ee, J. & Chan, L. (1994). *Attributional beliefs, goal orientations, strategic learning and achievement of Primary 6 Singaporean students.* Paper presented at Australian Association for Research in Education (AARE), Annual Conference in Newcastle, New South Wales.

Ee, J., Moore, P.J., & Atputhasamy, L. (2001). The relationship between teachers' goal orientations and strategy-based instruction and low-achieving students' goal orientations, self-regulated learning and achievement. *Asia-Pacific Journal of Teacher Education and Development*, 4(2), 115-134.

Foong, P. Y. (1999). Can we identify the reasons for a pupil's low attainment in mathematics. In Loo S.P (Ed). *Educational challenges in the new millennium. Proceedings of the MERA-ERA Joint Conference 1999.* Malaysia. 1999, 648-660.

Grauberg, E. (1998). Elementary mathematics and language difficulties – *A book for teachers, therapists and parents.* London: Whurr Publisher.

Groteluschen, A.K., Borkowski, J.G., & Hale, C. (1990). Strategy instruction is often insufficient: Addressing the interdependency of executive and attributional processes. In T. Scruggs & B. Wong (Eds.), *Intervention research in learning disabilities* (pp. 81-101). New York: Springer-Verlag.

Hagg, G. (1994). Underachievement in mathematics. In J. Neyland(ed.). *Mathematics Education: A handbook for teachers.* Vol. 1, 387-396. Wellington College of Education: New Zealand.

Haylock, (1991). *Teaching mathematics to low attainers*, 8-12. London: Paul Chapman Publishing Ltd.

Healy, J. M. (1999). *Failure to connect: How computers affect our children's mind and what we can do about it.* New York: Simon & Schuster.

Herrington, T., Wong, K. Y., & Kershaw, L. (1994). *Maths works: Fostering mathematical thinking and learning.* Adelaide: Australian Association of Mathematics Teachers.

Menon, R. (1995). Using language learning ideas to learn maths. *Review of Education Research and Advances for Classroom Teachers.* Vol. 2.

Montague, M. (1997). Cognitive strategy instruction in mathematics for students with learning disabilities. *Journal of Learning Disabilities*, 30(2), 164-177.

Wood, D. K., Frank, A. R., & Wacker, D. P. (1998). Teaching multiplication facts to students with learning disabilities. *Journal of Applied Behavior Analysis*, 31, 323-338.

Dr Foong Pui Yee *is an Associate Professor in the Mathematics & Mathematics Education Academic Group at the National Institute of Education, Nanyang Technological University. Her areas of research interest include mathematical problem-solving and mathematics education. Email: pyfoong@nie.edu.sg*

Dr Jessie Ee *is an Assistant Professor in the Specialised Education Academic Group at the National Institute of Education, Nanyang Technological University. Her areas of research interest include mathematics, motivation, strategy instruction and learning disabilities. Email: lcjee@nie.edu.sg*

The MI way of Learning MT

Toh Keow Lam

Introduction

When I was offered the chance to attend a 2-day workshop on Multiple Intelligences (MI) during the March holidays this year, I hesitated initially but was persuaded otherwise. It was a decision that would later pave the way for the many interesting and successful, experimentations in my classroom teaching. This renewed enthusiasm can be attributed to the realization of one simple yet profound principle that I learnt – that all individuals could learn but they learn differently, if only we can find the key to unlock their potential. This has since been the guiding principle in helping my students to learn the Chinese Language differently.

This article is an attempt to share some of the key learning points for using MI. I have also included a few of lesson plans that I have executed and the learning outcomes.

The Eight Multiple Intelligences

Verbal/Linguistic
This intelligence has to do with words and language, both written and spoken.

Visual/Spatial
This intelligence, which relies on the sense of sight and being able to visualize an object, includes the ability to create internal mental images and pictures.

Logical/Mathematical
Often called scientific thinking, this intelligence deals with inductive and deductive thinking, reasoning, numbers and recognition of abstract patterns.

Musical/Rhythmic
This intelligence is based on the recognition of tonal patterns, including various environmental sounds, and on a sensitivity to rhythm and beats.

Bodily/Kinestheic
This intelligence is related to physical movement and the knowing and wisdom of the body, including the brain's motor cortex, which controls bodily motion.

Intrapersonal
This intelligence relates to inner states of being, self-reflection, metacognition (thinking about thinking), and awareness of spiritual realities.

Interpersonal
This intelligence operates primarily through person-to-person relationships and communication.

Naturalist
This intelligence deals with the recognition, appreciation, and understanding of the flora and fauna of the natural world.

What does it take? – The 4 Stages

Stage I: Awaken Intelligence: Activate the senses and turn on the brain.

Each of the intelligences is related to the five senses. In general, a particular intelligence can be activated or triggered through exercises and activities which use the sensory bases – sight, sound, taste, touch, smell, speech, and communication with others – as well as inner senses – intuition, metacognition, and spiritual insight.

We must be aware that we possess multiple ways of knowing and learning and thus we must learn various techniques and methodologies for triggering intelligence within the brain-mind-body system.

Stage II: Amplify Intelligence: Exercise and strengthen awakened capacities

As with any skill, intelligence skills can also be improved and strengthened if used on a regular basis. Likewise, they will be neglected if not used.

We must learn how a particular intelligence (or way of knowing) works; that is, what are the various skills, how to access them, and how to use and understand different intelligence modalities. This involves both practice in strengthening intelligence capacities as well as learning how to interpret and work with the different kinds of information we receive from each intelligence. For example, the language of bodily/kinesthetic intelligence is physical movement, not words, sentences, writing, and speech.

Stage III: Teach For/With Intelligence: Structure lessons for multiple intelligences

We must learn how to apply the different ways of knowing to the specific content of a given lesson. We can teach all students to be more intelligent in more ways, and on more levels than they ever dreamt. Anything can be taught and learnt through all of the intelligences. About ninety-five percent of the material we have to teach comes pre-packaged in a verbal/linguistic or logical/mathematical form. However, we need not, and should not be confined to do so.

Stage IV: Transfer Intelligence: Take multiple ways of knowing beyond the classroom

We must teach our students how to use all of the intelligences to improve their effectiveness in dealing with the issues, challenges, and problems we face in the task of daily living. This is primarily a matter of approaching these matters on multiple levels, with a variety of problem-solving methods that use different intelligences. The goal is for the intelligence to become a regular part of one's cognitive, affective and sensory life.

How I use MI to teach The Chinese Language

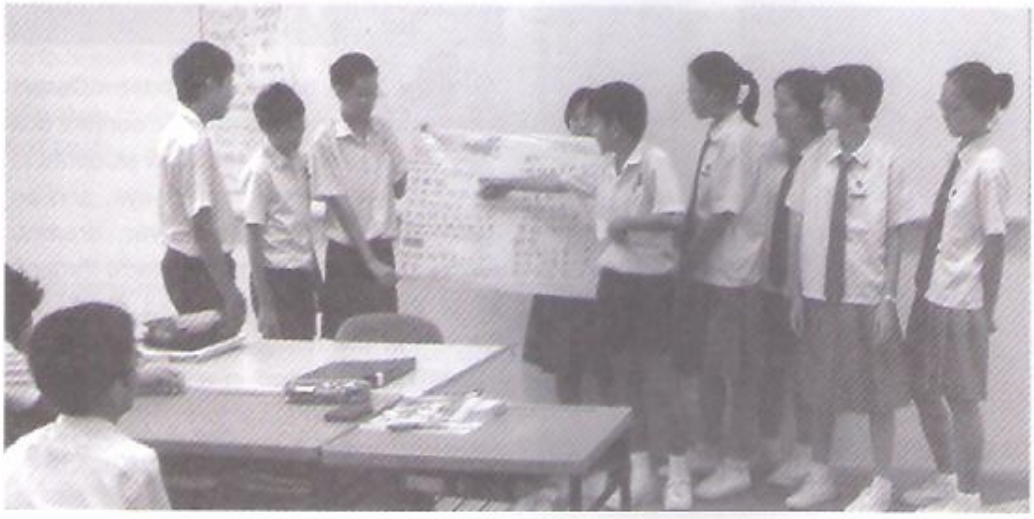
"As educators, we have to know how to approach their knowing and learning through a different set of doorways than the verbal/linguistic and logical/ mathematical, which dominate all systems of education in the world to-day. In a time when programs for the gifted flourish in many schools, I find myself an advocate for the giftedness of every child, if only we as teachers can find the keys to unlock their full potential." – David Lazear

Prior to my experimentations, I reminded myself to know my students well. This will then allow me to manage the class better, such as setting group work, to facilitate more effective and meaningful learning. Although the approaches may be different and at times the class may seem 'chaotic' and focus unclear, as a teacher, I learnt to be on task to achieve the lesson's objectives and ensure the relevance of the learning outcomes to the students' personal experiences as far as possible.

Experiment 1

Topic: Learning more about a place, such as Chinatown

Objective: To have students present their knowledge of these places with the help of the vocabulary learnt and make comparisons between the old and new Chinatown.



Intelligences invoked: Verbal/Linguistic, intrapersonal, interpersonal, visual/spatial, logical/mathematical Intelligences.

Process: Begin with teaching the basic vocabulary before group discussions. Set aside 45 minutes for them to conference, write and draw their experiences at the place. Then, they can make a comparison between now and the past, or from now to the future.

Learning Outcomes: Many of the groups drew representations of Chinatown of the past, present and future as evidence of their knowledge about the place. In addition, the students were able to make use of the entire vocabulary list as required. This is a result of teamwork, which generated a great amount of sharing among members as they leveraged on one another's ideas. The students did not stop short of presenting their work but went on to question the other groups to highlight insufficiency in content or wrong usage of words. The interaction was intense but purposeful and many found the experience enriching even as they learnt more about a place.

Experiment 2

Topic: Learning about the Love of a Mother

Objective: To showcase a mother's unconditional love through experiences told or song composition. Suggested content included what mothers would do when the students fail or succeed, or when they are sick.

Intelligences invoked: Verbal/ Linguistic/ intrapersonal/interpersonal/visual spatial/ logical/The Musical/Rhythmic Intelligence.

Process: Begin with teaching the basic vocabulary before group discussions. Break up the class into three discussion groups. Set aside 45 minutes for them to conference, write and draw their experiences. Each group was tasked to showcase the great love of mothers in a way unique from the others, depending on the talent makeup of the group.

Learning Outcomes: The students came up with different ways to illustrate how mothers shower their love on their children,

which included song composition by the groups. They presented their group discussions with gusto and conviction. Some of the ideas shared are genuine reflections of their own encounters, which apart from being touching, made the learning authentic.

Experiment 3

Topic: Learning about Culture – Dumpling Festival "Duan Wu Jie"

Objective: To appreciate our culture and learn from it.

Intelligences invoked: Verbal/ Linguistic/ intrapersonal/interpersonal/visual spatial/ logical/The Musical/Rhythmic Intelligence.

Process: Begin with teaching the basic vocabulary before group discussions. Set aside 45 minutes for them to conference on the what, why and how of appreciating Duan Wu Jie. Have the students discuss their learning points and share with the whole class.

My Personal Learning Points

There is a saying that goes like this:

Tell me, I forget
Show me, I remember
Involve me, I understand

Central to the using of MI is a student-centric pedagogical approach. Allowing students a sense of self-efficacy and promoting independent learning are key success factors. Without doubt, the individuals are endowed with their unique talents and personalities. Having this in mind and appreciating that individuals learn differently, it is important that I build up my repertoire of teaching and learning strategies. Of equal importance is providing a focus on clearly articulated standards and objectives to provide directions.

Technicalities aside, what remains is the need for my students to sense the passion in me in the entire process. It is a cue and an encouragement for them to also be passionately involved in their learning. At the end of the day, the lessons must be an enjoyable and fruitful time of learning that helps to sustain interest for the subject and impact positively on the learning outcomes.

I know that I am on the right track – the many smiling faces, the rekindled interest for the subject and the resulting improvement in performance tell me so.

References

Lazear, D. (1999). Eight Ways of Teaching – The Artistry of Teaching with Multiple Intelligences, (3rd ed.). SkyLight Training and Publishing Inc.

Rutherford, P. (1998). Instruction for all Students. Just Ask Publication.

Mrs Toh Keow Lam *is a Chinese language teacher in Fairfield Methodist Sec. School*

Tapping the Multiple Intelligences in our Students

Loke Pui San & Anne Heenatimulla

"It is not how smart you are but how you are smart"
– Dr. Howard Gardner

Introduction

Numerous challenges confront a teacher who attempts to engage any new pedagogical approach in the classroom. Bringing the "multiple intelligences" (MI) approach to teaching and learning in the classroom was no different. The undeniable time and energy that went into the preparation and delivery of MI Lessons were indeed the first things that were highlighted by teachers who underwent MI training at CHIJ St. Theresa's Convent. However, under the guidance of the MI 'guru' himself, Mr. David Lazear, many of us were convinced that this approach would benefit our students greatly, and that the initial work involved would be worthwhile.

During the course of our training, Mr. Lazear reminded us of the importance of viewing our students as learning different and not learning disabled – a perspective we have always subconsciously held but not quite taken into account in the planning and implementation of the school curriculum. The traditional system of education has always emphasized, tapped and rewarded the verbal/linguistic and logical/mathematical intelligences in our students. The other intelligences have, for the most part, been left unexplored and students who do not make the grade have often been mislabelled as learning disabled.

The MI approach we were told would enable students to learn through their strengths and articulate their individual talents while gaining literacy in several modes. Our initial cynicism was dispelled after participating in the learning activities facilitated by Mr. Lazear. We were surprised at how much new knowledge we acquired and retained through the MI tools. As much as it pained us (being teachers and all) to discover that some of our intelligences are dormant, we learnt to come out of our comfort zones and bring these untapped intelligences to the surface. It was indeed a journey of self-discovery for the teachers in this course. The course also ended leaving us with the all-important question of how we would implement this seemingly beneficial approach into our daily lessons.

Designing and Implementing an MI Package

Armed with our MI toolboxes, we began the daunting task of designing a curriculum package incorporating the various intelligences into our lower secondary syllabus.

As this new approach required a great deal of time to plan and implement, it was initiated only at the lower secondary level. The MI package was implemented in all streams for every subject and these written lesson plans were compiled, together with feedback from the teachers who conducted the lessons, as a resource base.

Intelligence-focused lessons were drawn up by the MI teams for each subject area, ensuring that the overused verbal/linguistic

and logical/ mathematical intelligences were given the backseat. The teams were encouraged to design lessons, which would tap the often overlooked bodily/ kinesthetic, visual/spatial and musical/ rhythmic intelligences. In designing the lessons, any number of tools from a given intelligence were employed and teachers were reminded that the interpersonal and intrapersonal intelligences should serve as by-products within the intelligence-focused lessons. In other words, it was important to keep in mind that co-operative learning strategies like "roundtable", "think/pair/ share" and "learning jigsaw" cannot be the primary focus of an MI lesson.

The initial hiccups in the package arose when lesson plans lacked appropriate awakening and amplifying activities (the first two stages in designing an intelligence-focused lesson) to prepare students to use a given intelligence. The awakening and amplifying stages are imperative for the effective learning of content through a chosen intelligence, and so it was back to the drawing board for the teams. However, with perseverance, the MI curriculum package was completed.

Planning learning activities for MI lessons in each of the intelligence modes is initially a challenge, however, the task comes more easily through experience. The collaboration of school faculty, administration, and parents is vital for the successful implementation of such an MI programme in the school, and we were fortunate to have this support.

Strengths and Limitations

It should be the norm, rather than the exception, for students to sing, dance, draw, and even role-play. Ideally, each child should also be able to experience daily academic success if there are numerous opportunities to learn through his or her strengths. It is no secret though that such activities require great amounts of time, which our curriculum does not always afford us. The good thing about MI is that it did not take time away from the curriculum but actually enhanced students' learning experiences, saving us the often tedious task of having to re-teach material that students do not remember. Teachers noted that when students learnt subject material through several intelligence tools, new knowledge was better internalized. A student who learnt vocabulary, for instance, through the bodily/kinesthetic tools of dramatic enactment or physical gesture, was able to retain meanings of new words longer than a student who learnt vocabulary just through memorization.

In the case of some students who were not comfortable in the traditional classroom-learning scenario, the MI approach meant an opportunity for them to learn through other intelligences that they may be stronger in. For example, teachers noted that restless students put their energy into learning through bodily/kinesthetic activities while passive learners had to shed their inhibitions and develop their weaker intelligences. The instructors themselves were no exception, having to both explain

and demonstrate MI tools to their students, which involved a bit of dancing and singing on some occasions. Rather than serving as an information provider, the teacher's role becomes that of a resource person and facilitator. The teacher is active behind the scenes in planning the multi-modal activities. Eventually, one's own multiple intelligences are awakened, and both student and teacher develop new multi-modal thinking and learning skills together.

Although teachers gradually grow accustomed to multi-modal instruction, and the incorporation of the intelligences into daily lessons, natural limitations exist. Among some of the limitations highlighted by teachers in St. Theresa's, were space constraints (an area of concern when using bodily/kinesthetic activities), class-size and the difficulty in bringing reserved pupils out of their comfort zones.

While the undeniable benefits of MI seemed to dwarf the above-mentioned limitations, assessment mode was also raised as an area of concern. If we were going to support learning through a variety of intelligences, it seemed only logical that we should evaluate our students through an array of assessment modes.

Even though students, at the end of the day, have to be assessed in the traditional pen-and-paper examination in Singapore, teachers can still vary the assessment modes in the classroom. The local continual assessment grading gives teachers the flexibility to include an MI component in the composition of their students' grades. In this manner, students are justly rewarded for their active participation in MI activities in the class, and at the same time, enjoy their learning experience.

Conclusion

In an attempt to better meet the varied needs of our students, we as educators, are constantly searching for effective new tools to employ in the classroom. If a teacher's own preferred style of delivering a lesson, can be adapted in such a way that it "speaks" to different intelligences, drawing out the learning potential in even the most unreachable student, then we can safely say it is worth a try.

A motivated student is more likely to be successful academically and the MI approach offers teachers numerous tools with which to inspire the learner. Some schools have promoted MI curricular approaches while continuing to use standard local and national assessment instruments, but assessment is not the ultimate goal of education. More importantly, education attempts to bring a child's strengths and talents to their full potential so that they will be better equipped to participate in an increasingly diverse society. As one educator put it, for the most part, the theory of multiple intelligences acts as a means of changing – one hopes, for the better – the kind of education achieved by all children.

Loke Pui San *started teaching English language and Mathematics in St Theresa's Convent in June 2000. Email: loke_pui_san@moe.edu.sg*

Anne Heenatimulla-Kingsley *has been teaching English Language and Literature in St Theresa's since May 2000.*
Email: anne_reshini_heenatimulla@moe.edu.sg

DENSITY

Specific Instructional Objectives:

At the end of the lesson, the **Sec 1 N(A)** students should be able to understand the concept of density and put 'wood', 'water', 'air', 'oil' and 'honey' in order, according to their densities.

Language related to the intelligences:

Example: Bodily/Kinesthetic – Body Sculpture (arranging a group of people to express an idea, concept or process.)

Time	Duration	Objective	Activity	Logistics
	5 min	To awaken students' bodily/kinesthetic intelligence.	**Awaken** (Control of voluntary movements) • Tell students that they are going to learn this lesson through their **body-smart** intelligence. However, they have to warm-up first. • Students are to follow the teacher's instructions while doing this warm-up exercise. (Teacher should do this exercise with the students.) 1. Jog on the spot. 2. Swing your arms and turn your heads from left to right (same direction). 3. Swing your arms and turn your heads in the opposite direction. 4. Snap your fingers. 5. Sing a song. • Ask students How do you feel when asked to do all the actions together? Is it difficult to co-ordinate? Is it easier after some time?	
	5 min	To make students more aware of this intelligence and the "running" in the 3 scenarios will be linked to the concept of density.	**Amplify** • Students to go into groups of 3. • All of them are to **imagine** they are **running** in 3 scenarios - on a running track, in an ordinary swimming pool and in a pool filled with honey. • Each of them is to write down how they feel, especially which being the most and least difficult scenario to run in. • They then share with the group. • Teacher asks a few groups for their most and least difficult scenario and their reasons. Jot these down on the board.	
	15 min	To understand what is meant by, "…. is denser than…." To feel what it is like to "go through" a dense substance.	**Teach** • Draw a square on the floor with a piece of chalk. • Ask 4 students to stand in the square and Student X to walk across the square. • Increase the number of students in the square and ask students to observe how quickly Student X gets to the other side of the square. Repeat this for an increasing number of students in the square. • Show students the link - the number of students in the square is the number of particles/mass. The more students (greater the mass) there are inside the square (fixed volume), the more difficult (more dense) it is for Student X to walk across the square. • Hence, the denser a substance is, the more difficult it is for something to go through. • If time permits, let more students try walking across the square. • Going back to the points on the board, ask students why it is more difficult to run through certain scenarios. (Reason: It is more difficult to run though honey because it is denser than air and water)	• Shift the furniture in the classroom so that there will be an empty space in the middle. Draw a big square to include the whole class if possible.
	5 min	To ensure that students understand the concept of density.	**Transfer** • On their own, students are to arrange 'air', 'oil', 'water', 'honey' and 'wood' according to their densities. • Tip: ask them to think of which floats on top of another because if it floats, the mass will be smaller. • Teacher may bring the materials to class and pour them into a beaker to show the students.	• Optional: a beaker, cork, honey, oil and water

An Open-ended Problem Solving Lesson with P6 Pupils

Jane Loo Jia Ying

Introduction

At the 2001 Teacher's Day Rally last year, our Prime Minister Goh Chok Tong spoke of the importance of developing a thinking nation to meet the global needs of a knowledge-based economy. He stated that to remain competitive, our education system should fine-tune its assessment mode to allow more creativity and innovation in our young.

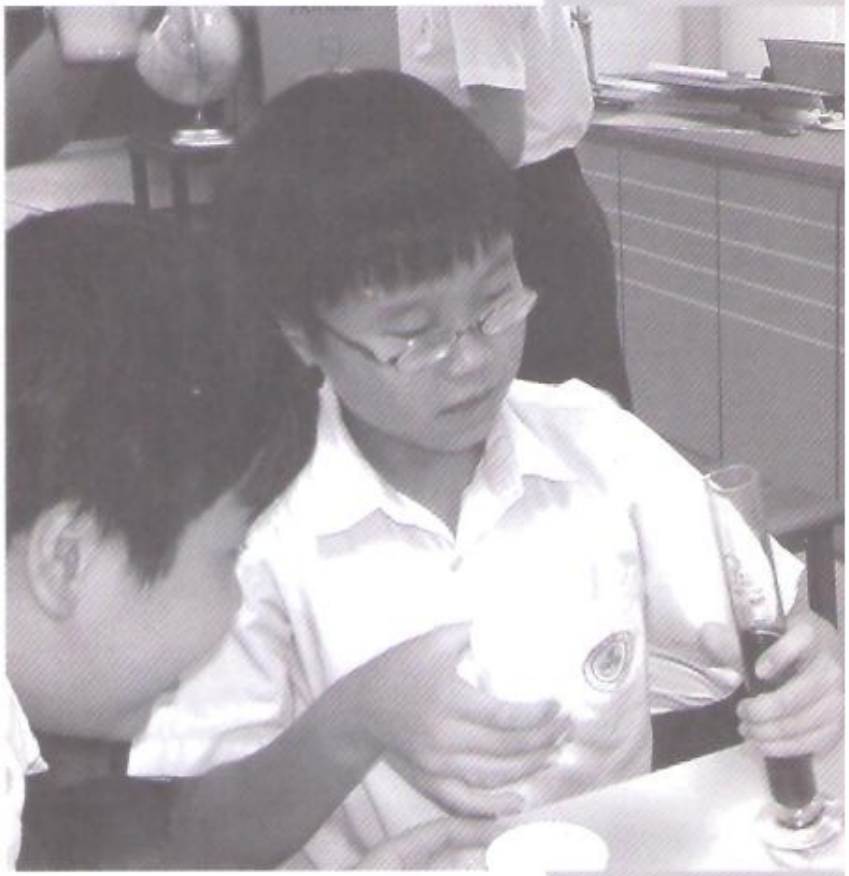
> *"We should invest more effort into developing assessments which do not have just one answer. This way, students will be encouraged to exercise their thinking skills and innovative spirit to come up with different solutions for the same problem.* ***An education system, which is premised upon one right answer and one right approach, forces conformist thinking. It does not allow students latitude to think out-of-the-box."***
>
> (Excerpt from SPEECH BY PRIME MINISTER GOH CHOK TONG AT THE TEACHERS' DAY RALLY, 2001)

Indeed, to keep up with the changes in the new economy, our instructional strategies need to be evolved from the usual "chalk and talk" method to one that provides more opportunities for pupils to participate in the thinking process. In the area of Mathematics, there are sometimes many different solutions to the same problem, and pupils may receive different solutions differently.

Open-ended problem solving is a form of mathematical investigation that defies the conventional thinking that every Mathematics problem has one and only one answer. It breaks away from the usual computational skills with standard algorithm, and allows the freedom for the pupils to explore his/her own strategies in solving the problem. With this approach, the teacher no longer provides his/her own model solution, but guides the pupils in making their own discoveries.

Design

My open-ended problem is designed for a group of Primary Six pupils who are in the middle to high-ability group.



Task: Imagine that you are going to organize a birthday party. You are required to prepare enough rose syrup drinks for 20 guests. How much water and rose syrup would you need?

This is a real life problem that requires some mathematical skills. At one glance, it appears to be a simple task, however, on further analysis of the problem, the pupils will soon discover that the answer cannot be calculated due to some missing information in the task, and this will lead the pupils to search for the missing variables.

In order to solve this problem, some assumptions have to be made. Firstly, pupils do not know the capacity of a glass or cup. As a result, pupils have to use their estimation skills to determine the capacity themselves. This estimation of capacity has not been an area of focus in the Mathematics syllabus, and it will be interesting to know whether the pupils possess good spatial sense.

Secondly, the task also incorporates the concept of ratio and proportion. The pupils must be able to infer that more water than syrup is required to prepare 1 cup of drink. The ratio is also not fixed. Pupils are to conclude that it varies from person to person, due to their personal preference. This further taps on pupils' logical thinking skills, and reflects their ability to determine their reasonableness of the answers.

Thirdly, the question is designed in such a way that 20 guests are expected to attend the party, with no mention of a fixed number of cups of rose syrup drinks to be prepared. Thus, the pupils are expected to be able to think realistically that 20 cups of drinks may not be sufficient for all the guests, as some guests may drink more than 1 cup at the party. As a result, they have to provide a realistic figure which should fall within a reasonable range of 30 to 50 cups.

In addition to that, the pupils are also required to describe as clearly as possible the steps taken in the preparation process, with no guiding questions to help them formulate the procedure. This is a test of their ability to translate their actions into words.

Lastly, to assess the pupils in their metacognitive skills and their ability to construct relationships, I decided to give the pupils an opportunity to restate the problem. This encourages creativity and higher order thinking skills. Pupils are expected to make the necessary changes to the incomplete problem and provide a solution to their own modified problem.

In a nutshell, the outline of this task is to determine whether the pupils possess:

1) the ability to understand the problem and identify the missing information
2) a good spatial sense in capacity and volume
3) critical judgment of the reasonableness of the mathematical data
4) mathematical knowledge – fractions or ratio as evident in the problem posing activity.

5) good communication skills and methodical thinking in the planning of an investigation

Implementation

The activity can be carried out within a duration of 1 to 1½ hours.

There are three parts in this open-ended exercise:

1) Task 1 – Problem-solving (Individual)
2) Hands-On Activity (Group)
3) Follow-up Activity (Individual)

1) Task 1 – Problem-solving

To set the stage for this activity, pupils are first invited to share their personal experiences in preparing a drink such as Milo or orange squash. Some pupils may suggest that they rely on trial and error or follow the directions on the container to prepare their desired drink. At this point, the teacher could highlight that preparing drinks involves some mathematical computation.

Next, the pupils are presented with the task. The pupils will soon discover that it is an incomplete problem, and the teacher can guide the pupils in eliciting the missing variables – the capacity of a cup and the ratio of rose syrup to water etc. Based on their own individual judgment, pupils will then make their own estimations of rose syrup required.

2) Hands-On Activity

Shortly after, in groups of 5, pupils will give a detailed outline of the procedure and materials required for the investigation. The various groups will then critique each other's plan. Through this exercise, the teacher can also observe the pupils for teamwork and communication skills.

As a hands-on activity, each group will prepare the rose syrup drinks based on their estimated amount of syrup and the amount of water. This gives them an opportunity to see that preparing rose syrup drinks is not simply experimental, but requires good mathematical thinking.

The teacher then rounds up the lesson, highlighting the learning outcomes.

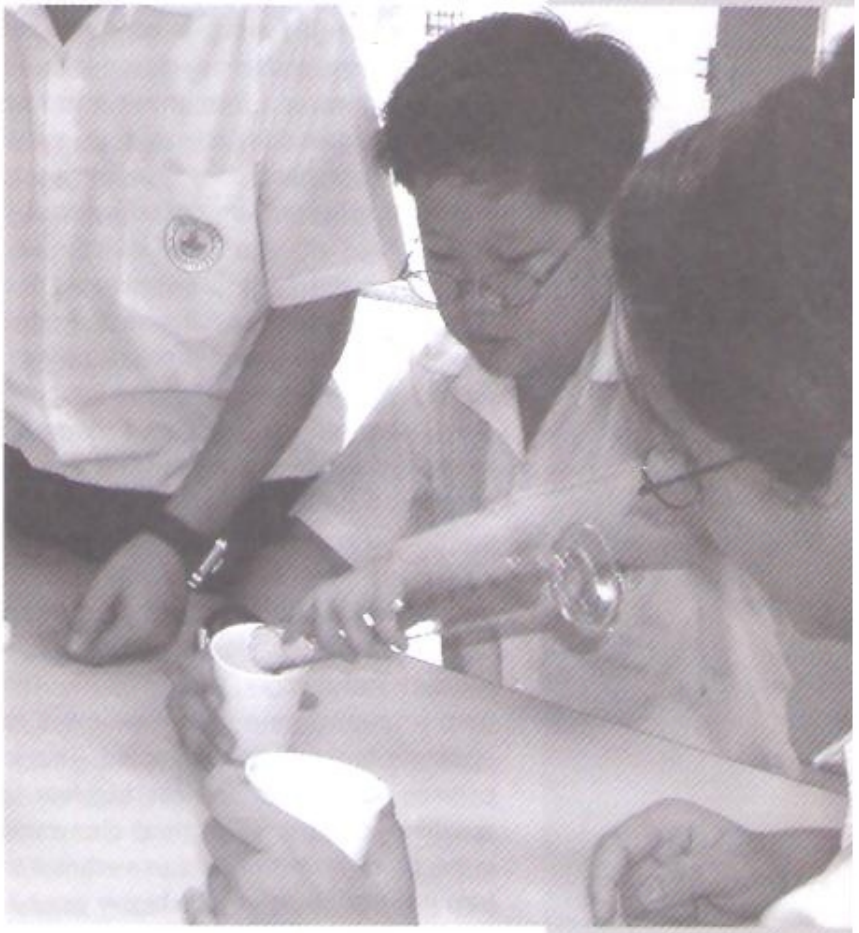
3) Follow-up Activity

Pupils will further extend their learning by modifying the incomplete problem into a mathematical problem that can be solved.

Observation of pupils

During lesson:

My intention of having a tuning-in session was to get pupils to share their personal experiences in preparing their own drinks.



They replied that they made their drinks from standard 3-in-1 sachets by just adding water, and suggested buying packet drinks instead of going through the hassle of making their own rose syrup drinks. Fortunately, when I explained to the pupils that it was more cost effective to prepare drinks on a large scale instead of paying for individual package drinks, they seemed to be more interested in this problem.

When I invited pupils to respond to the problem, 3 pupils told me that something was wrong with the question. They were able to suggest that some information was missing such as the size of cup, the ratio of syrup and water to be used. Their responses reflected that they were able to process the problem and identify the missing information needed to arrive at the solution.

I later prompted them to make some conjectures on the estimated figures themselves. They complained that they do not know how big a cup is as it was not shown to them, and some refused to make any wild guesses. This shows that our pupils are generally reluctant to make estimations, probably due to little emphasis and practice in our Mathematics syllabus.

I believe that I have over-estimated the ability of my pupils. As it was their first attempt on open-ended problem solving, the task might be too challenging for them. There were too many assumptions to be made, a situation that is not familiar in an otherwise normal mathematics lesson. I could have provided them with some data for a start. I felt the higher ability pupils benefited most as it develops their inquiring mind. They were able to respond better and seemed more eager to participate. The weaker pupils were more reluctant to elaborate further when prompted. This is perhaps due to their shyness and fear of speaking up in class. The group discussion in the hands-on activity is thus essential to help these pupils to see the bigger picture.

During Hands-On-Activity:

During my rounds of supervision, I noticed that some groups needed assistance in devising their plan, and they kept coming to me for support and assurance. It was difficult to convince them to think independently. To describe in writing the whole process of their plan was a challenge to these pupils, who were not used to such activity in their usual mathematics lessons.

During the concoction of the drinks, some pupils did not know the technique of increasing the rose syrup concentrate in steps. Instead, they poured out a substantial amount, and topped up with water. According to them, they wanted to try it out using the trial and error technique – a reflection that they were not sure what they were doing. This technique is used when pupils cannot see the pathway towards the solution.

Some pupils were also not systematic. They carried out the process many times until they arrived at their ideal drink. As a result, they wasted a lot of water and rose syrup. These pupils were not flexible enough to manipulate the figures to get the idea set.

Analysis of Pupils' Written Work

Task 1

Pupils were judged on the following criteria:

1) Ability to identify some or all the 3 variables
2) Ability to communicate reasoning with relevant mathematical computations
3) Comprehension of the question

Most pupils were generally not able to make spatial estimations. Their answers were varied. Pupils who made wrong guesses estimated that the capacity of a cup was either 100 ml or 330 ml. Only 55%

of the pupils guessed that it was between 150 – 250 ml. A standard plastic cup is actually 200 ml.

Similarly, a number of pupils did not see the fact that it was not realistic to prepare 20 cups of drinks for 20 guests. Others over-estimated that 1 guest could drink more than 5 cups and even up to 10 cups of rose syrup drinks.

Hands-On Activity

Pupils were judged on the following criteria:

1) Ability to make sense of the task
2) Ability to apply problem solving *strategies*
3) *Presentation of procedural description*
4) Accuracy of the results and relevant working

Out of the 8 groups, only 2 groups mentioned about the relative quantities of the water and rose syrup used. None drew a table listing the amount of rose syrup and water using small increments progressively or showed any mathematical computation. Some groups suggested making 1 cup of rose syrup drink using water and syrup in fractional parts, such as _ cup of rose syrup and _ cup of water. They did not realize that it is physically impossible to do so. 2 groups suggested making 1 cup of syrup drink and repeating the process 20 times! Only one group managed to provide a sketchy idea on the procedure used.

Follow-up Activity

Pupils were judged on their modified problem based on the following criteria:

1) Ability to make sense of the problem
2) Phrasing of question (clarity)
3) Incorporation of mathematical concepts
4) Difficulty level
5) Presentation of solution
6) Reasonableness of the final answer

Learning Outcomes

At the end of the activity, have the pupils learnt anything?

I hope I have brought home the message that not all mathematical problems can be solved. Pupils must constantly search for missing links, make some assumptions, clarify their doubts and check for the reasonableness of their answers. They have to depend on some guess and check strategy and not simply make wild guesses. Their estimated answers must be within an acceptable range. Pupils have also learnt that spatial estimation skills are important in our daily lives and it is necessary to *develop this skill. Moreover, pupils begin to* see the application of ratio and proportion used during the hands-on activity, rather than doing similar "imaginary" problems in textbook without much thinking.

Although in this initial lesson on open-ended problems, the pupils were not confident enough to conduct their own investigations without detailed instructions or procedures given, the learning is more active. During the activity, pupils had a great time making wild guesses, trying to defend their procedure. Our pupils are still not accustomed to accepting other pupils' alternative answers. Through more exposure of such open-ended problems they can be trained to do strategic thinking independently and be more able in evaluating alternative methods critically.

On the whole, the pupils found the lesson refreshing and different from the usual chalkboard and talk style. They liked the hands-on session as it gave them an opportunity to act it out. They were actually using some mathematically thinking when solving the task without realizing it. They were also given the opportunity to make mistakes and learnt from their peers, tapping on each other's strength. This fosters greater communication skills and

team spirit. Giving pupils opportunity to present their solutions will train them to reason and to provide their evidence in writing to enhance their language skills in communicating mathematically.

Suggestions for Classroom Teaching

This activity can be used as an introductory activity for the topic capacity. The pupils will have some fun estimating the capacity of a cup and verifying their answers using a measuring device.

For higher ability pupils, it would be good to show the pupils a plastic cup and a can of coke and ask the pupils to estimate how many cups one can of coke can serve. This relative comparison based on their personal experience will help pupils to estimate the capacity of a cup more accurately, instead of getting pupils to make too many wild guesses.

As there are many variables in this activity, the weaker pupils may need some guidance from the teacher or work collaboratively with a higher ability pupil. It is thus important for the teacher to be able to structure her questions appropriately during oral discussion or provide some guiding questions in the worksheet so as to develop pupils' thinking and understanding of the problem.

Conclusion

In our local context, Singapore pupils are used to completing worksheets individually and are confident in solving computation problems using operations and symbols. This is evident in our outstanding achievements in International Competitions in Mathematics and Science. However, when our pupils are exposed to a new mathematical situation, they are often caught off guard. Open-ended investigation tasks no doubt require more preparation and time on the part of the teacher, but the positive learning outcome involving pupils' process skills is worth it. It serves as a valuable opportunity for the teacher to assess pupils holistically by observing them in group discussion and presentation. Pupils working on the open-ended situation where there is no fixed answer or method, would enable the teacher to observe pupils' varied abilities that often cannot be assessed through pen-and-paper tests. When pupils participate in hands-on-activity and communicate with other pupils, they start to question their own understanding of the problem, and this reinforces their learning. In open-ended problem solving, pupils will realize that Mathematics is meaningful when they begin to make connections among mathematical ideas and see its application in our daily lives.

References

Ministry of Education website. Prime Minister's message at Teachers' Day Rally (2001).

Lovitt, Charles (1991). Maths problem solving and modelling for year 2, Nelson.

Willoughby, S. Stephen. (1990). Mathematical Education for a changing world, Association for Supervision and Curriculum Development.

Acknowledgements

Special thanks to A/P Foong Pui Yee for the invaluable guidance in the in-service (advanced) diploma course and the implementation of this lesson.

Jane Loo Jia Ying *has been teaching English, Maths and Science for the past three years in Jurong West Primary School.*

The Lesson Plan

Objective

At the end of the lessons, pupils are able to:

1) use mathematical skills to identify the missing information in an incomplete problem.
2) plan an investigation based on the above task.
3) make amendments to the incomplete problem and make it solvable.

Topic

Ratio and Proportion
Volume and Capacity

Problem-Solving Skills

Simplify, Guess and Check, Logical think, Estimation

Tuning in (25min)

- Invite pupils to share their experiences in making a Milo drink or orange squash.
- Present the task to pupils. Invite a few pupils to describe their solution. The pupils will be able to suggest that they were not able to solve due to incomplete information in the question.
- Get pupils to suggest the information needed to solve this problem and their estimated answers. Pupils will then determine the reasonableness of their estimates.
- Explain to pupils that in many real life situations, information may be missing and they will then have to make some conjectures.

Development (30 min)

- Working in groups of 4 or 5, pupils plan an investigation to help solve the problem.
- The pupils present their procedures and results. After all the groups have presented, the teacher then invites the pupils to comment on the preparation process.
- Based on their group's suggested proportions, the pupils then concoct their own syrup drink. The teacher goes around to taste their drinks and get pupils to state their final ratio.
- As a teaching point, the teacher can highlight the fact that many commercial bottled drinks are bottled according to the ratios of the various ingredients needed to make a bottle of drink. The taste is always consistent due to the precise proportions of the various ingredients in the process.

Conclusion (5 min)

- The teacher rounds up this activity by stating that many real-life situations do not have a clear-cut solution. There is some trial and error involved. The answer must however be logical and within an acceptable range. Thus in many mathematical situations, pupils have to check their understanding and reasonableness of their answers.

Managing the Special Needs of Students the ACS(I) Way

Christine Bok Hai Choo

Introduction

Learning disabilities such dyslexia, attention deficit hyperactivity disorder (ADHD), and autism spectrum disorder (ASD) have crept into the conversation among many in ACS(I). Increasingly, there are many such cases being identified as parents are more aware of such learning disabilities.

Current Situation

To date, the school has about 15 cases of students who have been identified to be having either dyslexia, ADHD or ASD. These assessments are done by the trained personnel in the Dyslexia Association of Singapore (DAS), Educational Psychologists (EP), psychiatrists and medical personnel. In the primary schools, such students were assessed by the EPs and based on the recommendations, such students were placed in the Learning Support Program (LSP) to help them learn at their own pace. These LSP coordinators were given special training in dealing with such students. Perhaps, the secondary schools will be able to benefit from a similar program in the near future.

Counselling and Well-Being Unit

ACS(I) believes that every student is important to us and the school believes in helping every child maximize his potential. My passion for helping students who have problems coping in school was heightened after completing a Masters Course in Applied Psychology (NIE). A large part of this course requires hands on sessions and I have learnt a lot from my practicum supervisor who was then a senior EP with the PGSB. With this special training, I am able to help look after students with learning disabilities and other emotional/ behavioral problems.

The Counselling and Well-Being Unit is being staffed by a very competent and dedicated group of teachers. We have teachers who are trained in the following areas: educational psychology, counselling psychology, counselling the gifted and family counselling. The team works together to handle cases ranging from learning disabilities to emotional and behavioral problems.

For the purpose of discussion, I shall focus on the practices that we have used to help students with learning disabilities.

Resources From PGSB

Currently, the Psychological and Guidance Services Branch (PGSB) is able to provide the services of the Educational Psychologist (EP) only to the primary schools. If any secondary school needs the services of an EP, the school makes a request for help from the PGSB.

The PGSB has produced a very useful reference guide, "I'm worried about Kim..." and this was made available to all schools in Singapore. The reference guide provides useful information, lots of useful tips and good resources for teachers who might have to handle such students.

Training for staff

To keep abreast with the many challenges,

the school has organized two very useful and interesting workshops for the whole staff on the following topics, "Understanding and managing ADHD students" and "Meeting the special needs of students". We have invited an educational psychologist and a psychiatrist to share at these two workshops. The feedback from teachers from both workshops was very positive and encouraging.

Panel of advisors

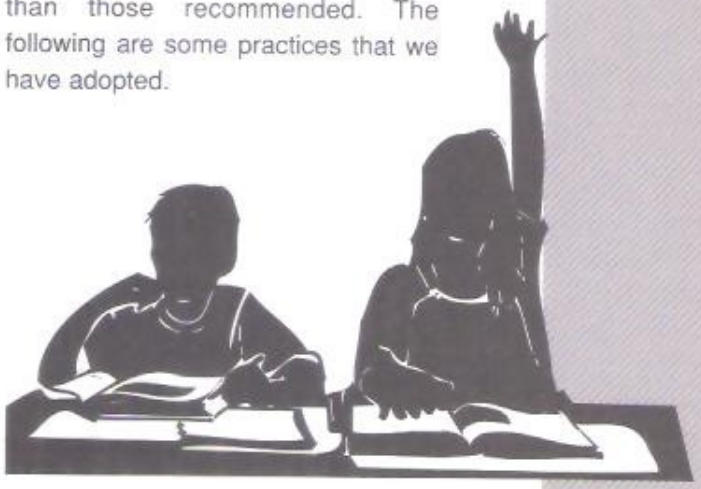
The school has in place a panel of advisors from whom we could seek the advice/ counsel for difficult cases. Our panel of advisors are made up of mainly old boys from the school; some of them are child psychiatrists while others specialized in, family counselling, clinical psychology and pastoral counselling.

Identification

When a student enters ACS(I) in Secondary One, he would be asked to provide the school with information pertaining to any medical condition or other special needs that he might have in a student record known as the Student Profile. Parents could also inform the class teacher or principal about their son's special needs. The class teachers would then look through the student profiles and highlight such students to the Head of Level One. The Head of Level looks after the welfare of all students in that particular level. Psychological reports and relevant documentation must support all these requests. These cases would then be referred to the Head of Counselling and Well-Being Unit.

The whole procedure of how a student with learning disability is handled is shown in the flowchart.(page 54)

Many of the strategies that we employ in ACS(I) are recommendations taken from the book, "I'm worried about Kim..." provided by the PGSB. However, there are some special arrangements made other than those recommended. The following are some practices that we have adopted.



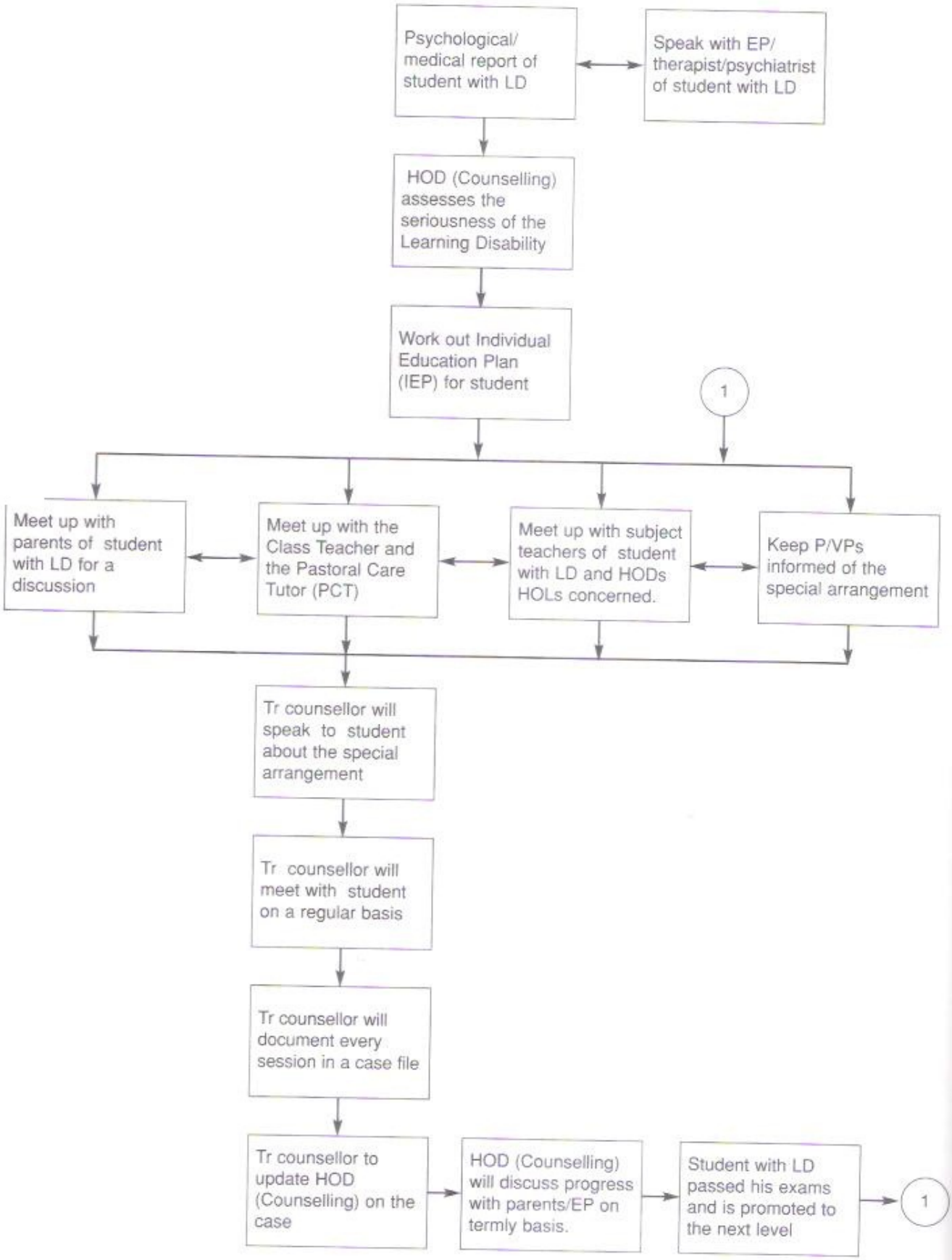
Attention Deficit Hypersensitivity Disorder (ADHD)

- A special meeting was arranged for the subject teachers, teacher counsellors, therapist and the student's parents where teachers could share their anxieties/fears on handling such students. The therapist also shared some practical tips e.g. *structure and boundaries* for such students. The meeting was informative and useful for all who attended.

- Teacher counsellor also works closely with the therapist in such a way that the therapist is kept informed about the student's progress in school. Such arrangements are time consuming but nevertheless, the effort is worth it because eventually, the student is able to manage himself in school.

- Sometimes, such students do manifest 'bonding' problems with their teachers. One such instance was that there was a special arrangement made in the invigilation schedule so that that teacher does not invigilate that particular student during the examinations as the

Procedural Flowchart of a Team Approach



student does not feel comfortable in the presence of the teacher.

- At the end of the year, when the student is promoted to the next level, the Head of Level would share his case with the next Head of Level. Whenever possible, the school would try to match the teachers to the student's special needs.

Dyslexia

- Students who have been identified by the relevant authorities to be dyslexics are given extra time for their written examinations. The guidelines from MOE are as follows:

Duration of Exam	Extra Time
Less than 45 mins	10 mins
1 hr to < 1 hr 30 mins	15 mins
1hr 30 mins < 2 hrs	25 mins
2hrs to < 2 hrs 30 mins	30 mins
2hrs 30 mins to < 3 hrs	40 mins
3 hrs and above	45 mins

- Students with dyslexia also meet with their teacher counsellors on a regular basis. As many of these students might have low self-esteem, it is essential for them to share their needs and anxieties with the teacher counsellors.

- Teachers teaching students who are dyslexic are encouraged to do selective marking in the sense that they do not correct every error but rather the teacher would target at correcting different errors on different occasions.

Autistic Spectrum Disorder (ASD)

- Students with ASD and who are studying in the mainstream schools usually belong to a group identified as those with Asperger Syndrome (AS). These students are described as those with higher ability and they are verbally more proficient.

- As these students with AS usually lack skills in social communication, social interaction and have problems relating to imagination, they need special attention and skills to teach them how to cope in school.

- A teacher counsellor who is assigned to such a case has to be specially trained. The Autism Resource Centre does conduct training for school teachers handling students with AS.

- The teacher counsellor has to work closely with the student with AS, his parents, his teachers and his classmates. It is essential for the teacher counsellor to speak with his class so they will understand his condition and then get the class to support him in all his activities. The teachers also have a similar meeting with the teacher counsellor and they are also taught skills on how to handle the child.

- Students with AS are being monitored very closely by the teacher counsellors so that they could modify their plans or intervention when necessary to help such students cope in school.

- Not only do the subject teachers teaching the students with AS need to be specially briefed on his condition but all teachers who come in contact with them at one time or another. In ACS(I), all teachers teaching a particular level where the student is, will be given tips on how to handle him should they meet him along the corridors or in their CCAs.

Team Approach

For students who have been assessed as having problems in learning or in other areas, it is important to recognize these students as unique individuals who might need a helping hand or two from us. One of the effective strategies in helping these

students is to adopt a team approach. Members of team would include his parents, his therapist, the school counsellor, his teachers, his classmates and his friends. All members in the multi-disciplinary team would be helping the student to reinforce his strengths and the same time, encourage him along the way as he tries to achieve his goals.

A Wish List

- More specialized training for teacher counsellors especially in the areas of dyscalculia, family therapy and cognitive behavioral therapy etc.

- As more parents become more aware of learning disabilities in their children, the MOE should equip a special group of teachers in the secondary school with special skills to handle such cases and to help the teachers cope with such students as currently, there are no EPs attached to secondary schools.

- Teacher counsellors should be given a *special workload* in the school so that they could concentrate on helping these students with special needs.

- More teacher counsellors should be trained to help meet the increase in the number of students with special needs. Teacher counsellors are found to be more effective than other counsellors as firstly, they are teachers and they are familiar with the school system and secondly, they are on site. The student can get to meet up with his teacher counsellor almost immediately when there is a need.

Conclusion

It is a real joy to see students with learning disabilities settled into the school system and they are enjoying the activities like the rest of the students. It has been a real challenge for me and my colleagues to handle all these students ever since the unit was started. At the end of the day, our greatest reward is knowing that we have made a difference in their lives.

Ms Christine Bok Hai Choo *is the Head of Counselling and Well-Being Unit and also the Head of Level One in Anglo-Chinese School (Independent).*

Mediated Learning Experience to Help Underachievers

Alice Seng Seok Hoon

There are many reasons why the child is not achieving well up to his or her potential at school. A main problem is that teachers find it hard to identify the underachiever in class and to take steps to remove the barriers towards his/her optimal achievement. The school system is unfortunately characterised by the teacher-centered approach which assumes that these underachievers with various learning difficulties should be accepted as they are, since they are incapable, for a variety of reasons, to be what they can supposed to be. The teaching-learning relationship is quite passive-acceptant and some form of hidden frustration and compassion are strangely combined with the need to protect such children from daily tasks beyond their conceptual, physical and emotional reach.

This passive-acceptant approach is reflected in various ways in the schools as for instance, psychometric assessment is aimed at describing the stable, unchanging characteristics in the underachieving child. Underachievers are labelled for example into low achievers, moderate achievers and high achievers. Curricular programmes and materials are planned and developed in such a manner that key subject areas are spelt out in a simplified, slowed down version. Perhaps a great emphasis is placed on reproductive and manipulative materials. There is not enough creative activity work calling for a higher level of thinking or independent performance.

The underachieving child if put in a non-challenging environment and if there is no systematic attempt to modify his behaviour, he is restricted to specific tasks requiring a much lower cognitive demand and he is often resigned to this 'disability'. In this 'vicious' cycle he experiences difficulties which lower his level of motivation and aspiration.

In order to raise this child to higher levels of development the passive-acceptant approach must be replaced by an active modification approach. (Feuerstein et.al., 1980). This active modification approach is based on the idea of the Modifying Environment (Beker & Feuerstein, 1990) which is rooted in the assumption that fundamental change can be stimulated by planned, active intervention that... systematically makes demands on those within it for cognitive, emotional, and social modification in the context of their existing levels of development, skill, etc. It does not 'accept the student where he (or she) is,' but it does 'start where the student is,' building on existing competencies while providing for needed feelings of security. As competency and performance improve, demands rise accordingly, thus establishing ever higher levels of functioning. Whatever the specific setting, the task is to establish and maintain a modifying environment appropriate to the needs of the particular clientele being served. (Beker & Feuerstein, 1989).

The objective, it should be emphasized, is not simply that students should be able to do specific tasks better, but that they should do them differently in ways that will better enable them to approach and master other tasks of the same kind in the future. (Beker & Feuerstein, 1990). This cognitive demand is highly necessary in our knowledge-based economy where so

many individual intellectual, social as well as emotional choices have to be made. The underachieving child too, has to learn to adapt and Beker (1989) emphasises a need for him to establish cognitive and emotional flexibility and the capacity to modify his own thinking, feelings and behaviour in response to internal and external conditions.

In order to make such modes of learning and thinking available to the child, much more is required than offering some specific skills or lessons. Ideally the whole school is systematically involved in a sort of three pronged approach to:

1 Assess the child's characteristics and his/her level of modifiability more dynamically.

2 Offer this information obtained through this assessment to policy makers, teachers, parents and to the children themselves.

3 Establish guidelines for intervention based on the preferred modes for increasing modifiability, as derived from the results of a dynamic assessment.

The environment is shaped so that it becomes a modifying environment and with the shaping of the environment, the modifiability of the individuals is increased. (Feuerstein & Rand, 1991).

Mediated Learning Experience

One key component in the Modifying Environment is what Feuerstein define as Mediated Learning Experience (MLE), 'an interaction in which another human, usually the adult caregiver, interprets the world to the child.' (Feuerstein et.al., 1980). In a mediated learning experience, the teacher or mediator interposes himself or herself between the child and the environment. According to Feuerstein the underachieving child learns by means of two major systems: direct exposure and mediated learning.

Learning through direct exposure is based on Piaget's formula of S-O-R which translated means that the organism (O) or the individual ID child interacts directly with the stimuli (S) of the surrounding world and responds (R). In this kind of interaction with the environment learning is incidental. Mediated learning on the other hand is the more vital approach that ensures effective learning. Feuerstein develops Piaget's formula of S-O-R further to include a human mediator between the world of stimuli, the organism and the response. His new formula for mediated learning is then S-H-O-H-R where H is the human mediator. The human mediator interposes himself between the learning organism and the world of stimuli to interpret, guide and give meaning to the stimuli.

Central to the MLE process is the theory of structural modifiability which represents a comprehensive (holistic) approach to problems of low levels of cognitive performance. ...In the course of every individual underachiever's development, changes take place such as walking, speaking, reading, etc. These changes are connected to specific types of behaviour. The underachieving child with cognitive modifiability methodically accumulates information, classifies and organises it, seeks laws in what surrounds him, raises hypotheses and examines them. Structural modifiability is an active process in the child who experiences an entire range of thinking functions and this brings about a change which can be totally unexpected on the basis of his regular development. (Kaniel & Feuerstein 1989 p 167).

The quality of the structural changes can be described by the following dimensions.

1 retention or permanence

2 resistance
3 flexibility or adaptability
4 generalisability or transformability.

MLE is a dynamic process by which structural cognitive modifiability occurs with the help of the mediator (teacher) who organises and interprets the world to the child. When an individual gives meaning to events, helps children select relevant from irrelevant variables, assists in abstracting rules for regularly occurring phenomena, and generally attempts to develop children's ability to think, that individual is engaged in mediated learning.

The MLE approach creates an interactive process which allows the teacher to derive a great amount of information concerning the nature of the difficulties the child is confronted with in the cognitive tasks given to him. The dynamic assessment session is marked by a constant feedback process involving both the mediator and the mediatee, with the mediator constantly intervening.

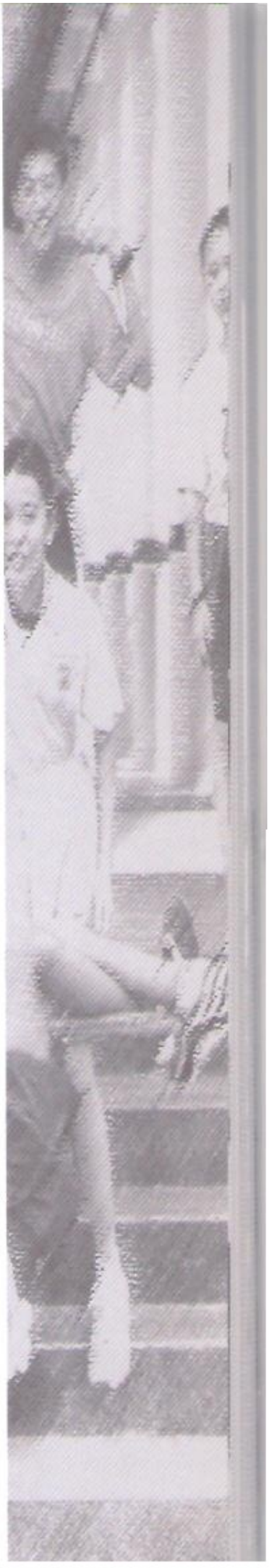
According to Feuerstein and Krasilowsky (1970), many severely deprived adolescents in Israel had benefited from cognitive intervention programs based on MLE. Almost two decades of clinical experience with cognitive modifiability approaches applied to hundreds of socially deprived adolescents as well as experimental work done on groups of retarded individuals, have demonstrated the effectiveness of these methods to evaluate modifiability in youngsters above and beyond their low manifested level of cognitive functioning.

MLE basically has been used by mothers and fathers with their children all the time, usually without their thinking about it. However, many children have not experienced adequate MLE probably due to parents being very poor transmitters or receivers and as a result these children have not developed the adaptational skills on which further developmental learning depends. Sometimes the cognitive deficits in the child can be organic in nature or indirectly related to parental malfunctioning due to economic or marital stress and mental or emotional difficulties. In any event, when the needed MLE is provided through parents or any adult when that is possible, the cognitive deficits can be successfully resolved.

According to Feuerstein, many children who manifest low mental functioning do so not necessarily because of particular 'etiological' factors like heredity and/or organicity, but because of the lack of MLE. The deficiency produced by lack of MLE is mainly in the areas of attitude, orientation, habits and cognitive strategies of the child toward the world and toward himself. Such deficiency may not necessarily occur if MLE is made accessible. It is important to emphasise that MLE represents the quality of the interaction and is no way connected with any school subject matter. Feuerstein had developed ten criteria that described mediated learning which may be seen in various types of situations, different environments and cultures.

1 intentionality and reciprocity
2 meaning
3 transcendence
4 competence
5 self-regulation and control of behaviour
6 sharing
7 individuation
8 goal planning
9 challenge
10 self-change.

All the criteria of MLE are interlinked and it is up to the creativity, flexibility and insightfulness of the teacher to respond to the underachiever in ways which exploit the mediational potential of the dynamic relationship.



Underachieving children need to enhance their 'propensity' to use their experiences with stimuli in order to become modified and more experienced by this exposure. According to Feuerstein and Rand (1991), they must be rendered more 'flexible' so that their previous ways of thinking can interact with the new data by new ways of perceiving them, new modes of 'elaborating' them, and new and more adequate ways of responding to them. Through this process, they will become better able to benefit from experience.

The first goal of any intervention programme that aims at enriching the low achieving children will be to have them 'permeable' to the program, by creating in them the prerequisites for learning and that is done through increasing their modifiability. A number of subgoals are necessary and Feuerstein insisted that these must guide the construction of the programme and the selection of its materials and content. These are listed as follows:

1 correction of deficient cognitive functions
2 acquisition of prerequisite information
3 production of generalization and transfer
4 development of intrinsic motivation
5 creation of task-intrinsic motivation
6 changing the role of the underachiever.

Two Singapore studies

In a pilot study (1991) of four community tuition centers, an experimental group of 52 students received a combination of mediated learning experience and the usual academic programme for four months, while a control group of the same size received only the academic instruction. The children averaged 11 years of age and all of them were perceived by their teachers as underachievers having difficulty in concentrating, using poor study skills and work habits and lacking in confidence and motivation. Fifteen participant tutors attended a workshop on the mediated learning experience philosophy and received supervision and field coaching. Students were tested using Raven's Standard Progressive Matrices (RPM) and the Cognitive Abilities Test (CAT) and a record of class tests in mathematics and English was compiled. Results showed that mediated learning experience classes in

Task avoidance in completing homework.

MLE Criteria	What is Mediated	How it is mediated
Intentionality/ Reciprocity	Having child identify the problem, recognize A problem to be solved (elaboration)	Create signals for child to start task, remove distractions, create clear starting and stopping task.
Transcendence	Show how achieving success relates to other aspects of school/home	Bridging to other activities where completing tasks helps achieve positive outcomes.
Meaning	Get clear perception of need for and value of task completion (input)	Validate meaning of homework positive outcomes when it is completed, role of tasks in other family members' lives.
Competence	Help child use existing skills to complete tasks	Coaching, teaching, reinforcing past success, identifying newly acquired skills
Goal setting	Precision and accuracy in response	Selecting time duration and outcome indicators, showing enthusiasm, praise,encouragement reviewing progress.

three of the four centers performed better on their school tests in mathematics, but that no significant improvement was noted in English, RPM, or CAT scores. On the other hand, the feedback from the tutors were more encouraging.

The second study in 1997 involves parents. (Falik, 1997). A three-day workshop based on Feuerstein's mediated learning experience principles was held for 25 parents and child care professionals who work with children and their parents. They were introduced to the concepts of MLE and their relationship to behaviour identification and management. This included an introduction to the theory of structural cognitive modifiability (SCM), the differences between direct and mediated learning experiences (MLE) and the relationship between MLE, SCM and the development of cognitive functions and social learning behaviour in children. This was followed by a discussion and demonstration of various specific techniques of mediation, questioning and interaction techniques, dimensions of structuring learning experiences, explaining and elaborating children's behavioural responses and bridging to further experiences.

Participants were then engaged in an activity which enabled them to practise the model and begin developing mediational skills by:

1 Identifying a behaviour that they wished to modify.

2 Identify the cognitive and behavioural functions embedded in the behaviour.

3 Determining the primary and secondary mediational objectives to be achieved i.e. what will be the direction and content of change.

4 Plan the specific targeted behaviour to which mediation will be directed and

5 Identify one or more specific interventions to be used to accomplish the goals.

The working groups carefully described what the child did and did not do related to the identified problems (using the cognitive functions as a basis for description), clarified what behavioural changes they wanted to institute, and worked out detailed plans for what to mediate, when and how to mediate, and the range of activities and mediational responses anticipated to affect change in the problem behaviour.

The table below is a brief illustration of how one working group used the MLE model to address an identified problem behaviour quite common with underachievers.

Participants in this workshop identified primarily academic performance oriented tasks in the underachievers. Any intervention strategy to help these struggling underachievers need to include other non-academic aspects. The MLE technique is only one way we can help underachieving students. Creativity and practicality are imperative if we wish to help these students grow both academically and personally.

Conclusion

The term 'underachiever' does not provide us with any tools for assessment and treatment. Such children are often described by phrases like 'could do better' or 'lacking motivation'. It would be more accurate to write 'could feel better' or 'lacking stimulation'. What is proposed in this short paper is to use the Mediated Learning Experience and structural cognitive modifiability concepts to enable us to locate specific cognitive functions in the child and to assist us to plan appropriate intervention programmes.

We now know how to motivate more able

learners and educate pupils who are socially and culturally disadvantaged. Yet our educational practices have somehow resulted in a widespread underfunctioning with some of our creative, imaginative and autonomous learners These underachievers are particularly at risk especially the abled underachievers who share characteristic attitudes, self-esteem, learning styles, emotional and behaviourial difficulties. We perceive underfunctioning arising from a complex interaction of many sources. The MLE approach has faith in the underachieving child's ability to change and therefore great efforts must be made to offer him many choices. It seeks out the child's latent talents beyond his overt behaviour and he should be encouraged to be actively involved and integrated into our society.

References

Beker, J. (1989). On the nature of modifying environments- A preview. Child and Youth Care Quarterly. 18(3), 159-160.

Beker, J. & Feuerstein, R. (1989). Toward a common denominator in effective group care programming: The concept of the modifying environment. Hadassah-WIZO-Canada Research Institute. Jerusalem, Israel.

Beker, J. & Feuerstein, R. (1990). Conceptual foundations of the modifying
environment in group care and treatment settings for children and youth. Journal of Child and Youth Care. 5(4), 23-33.

Falik, L. Application of Mediated Learning Experience to the concerns of Singapore parents. Paper delivered at the 7th International Conference on Thinking. June 1-6, 1997. Singapore.

Feuerstein, et.al. (1980). Instrumental Enrichment: An Intervention Program for Cognitive Modifiability. University Park Press. Baltimore.

Feuerstein, R. & Krasilowsky, M. (1972). Interventional Strategies for the significant modification of cognitive functioning in disadvantaged adolescent. The Journal of the American Academy of Child Psychiatry. 11(3), 572-581.

Feuerstein, R. & Rand, Y. (1991). Intervention Programs for Retarded Performers:
Goals, Means, and Expected Outcomes. In Idol & Jones (ed.), Educational Values and Cognitive Instruction: Implications for Reform. (pp.139-178). New Jersey. LEA.

Kaniel, S. & Feuerstein, R. (1989). Special Needs of Children with Learning Difficulties. Oxford Review of Education. 15(2), 165-179.

Seng Seok Hoon (1991). Potential of Mediated Learning in the Primary School Classroom. A Pilot Study. Paper presented at the Annual Meeting of the American Educational Research Association. AERA. April 3-7, 1991. Chicago.

Alice Seng Seok Hoon *is Associate Professor of Psychological Studies at the National Institute of Education, Nanyang Technological University, Singapore. E-Mail: shseng@nie.edu.sg*

Gifted Education Programme: Optimising Learning in High-Ability Students

Linda Wong

The general perception of what we do in the Gifted Education Programme (GEP) is that it is to a great extent exclusive; and our practices, more often than not, are thus deemed to be 'irrelevant' to mainstream instruction. In fact, if there is one thing to be said about the GEP curriculum, it is that it simply strives to optimise learning for the group of pupils situated at one end of the ability spectrum – essentially because these pupils have demonstrated high general reasoning abilities and academic precocity.

From where we stand, we see that many of our pedagogic practices are well worth sharing because ALL learners need to have experiences designed for them that bring about optimal learning, at the same time making the learning process itself enjoyable and, above all, meaningful. In our teacher training efforts, we talk about the importance of achieving 'flow' – a state experienced by adolescents when both personal skill level and challenge level are correspondingly high, allowing optimal learning to take place (Csikszentmihalyi, 1987; Van Tassel-Baska, 1994). 'Flow' is a highly desirable state that practitioners know all too well to be elusive and hard to orchestrate, sustain or replicate, but it is what we together, curriculum writers and teachers in the GEP, aim for in our planning and execution of the enriched curriculum.

The operative word in our approach to curriculum design and delivery is 'differentiation' – a term that stems from Ward's theory of 'differential education' which argues for the necessity to develop appropriate curricular content and experiences for learners with different needs and abilities (Van Tassel Baska, 1988, 1994; Tomlinson, 1995). In the GEP, we thus consciously 'differentiate' four aspects of the curriculum: the content, process, environment and product, so that these will bring about optimal learning in our pupils.

But what does this mean in practice? In this article, I will not describe the advanced subject matter that pupils in the GEP are exposed to per se. Instead I will try to provide an overview of the practices by which that content is deepened and broadened, focussing first on a number of instructional models and strategies that scaffold our lessons and units of work, forming the staple GEP classroom diet as it were. Then I will go on to describe certain out-of-class enrichment activities, conducted at primary and secondary levels, explaining their objectives and learner outcomes as we go along.

One essential dimension that interacts constantly with the core subject curricula is the parallel thinking curriculum. As in the mainstream, we 'infuse thinking' into all the subjects taught. But how does one teach thinking consistently, especially when one is ruled by the content syllabi of the various subjects? Is it more effective to teach discrete skills or strategies? How do we elicit higher level thinking and ensure that it is taking place? How do we assess the quality of the thinking that is happening in our classrooms?

Over the years, we have tried out a number of models to enhance the development of thinking in our pupils, and two have proven particularly useful. The first of these

Table 1: Taxonomy Table

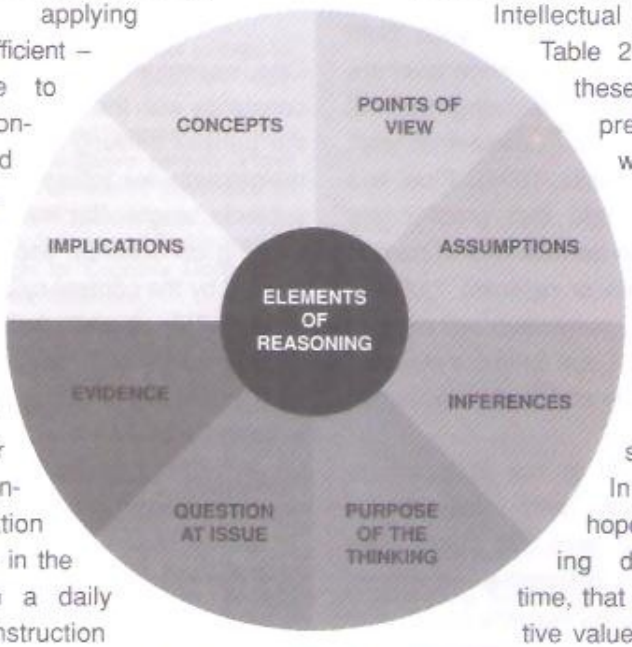
The Knowledge Dimension	The Cognitive Process Dimension					
	Remember	Understand	Apply	Analyse	Evaluate	Create
Factual Knowledge						
Conceptual Knowledge						
Procedural knowledge						
Meta-cognitive Knowledge						

From A Taxonomy for Learning, Teaching and Assessing – Anderson & Krathwohl

models, especially in its revised form, is crucial in sharpening the awareness of teachers as they design their lessons. It is the revised Bloom's Taxonomy of Educational Objectives (Anderson and Krathwohl, 2001 - See Table 1). Teachers in the GEP are encouraged to refer to it all the time to determine the pitch of the question they are asking or the demand level of a task/activity that they are designing for assessment purposes.

The message is constantly reinforced that knowledge of facts (remembering, understanding, applying them) is not sufficient – teachers strive to teach at the conceptual level, and pupils are challenged by and revel in the exploration of concepts and connections. This in itself accounts for much of the content differentiation that takes place in the Programme on a daily basis. Daily instruction also emphasises analysis, evaluation and synthesis (the critical and creative dimensions of learning), giving practice in these higher level processes, rather than spending time on the teaching and testing of facts. Finally, meta-cognitive reflection is a ubiquitous feature of our instruction. These aspects will be illustrated through the activities mentioned later.

The second model that anchors the teaching of thinking in the GEP is Paul's Reasoning Model (Paul & Elder, 2001). The model consists mainly of the Elements of Reasoning, represented in a wheel (see Figure 1), and of a set of Universal Intellectual Standards (see Table 2). Used together, these provide a comprehensive framework for developing and assessing critical thinking. We try to use these routinely in all the taught subjects, and at both primary and secondary levels. In doing so, we hope to cultivate thinking dispositions over time, that encompass affective values as well (Paul & Elder, 2001; Tishman, Perkins and Jay, 1995).



Paul's Elements of Reasoning
Figure 1

Pupils can be trained to habitually ask powerful questions using the Universal Intellectual Standards:

Table 2
Universal Intellectual Standards

CLARITY
- Can I elaborate?
- Can you illustrate what you mean?
- Can I give examples?

ACCURACY
- How can we verify this?
- How can I find out whether this claim is true?

PRECISION
- Could I be more specific?
- Could we give more details?

DEPTH
- What factors makes this a difficult problem?
- What are the complexities of this question?

LOGIC
- Does all of this make sense altogether?
- Does this conclusion follow the evidence?

RELEVANCE
- How does this relate to the problem?
- How does that bear on the question?

SIGNIFICANCE
- Is this the most important problem to consider?
- Which of these facts should we focus on?

BREADTH
- Do we need to look at this from another perspective?
- Are there other points of view to consider?

FAIRNESS
- Is my view justifiable in this context?

From Critical Thinking, R. Paul & L. Elder

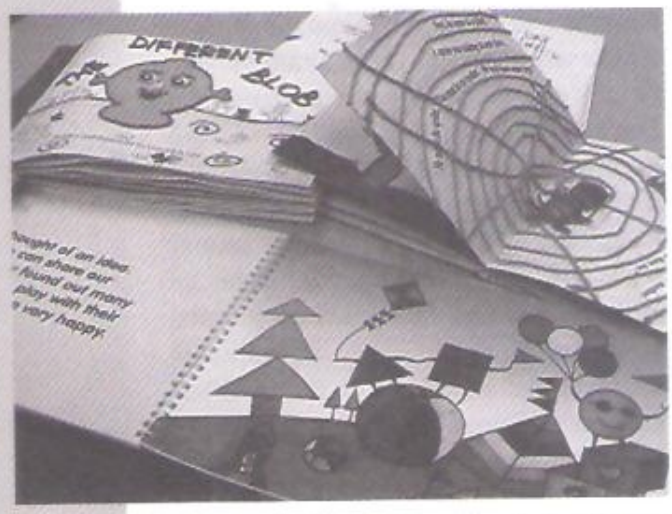
Against the backdrop of these 2 models that support thinking and learning processes, we employ a range of instructional strategies both in our regular classroom teaching and in our out-of-class enrichment activities. These strategies are, on the one hand, selected to match the characteristics of our pupils (they are generally intellectually curious and are able to handle complexities), and on the other hand, inspired by the desired learner outcomes of the Programme. Thus, in order to develop intellectual depth and higher-level thinking, we advocate instructional strategies that focus on concept teaching. These include Concept Development (Taba et al., 1971) and Concept Attainment strategies, the Inductive method, and whenever appropriate, an interdisciplinary approach to teaching over-arching concepts (Erikson, 2002; Eggen and Kauchak, 2001).

Let me illustrate. At Primary 5, for instance, a competition is designed to emphasise concept learning in science. It is called E= C2 M, which stands for "Elevating Concepts through Changing Mindsets". The mini-assignment requires pupils to choose a concept in science (e.g. Matter - air; heat - expansion and contraction; electricity - conductors and insulators; plant life - stages of growth; the body – the respiratory system; forces - gravity), do some research on the chosen concept to find out more about it, and decide how to illustrate it by means of a creative product.

The following are essential traits to be cultivated in order to develop a disciplined mind:

- Intellectual integrity
- Intellectual humility
- Intellectual perseverance
- Intellectual fair-mindedness
- Intellectual courage
- Intellectual empathy
- Intellectual confidence in reason
- Intellectual autonomy

Paul & Elder (2001)



The pupils' projects are graded with the help of rubrics. The main criteria include 'understanding of concept', which assesses the accuracy of the concept learnt; and 'quality of product', which assesses whether the creative product enhances understanding of the concept it is meant to illustrate. This assignment forms part of their continual assessment. The mode of assessment reflects the importance given to concept learning. It also tests for whether individual pupils can transform knowledge and give it new expression.

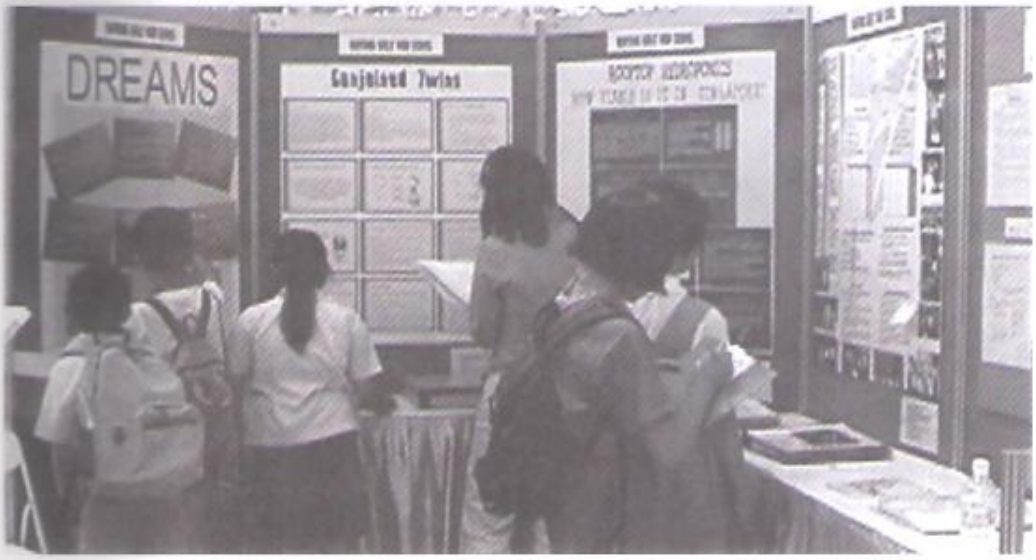
To illustrate the possibilities for an interdisciplinary approach to concept teaching and learning at the Secondary level, I have chosen a unit on 'conflict' designed for Secondary 2. The overarching concept was identified by teachers and curriculum officers for its relevance to their respective subjects. They then articulated how the concept of 'conflict' was important in their domain, and what were the possible instructional outcomes in their respective subjects. Hence, while the core history curriculum included the Japanese Occupation of Malaya – the enrichment required an analysis of the causes of conflict and types of conflict entailed by the occupation; the Literature curriculum featured war poetry (expressions for and against war; views on the consequences of conflict) and the Merchant of Venice (play revolving around a clash of values and cultures, also used to teach dramatic conflict, tension and resolution); the Geography curriculum included a discussion of the conflict between development and conservation. The Civics and Moral Education curriculum contained lessons on conflict resolution. It must be noted that for a unit to be truly inter-disciplinary and concept-oriented, the overarching concept must be defined and considered from different perspectives, that is, it must be examined through the lens of the various disciplines. Such a process deepens pupils' understanding as it brings interdisciplinary connections to their consciousness. Evidently, such units of work can only materialise with the collaboration of teachers and as a result of continued 'conversations' across disciplines.

As far as possible, learning is made relevant to pupils through tapping their interests and through applications to the real world. This may be seen in action in different components of the Programme. The Maths Trail at Primary 5 and the Science Trail at Secondary 1 are examples of how situations or scenarios are used to develop problem-solving skills. The Maths Trail usually focuses on such practical skills as estimation and mental calculation.

Pupils are given problems to solve regarding distance, speed, quantity of material required, etc. For example, one task requires pupils to design a method to estimate the speed of the monorail at Sentosa. The Science Trail 2001 entitled "Something fishy is going on here" involved solving a water contamination problem at the Botanic Gardens pond. Pupils had to apply their knowledge of chemistry and life science to determine the contaminants. They also had to manipulate instruments and samples, and record their findings.

One powerful way to encourage intellectual curiosity and develop autonomy in learning is to allow room for pupils to pursue their personal interests within the curriculum. Thus, in the GEP, the Individualised Research Study (IRS), as the name suggests, heavily emphasises self-selection of topic and the inculcation of management and research skills. In IRS, the pupil's interest takes centre stage, while the teacher acts as a facilitator and imparts necessary skills. The range of topics to be featured in this year's exhibition reflects the diversity of pupils' interests and the application with which they pursue a topic close to their hearts. The topics range from practical concerns like "To reduce time queuing in the school canteen" (Rosyth school) to technological experiments like "The effects of green tea on the preservation of tofu" (Dunman High School), from social investigations such as "Drugs and young people in Singapore" (Nanyang Primary School) to artistic explorations like "Film production" (Raffles Girls' School), and from the quirky hobby-based "Building paper planes" (Anglo-Chinese Primary School) to the scientific "Investigation of the silk of the orb-web weaver spider" (Raffles Institution). We truly believe that every child has an interest, if not many, and these interests may be harnessed to bring about self-motivated and self-directed learning.

Besides self-direction in learning, IRS introduces 2 other elements of authentic learning, that of 'the professional's method and discipline', and that of 'the real audience'. These elements are also built into areas of the subject curricula. For instance, the enriched history curriculum exposes pupils to the concept and skills of historiography, i.e. what the professional historian does, the skills involved in historical research such as referring to and interpreting primary and secondary documents. In an annual activity enhancing National Education, the History Drama, S2 pupils write the script for and enact historical events for Primary school pupils, a real audience. The GEP Science Fair is



the culmination of investigative lab research projects done by Secondary 2 and Secondary 3 pupils. The annual Literature Seminar provides a platform for Secondary 2 and Secondary 3 pupils to present their academic explorations beyond the taught texts to their peers. Hence, this year's topics range from "A deconstruction of Fantasy novels" to "Search for identity in Homer's Odyssey and Achebe's No Longer at Ease", to "Existentialist Literature, rock music and pre-millennium tensions".

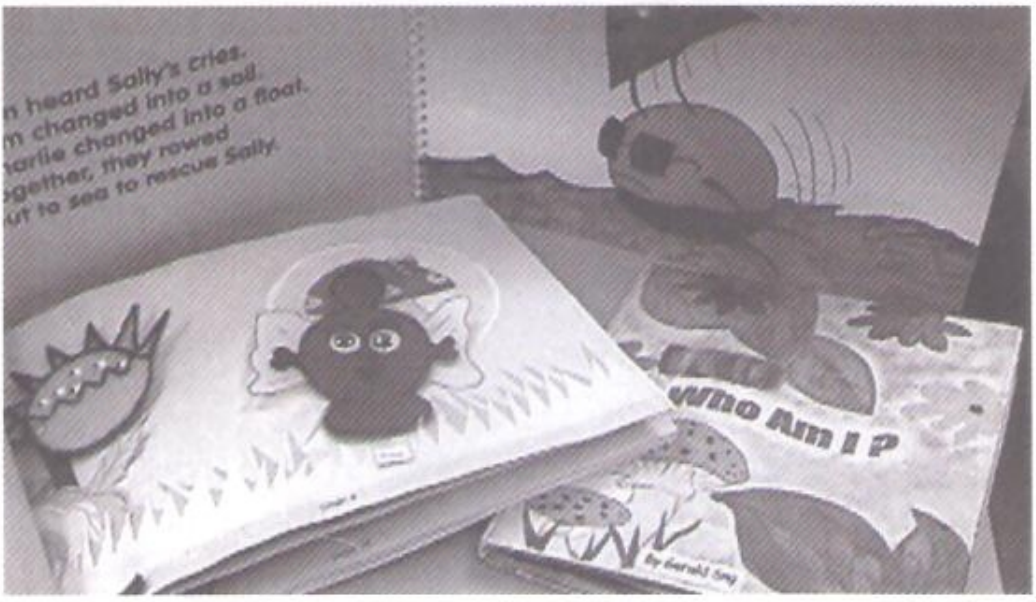
All the above represent the extensions to the core curriculum that take the form of either classroom tasks or out-of-class enrichment activities facilitated by teachers. I will only mention that beyond these, we organise a range of Special programmes (both in the sciences and the arts) that involve attachments with mentors from Tertiary institutions and the community. In these Special Programmes, learning is accelerated, giving selected participants a further taste of what it is like to do 'professional' research or practise creative writing for publishing.

Even as I have sketched in broad strokes the landscape of learning processes in the GEP, I would like to conclude with a look at learning in the affective domain. It must be stressed that affective learning often takes place alongside the cognitive. Thus, it would be evident from what has gone before that life-skills, such as self-management skills, and values such as responsibility and perseverance, are embedded in the above processes. Two of the six goals of the Programme focus on service:

- To develop a strong social conscience and commitment to serve society and nation

- To develop moral values and qualities for responsible leadership

We have recently embarked on piloting a number of Service-Learning projects, both at Primary and Secondary levels, to enhance the implementation of CIP requirements. These are designed to not only engage pupils more meaningfully at the moral and emotional level, but also to involve a commitment of their intellectual energy and talents. One of the pilot projects, The Picture Book project, came to fruition just last week. It was conducted in collaboration with the Association of Persons with Special Needs, APSN. The project involved 22 Primary 4 pupils



creating picture books (writing and illustrating stories) that would raise public awareness of children with Special Needs. Specific learning objectives helped to provide focus: pupils had to gather information about characteristics and needs of the children in Chao Yang and Jervois special schools, had to meet and interact with them, correct their own misconceptions and stereotypical views, and communicate awareness-raising information and insights through their creative products. Not only were the products beautifully and thoughtfully crafted, they expressed sensitive insights and were accompanied by diary logs that showed once again the importance of meta-cognitive reflection in integrating the affective with the cognitive.

Gerard (Primary 4 - NYPS) wrote this in his evaluation of the experience:

My book is about a caterpillar who wants to find out who he is – Not many of us are brave enough to ask ourselves, "who am I?" or ask others what they think of us. ... the caterpillar is bold enough to find out more about himself ... he is able to share his gift of cocoon spinning and eventually becomes a beautiful butterfly.

It (the project) gave me a great opportunity to interact with friends at Chao Yang and understand their educational needs. I learnt to look for gifts within myself that I could share with them ... I really enjoyed conceptualising the story and making it interesting for them. I have the responsibility to share my love of writing with others and bring it into my friendships with others to make them happy.

I wish to have more time and opportunities to work with the children at Chao Yang in other areas like music and sports. Perhaps next year, it would be good to organise a community project for my other GEP friends.

Such responses are what we look forward to as we design more ways of helping our pupils reconcile mind with heart, make connections, enjoy learning and serve others with their gifts. Though they may appear to learn differently, all they want is to find meaning in learning. They are not so different after all.

References

Anderson, L.W. & Krathwohl, D.R. (2001). A Taxonomy for Learning, Teaching and Assessing. Longman.

Eggen, P.D. & Kauchak, D.P. (2001). Strategies for Teachers – Teaching Content and Thinking Skills. Allyn and Bacon.

Erikson, H.L. (2002). Concept-based Curriculum and Instruction – Teaching beyond the facts. Corwin Press Inc.

Paul, R. & Elder, L. (2001). Critical Thinking: Tools for Taking Charge of Your Learning and Your Life. Prentice hall.

Taba, H., Durkin, M. C., Fraenkel, J. R., & NcNaughton, A. H. (1971). A teacher's handbook to elementary social studies: An inductive approach (2nd ed.). Reading, MA: Addison-Wesley.

Tishman, S., Perkins, D.N. & Jay, E. (1995). The Thinking Classroom – Learning and teaching in a Culture of Thinking. Allyn & Bacon.

Tomlinson, C.A. (1995). How to Differentiate Instruction in Mixed-Ability Classrooms. Association for Supervision and Curriculum Development.

Van Tassel-Baska, J. (1994) Comprehensive Curriculum for Gifted Learners. Allyn & Bacon.

Linda Wong *is a Senior Gifted Education Specialist, GE Branch, Ministry of Education, Singapore*

Supporting Diversity and Special Needs

Liza Thia & Fiona Cheam

Introduction

The essence of an Ability-Driven Education (ADE) is differentiation. To translate the philosophy of ADE into practice, we need firstly to be able to identify the unique needs of individual children, and secondly, to be able to customise teaching to meet these needs. ADE is also about the holistic development of our pupils such that they would be able to apply themselves meaningfully, and optimise their talents and abilities.

At the Psychological and Guidance Services Branch (PGSB), it is our mission to provide a comprehensive psychological and guidance service to schools through consultancy, training, assessment and intervention, to enable pupils to optimise their potential in the areas of cognitive, affective, character and career development. In this article, we explain who we are and how we support schools in meeting the different learning needs of our pupils.

Providing an Integrated Service to Schools

A key service offered by PGSB is the provision of psychological and guidance services to schools to support pupils with learning, behavioural and emotional difficulties. Every primary school can call upon a **Multi-Skilled Team** (MST) for consultation, training, assessment and intervention. The MST consists of Educational Psychologists, Guidance Specialists and Reading Specialists, who collectively have expertise in psychology and human development, literacy development, counselling, educational and career guidance. In addition, all MST members are trained teachers, with an intimate understanding of the school system and the educational context. They visit schools on a regular basis to provide a range of direct and consultation services to schools.

- The Educational Psychologist (EP) provides consultation as well as direct support for pupils with learning, behavioural and emotional difficulties. In addressing the varied needs of pupils, the EP may engage the school at a systemic level, suggesting modifications to existing structures and processes to better meet pupils' needs. In other cases, the EP may work individually with a child or a teacher, to address a very specific need of the child (e.g. a learning disability). This may involve teacher and parent interviews, classroom observations, psychological assessments, curriculum-based assessments and behavioural analyses. Following this assessment of needs, recommendations and/or referrals are made and support is put in place.

- The Guidance Specialist (GS) provides consultation on pastoral care as well as counselling of pupils referred with emotional and/or behavioural difficulties. Where necessary, group intervention is also provided through study skills and social skills training for pupils.

- The Reading Specialist (RS) conducts assessments and plans support for pupils with literacy difficulties. For pupils

assessed to have severe reading difficulties, the RS tailors an Individual Education Programme that is implemented for the child, and reviewed regularly. RSs also provide consultation to schools on setting up whole school programmes to develop literacy, such as buddy reading and buddy writing programmes.

Working with Key Stakeholders

In working with schools, PGSB acknowledges the key role that parents play in their children's education. When a pupil is referred to the MST, parents are invited to discuss their concerns with the MST and the school, and offer their perspectives on the difficulties. They are given feedback on assessments and diagnoses, and encouraged to participate actively in the recommended intervention.

For pupils with more severe learning difficulties, the MST collaborates with external agencies (e.g., Dyslexia Association of Singapore, Autistic Resource Centre, Child Guidance Clinic, Students Care Service) to provide an additional avenue of support for the pupil.

Feedback on the MST has been very encouraging thus far:

- "Thank you very much for the invaluable support and standing by with us and understanding our constraints and suggesting various strategies as we take this very trying case and meet the challenges ahead." Principal of a pupil with severe behavioural difficulties.
- "We would like to extend our thanks to you for spending so much time with J (the child) and ourselves. At least now we are aware of her strengths and weaknesses and will try our best to guide her." Parent of a girl with reading difficulties (dyslexia).
- "I am impressed with (the MST member's) professionalism and expertise in engaging the group and my son." Parent of a boy diagnosed to be in the autistic spectrum.

In order to encourage a holistic approach to pupil management, PGSB trains and assists schools in developing a framework, systems and structures that focus on early and systematic identification, assessment and provision of support for pupils with learning, behavioural and emotional difficulties. One such system is the **Stage Model of Intervention**.

The stage model approach was piloted in nine schools and is currently adopted in 48 schools. In each of these schools, there is a Case Management Team (CMT),

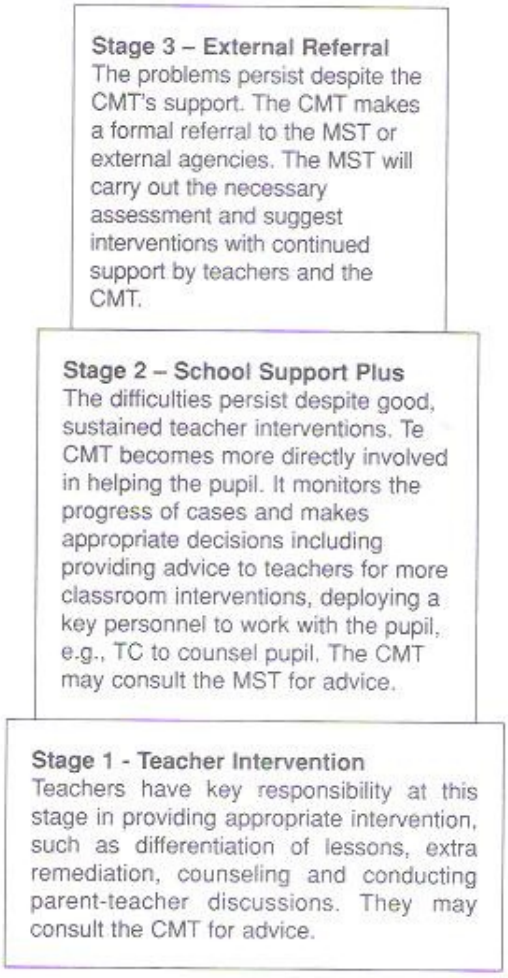


Fig 1 Overview of the Stage Model of Intervention

comprising key school personnel such as the Discipline Master (DM), Pastoral Care Co-ordinator (PCC), Teacher Counsellors (TC) and the Learning Support Coordinator (LSC). The CMT looks into the overall management of pupils with learning, behavioural and emotional difficulties, as well as facilitates the referral process to the MST. An overview of the Stage Model is illustrated in Fig 1.

Our schools have identified the following as benefits of this system:

- It is a more holistic approach towards intervention - the structure is very clear and effective.

- Staff in the school are more aware of the roles of the LSC, TC. Hence, cases and referrals are channelled to the relevant people in the CMT.

A captivating puppet corner designed to facilitate the practice of oral language.

- The guidelines have made teachers more focused and have tightened the referral system. Teachers know when and to whom to refer cases.

- Teachers are able to share cases and get assistance from the CMT.

- There is very strong collaborative work and teamwork. CMT members are empowered to take initiatives to bring up issues and gather feedback. There seems to be an on-going consultation among members as a daily practice.
- CMT members form a support group for each other.

Providing Early Intervention

PGSB assists schools to develop, implement, monitor and evaluate specialised early intervention programmes (e.g., the Learning Support Programme and the ENABLE Programme).

The **Learning Support Programme** (LSP) is an early intervention language and literacy programme, first introduced in 1992 to provide additional support to pupils in Primary 1 and Primary 2 who are educationally 'at-risk' of failing in school. These pupils lack the necessary language and literacy skills to access the curriculum. Each year, about 12% to 14% of Primary 1 and Primary 2 pupils receive support through the LSP. The LSP is implemented in all primary schools, which are provided with an additional teacher, known as the Learning Support Coordinator (LSC). Where the school cohort is large or has a high proportion of 'at-risk' pupils, a second LSC is provided.

Appreciating the importance of a conducive environment for effective teaching and learning, the LSC creatively organises the room with colourful and interesting learning stations, cosy library corners, attractive displays of pupils' work, etc. [Pix 1].

Pupils in the LSP are taught in small groups of 8 to 12. In the LSP, lessons are highly differentiated to meet the individual needs of the pupils. LSCs have to draw from a wide range of teaching methodologies and resource materials, differentiating pace, content and activities to ensure that every pupil learns and experiences success at each lesson. With

An attractive and stimulating classroom, stocked with colourful manipulatives for Math

constant encouragement from the LSCs, the pupils in the LSP develop confidence and self-esteem, and are motivated to learn and achieve.

The **LSP for Mathematics** is a parallel programme implemented by a Math Support Teacher (MaST). It is currently implemented in 50 schools on a pilot basis, the results of which will determine its roll-out to all schools. As with the LSP (English), pupils are supported in small groups to allow a high level of teacher-pupil interaction. Multi-sensory and activity-based learning is advocated so that pupils experience Math in a fun and meaningful way. [Pix 2]

Success Stories

"The success of the Learning Support Programme can be attributed to the unique combination of specially trained teachers and the daily interaction that these teachers have with their pupils." Mr Hawazi Daipi, Parliamentary Secretary of Education, at the inaugural Learning Support Conference 2002. Pupils in the LSP make good progress:

- Improved reading ages – pupils start school at P1 with limited reading skills, equivalent to children of less than 5 years of age. In 2001, after 10 months of intervention in LSP, the average reading age of LSP pupils increased to almost 7 years of age.

- Improved pass rates – in 2001, less than half (45%) of Primary 1 LSP pupils passed English at the first semestral assessment). By the second semestral examination at the end of the year, the pass rate was 65%.

- At the end of Primary 1, 60% of the LSP pupils are discharged from the programme. The remaining pupils continue to receive support in Primary 2.

LSCs and MaSTs have been encouraged by the fruits of their labour:

- *"They have improved in their self-esteem and are less fearful of making mistakes."* Mdm Amelia Chua from Siling Primary

- *"They are more confident when interacting with teachers."* Mdm Rosnah from Qiaonan Primary

- *"They are responsive and participate actively during lessons. They are also motivated to read more books."* Miss Lim Tian Hua from East View Primary

- *"The pupils' oral skills and expressive language have improved. They have learnt to be more sociable and demonstrate team spirit."* Mrs Angela Tan from Stamford Primary

- *"They develop better interactive, communicative and social skills and are able to share writing materials during group work."* Miss Judy Lie, Haig Girls Primary

- *"They have better number sense and are more willing to try and work independently."* Mrs Ding Suan Neo from Woodlands Ring Primary

- *"They have shown improvement in their attitudes towards the learning of mathematics."* Mrs Pang Wee Meng from Rosyth

Many of the pupils enjoy the LSP lessons, and their learning int erest has been stimulated by the creative teaching strategies and a conducive and nurturing environment:

- "Teacher, I like to come to your class."

- "... because this class is very nice."

- "We play many games."

- "We get many stickers."

- "It is fun!"

Another effort that aims to help lower primary pupils in English and Mathematics is the programme for **ENcouraging Achievement and Better LEarning** (ENABLE). Started in 1989, the ENABLE programme aims at identifying pupils who are underachieving at the end of Primary 1. Support is provided in Primary 2 and 3 by ENABLE teachers trained in diagnostic and focused remediation. Teachers go through a continuous cycle of identifying specific learning deficits, teaching, and evaluating learning of the pupils. They are also encouraged to consider other factors that contribute to underachievement when planning their lessons, such as catering to different learning styles, providing motivation and emotional support, and teaching study and organisational skills.

Providing Training for Teachers

The first step in addressing a problem is in its identification. In addition to the training of LSCs, MaSTs and ENABLE teachers, PGSB mounts several courses during the year to provide teachers with an understanding of learning difficulties and learning disabilities. These courses are designed not only to impart knowledge to teachers on signs and symptoms to look out for, and teaching and behaviour management strategies. More importantly, they aim to create an awareness of how these difficulties impact the child academically, socially and emotionally. In these courses, we try and recreate for the teachers what it feels like to be a child with a learning disability. With this first hand experience, teachers are more empathetic, patient and determined to support their pupils. Some examples of courses conducted this year are:

- **Why Isn't My Pupil Learning As Well As He Should?** introduces the key learning difficulties, i.e., dyslexia, Autistic Spectrum Disorder (ASD), and Attention Deficit Hyperactivity Disorder (ADHD), through a highly stimulating and activity-centered training.

- The **Dyslexia Awareness Seminar** helps teachers understand the causes of dyslexia, and the associated difficulties. They are equipped with skills to work with pupils with dyslexia in the classroom.

- The **Autistic Spectrum Disorder** training allows participants to experience the kind of teaching environment and atmosphere that suits pupils with ASD. They gain a wide repertoire of skills and specific techniques to successfully include pupils with ASD within the classroom.

- **"Attention – Can't Pay/Won't Pay?"** addresses the nature of behavioural difficulties and difficulties related to ADHD. Appropriate intervention and effective strategies are also explored during the training.

- **School-based workshops** – MST also customises training workshops for schools on a request basis, according to the needs of the school. Some of the school-based training conducted includes Dyslexia Awareness (for schools with a high number of pupils with dyslexia), Oral and Reading Strategies, Phonological Awareness, Behaviour Management, etc.

Each training session is planned with much thought and effort and we are proud of the positive feedback:

- "We got some insights into dyslexia and are now aware."

- "I learnt a good number of new things today. I feel enriched through this session."

- "I've learnt how to manage ADHD children and help them fit into the school system."

- "The perspective of a parent of an ADHD child opens my eyes."

- "I enjoyed myself immensely. The workshop stimulated me to think of what I can do to help my autistic pupil. Thank you very much."

- "The course is an eye-opener for me. Teachers will certainly benefit from such as course."

- "Thank you! A very down-to-earth, practical course. Benefited much!"

In 2001, PGSB produced a booklet, **"I'm worried about Kim..."** to complement our training efforts. This publication, given to every teacher, provides information on different types of learning, behavioural and emotional difficulties, and effective strategies that can be implemented in the classroom.

Conclusion

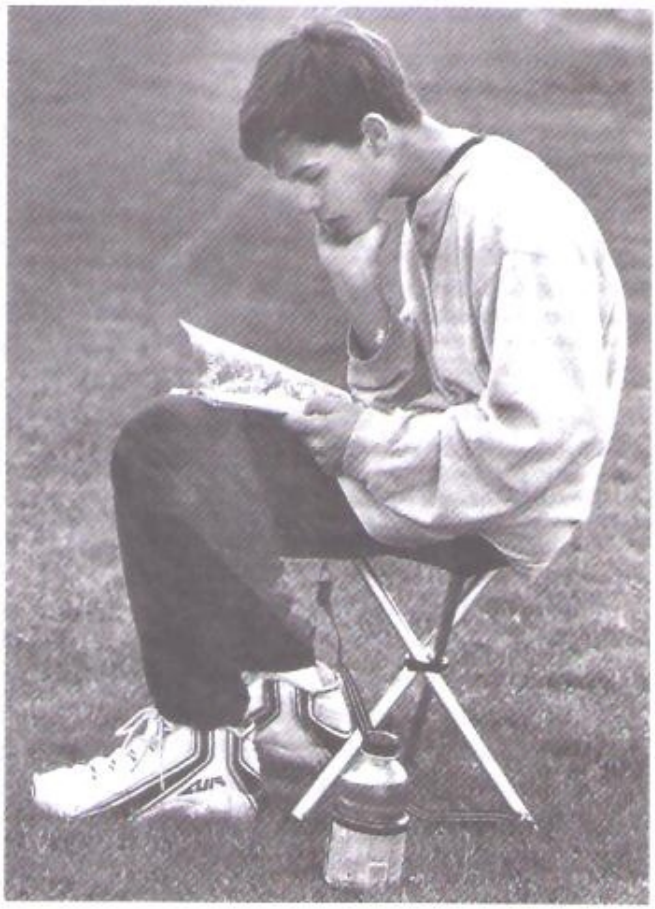
In the Ability Driven Education, schools need to systematically plan and provide support for each pupil in order to help meet his unique learning style and needs. There is a sizable minority in our classrooms who learn differently, and hence need to be taught differently. To stimulate their interests and optimise their learning potential, teachers need a good understanding of these differences, and cater to their learning, emotional and social needs. This challenge can be met by working collaboratively with professionals from HQ, parents, and other partners from the community.

Liza Thia *is an Educational Psychologist in the Psychological and Guidance Services Branch (PGSB), Ministry of Education, Singapore.*

Fiona Cheam *is a Chartered Educational Psychologist, and is Head of South Zone, PGSB, Ministry of Education, Singapore.*

Why Johnny Won't Read

Jon Scieszka



Boys will be boys – and with the right books and role models, they'll be readers, too.

When my son Jake was in third grade, the one required summer reading book for his whole class was *Little House on the Prairie*. Jake's first impression? "Why are we reading this? Reading is for girls." Jake is now in high school, but along the way he has worked through required readings of E.B. White's *Charlotte's Web*, Alice Walker's *The Color Purple*, Michael Dorris's *Yellow Raft in Blue Water* and Toni Morrison's *Sula*. Jake's current impression? 'Reading is definitely for girls."

Jake is not alone in this opinion. The 10-year-old boys in my neighbourhood, the boys I talk to when I visit schools, the boys who write to me – "I don't like books, but I kind of liked one of yours" – these boys don't see reading as a "guy" activity. And this perception of reading is showing up in grim statistics, most notably those provided by U.S. Department of Education reading rests, which have shown boys scoring lower than girls every year, in every age group – for the past 30 years. It's a pretty sad state of affairs, if you ask me.

I grew up with five brothers (no sisters). *Everything* was a guy activity in our house – eating, wrestling, cooking, reading, more eating and wrestling. I remember hearing my mother read Dr. Seuss aloud to us and

being absolutely amazed. I wanted to read those works myself. I never thought of reading as something for girls.

We always had books around the house. And there were, of course, fewer entertainments competing with reading when I was growing up. Undistracted by cable TV, the Internet, DVDs and Playstation 2, I could be bored enough to be driven to discover on the summer cottage bookshelves copies of *Tales of Edgar Allan Poe*, Reader's Digest's *I Am Joe's Liver* and Boccaccio's *Decameron*. I read to make my own discoveries. The more I read, the more I wanted to read.

Today, I'm the father of a girl and a boy. My daughter, Casey, is as much a reader as Jake is not. As a baby, she read books aloud in her own made-up language. Growing up, she devoured entire shelves of Nancy Drew, the Babysitter's Club, American Girl and Sweet Valley High books – for fun. Jake has never been one to pick up a book for fun. His classic answer to my question "What books are you packing for vacation? is still "Why would I take books? This is supposed to be a vacation."

I know some of this is just who they are. Not every child is a reader. But I worry that more girls than boys are readers because we're not showing boys that reading is as much a guy activity as a girl activity.

When I taught second grade, I was the only male teacher (except for the gym teacher) in the primary division. This isn't unusual. Seventy-five percent of elementary school teaches in the U.S. are women, while the percentage of female elementary school librarians is closer to 80. So it shouldn't surprise us that many boys don't see reading as particularly masculine activity. We *tell* boys that reading is something mostly women do. We *show* them that reading is something mostly women do. While they're creative and well-intentioned, I'm not convinced that the Reading is Fundamental posters of Michael Jordan and Sammy Sosa with their noses in books are making much of a difference. Boys know why these guys are famous and how they make their money. It's not from reading.

One thing I know for certain is that boys need positive male role models for reading. In my second-grade class, I saw boys who had already been tagged as "problem" students in first grade blossom into learners and readers. This wasn't the result of anything extraordinary that I did. I didn't do anything drastically different from what the women teachers were doing. I think it was just that I was male, and I was reading. I was the role model

What's with Guys?

- *Biologically, boys are slower to develop than girls and often struggle with reading and writing skills early on.*
- *The action-oriented, competitive learning style of many boys works against them learning to read and write.*
- *As a society, we teach boys to suppress feelings. Boys aren't practiced and often don't feel comfortable exploring the emotions and feelings found in fiction.*
- *Boys don't have enough male role models for literacy. Because the majority of adults involved in kids' reading are women, boys don't see reading as a masculine activity.*
- *Many books boys are asked to read don't appeal to them. They aren't motivated to want to read.*

Source: www.guysread.com

for how a guy could be interested in books.

I'll always remember the struggling second grader I tried to encourage by saying, "Reading can be fun." He looked at me from under eyebrows bent in serous concentration and gave me the challenge of a lifetime: "Show me something fun."

As a writer, I've always tried to do that. I've tried to inspire the kids at the back of the room who don't think of themselves as readers. I want them to be grabbed by the story. What if the wolf got to tell his side of the Three Little Pigs story? What if the little man wasn't made out of gingerbread, but out of stinky cheese? What if three regular guys could travel anywhere in time? I don't want my readers to be thinking how good reading is for them. I want my readers to be crazy to find out what happens next.

I've also come to realize that the cause of boys' reluctance to read can be reduced to a single, crucial element – motivation. Reading research shows that young people need high-quality teachers, a wide variety of books and a range of reading activities. They need to hear books read aloud. They need to spend time talking about books. But in order for any of these efforts to be successful, kids need to want to read. Most of the girls in the classes I taught wanted to be readers. But a lot of boys don't see a real reason to read.

I think schools and parents sometimes handicap their efforts to get boys reading by not offering boys the books that will inspire them to want to read. So many required reading lists and favored books in schools reflect women's reading tastes. That's not to say that *Little House on the Prairie*, *Charlotte's Web* and *The Color Purple* are bad books, that they should be read only by girls or that some boys might not love them, too. But imagine how motivated you would be to read as an adult if you were told that before you could read anything else that appealed to you, you first had to read the books your spouse likes.

So how do we start motivating our boys to read? One obvious solution is to get more men involved in teaching, more fathers actively reading with their boys, and adult men generally showing boys that reading is a male activity. But the obvious solution also seems to be much more easily said than done. How do we change social values and gender roles?

Providing book choice, and finding the books boys like to read, are two areas where we can do something right away. This is the primary mission of an initiative I started last year called Guys Read. Guys Read is not a campaign against girls or a call for authors to write books just for boys. It's a literacy campaign for boys based on my observation that something in the boys-and-reading equation isn't working. It's an idea that we might be able to help motivate boys to read by letting them know what other males, other guys, have enjoyed reading.

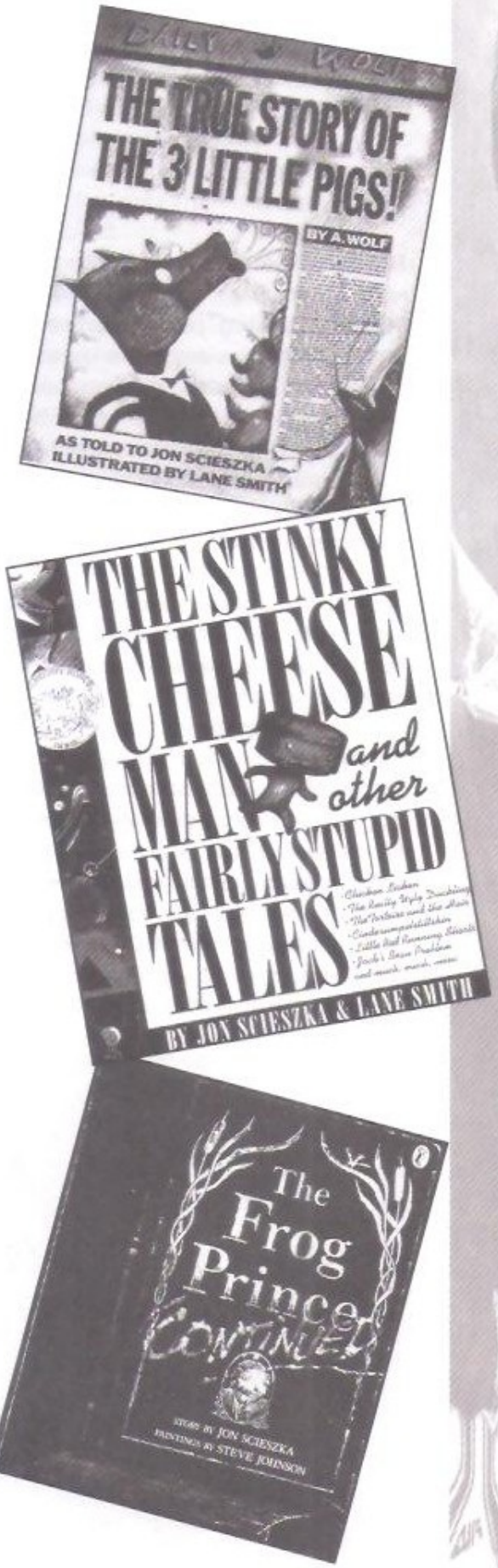
I put up an initial Web site (*www.guysread.com*) last spring to announce the program, and to start collecting ideas and titles of books boys like. I was a bit worried initially that we'd get a mountain of votes for *Harry Potter* and *Captain Underpants* – and not much more. I'm thrilled to say that I was completely wrong. Our voters have recommended everything from Hot Rod magazines to Phillip Pullman's award-winning His Dark Materials fantasy to Louis L'Amour Westerns to Katharine Paterson's *Bridge to Terabithia* to some of my favorite Terry Pratchett science fiction novels and beyond.

What makes a "guy" book, then? I'm not really sure. Guys have voted for Gary Paulsen action books but also for more introspective David Almond books. They

recommend Will Hobbs novels with male protagonists but also Sharon Creech's girl-narrated *Walk Two Moons*. Books written by men are big with guys, but books written by women are not excluded. Nonfiction is popular. Fiction is, too.

Ultimately, I don't think we can, or really should, try to distill all these choices down to what makes a "guy" book. I think the power of this collection of titles is in its very specific nature. We're not telling boys abstractly that "Reading is Important" or "Reading is Magic." We're telling boys concretely that "Other guys liked Louis Sachar's *Holes*. You might like it, too.

If we help boys find books they want to read, they just might surprise us and start reading. They might find out that reading can be for guys, too.



Editor's Note

This article was first published on 2 June 2002 by The Washington Post Company. It is reprinted here with the kind permission of Mr Scieszka in the hope that more teachers and parents can help motivate boys to read.

You are invited by Mr Scieszka to visit www.guyread.com for more information and a recommended list of titles for boys.

Jon Scieszka *is the author of numerous books for children, including 'The True Story of the Three Little Pigs," "The Stinky Cheese Man and Other Fairly Stupid Tales," The Time Warp Trio series and, most recently, "Baloney (Henry P.)."*

Preamble to an Understanding of Dyslexia

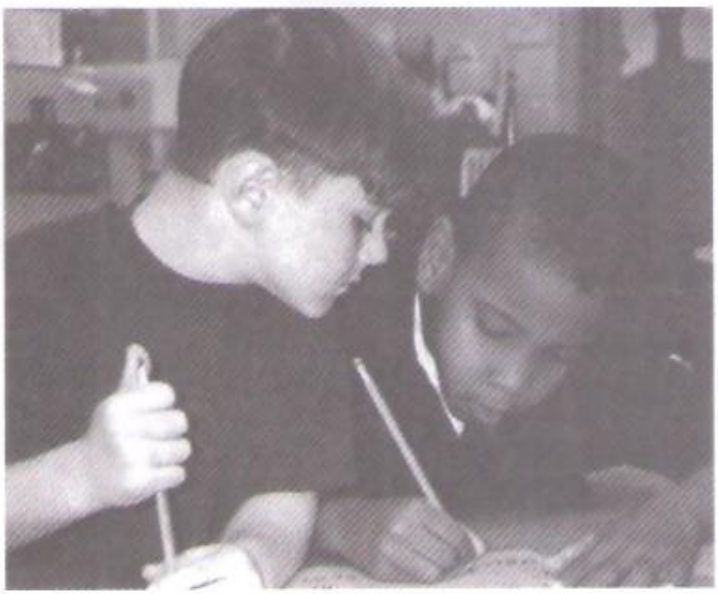
Janette Skeath

The term "Dyslexia" meaning "difficulty with words or language" is fairly well known. Despite increasing public awareness of Learning Difficulties and similar definitions, the condition's signs and symptoms are not always interpreted correctly. At first sight, this is rather surprising given the amount of literature on the subject, not to mention the various Dyslexia checklist tests for home use and so forth.

One problem is that Learning Difficulties can show in many different ways and may arise from a number of causes. Difficulties with diagnosis are almost inevitable given the diversity of the symptoms. Having said that, Dyslexics do share certain key characteristics. Both in Literacy and Mathematics. Research suggests many have a phonological deficit in the sense that they seem unaware that words consist of a number of different sounds which can be separated and rearranged. This, in turn, means that Dyslexics have difficulties in reading, writing and spelling, hard evidence of a real problem.

These linguistic and numeracy problems can be observed in pupils who are otherwise performing perfectly well and the difficulties rest in conventional instruction/ remediation. A family history of language difficulty may also be significant. Dyslexia is an enduring condition. It can affect many aspects of school and home life. The difficulty is both inconsistent and variable and discrepancies in performance are normal for the dyslexic pupil.

Many children with speech and language difficulties will experience difficulties with the acquisition of literacy skills. For some this will be as a result of their speech and language impairment, for others Dyslexia will be an additional difficulty over and above their speech and language difficulty. For all these children successful outcome will require early identification and specific targeted provisions through speech and language programmes, multi-sensory tuition, specialist teaching and therapy.



My experience of twenty years of teaching in specialist schools for Dyslexics has led to the conclusion that most pupils have difficulties in at least some areas of Literacy and Mathematics.

I have learned there is no single answer to teaching and learning problems. Each child we meet is a reminder that every child has individual needs, even if these needs are

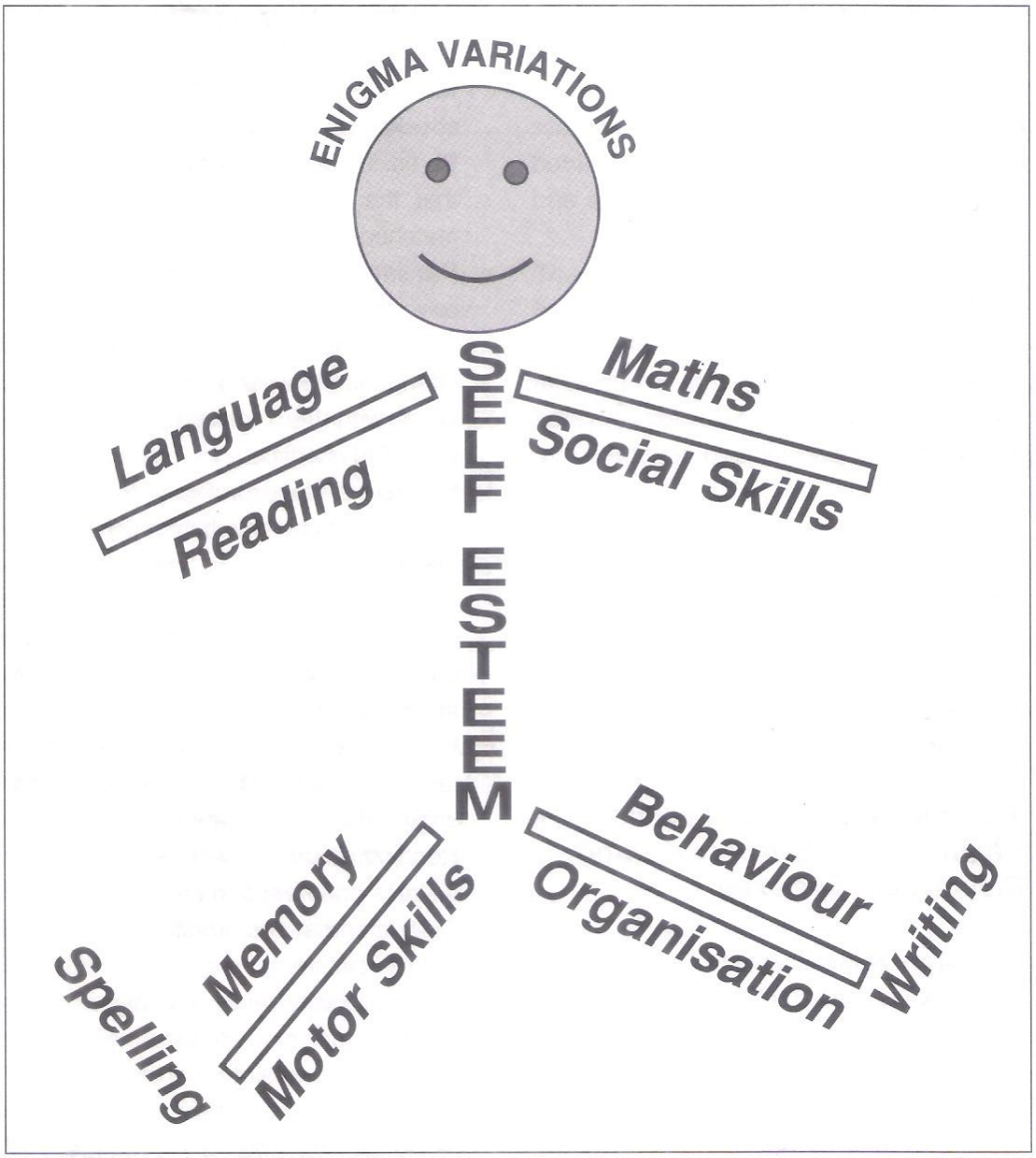
grouped around a basic common core. To address this individually, we have developed a flexible approach, based on an awareness of Dyslexia, an understanding of how our pupils learn and fail to learn, combined with an appreciation of the structure and nature of Mathematics.

We have collected, tested and organised the most effective ideas from many sources, including material for students of the highest potential. The subjects covered go back to first principles to act at the root of the problem.

The contents and structure of the EMLD Mathematics programme can be applied to Dyslexic children throughout the school age range, for individual teaching and to other, non-Dyslexic children who experience difficulties with mathematics.

Teaching and Working with Children with Specific Learning Disabilities (Dyslexia)

- Seat the Student near the Teacher's desk but include as part of regular seating.
- Place the Student up front with his back to the rest of the Class.
- Surround the Student with good role models and encourage peer tutoring and co-operative learning.
- Maintain eye contact with Student during verbal instructions.
- Make directions clear and concise and be consistent with daily instructions.
- Simplify complex instructions and avoid multiple commands.
- Make sure the Student comprehends before beginning the task involving a verbal repetition of instructions from the child.
- Repeat in a calm and positive manner, if needed and encourage them to look at your mouth.
- These children need more help for a longer period of time than the average child.
- Require daily assignment notebook if necessary. Ensure the assignments are written down, perhaps by the Teacher or checked by the Teacher.
- Be flexible about teaching strategies so that the child's learning style can be matched.
- Provide visual support where ever possible.
- Understand the Student's particular strengths and weaknesses.
- Work with the 'whole child' – SELF-ESTEEM is critical.
- Maintain a close proximity to reassure the Student and help him maintain focus - secret signals to help him stay on task.
- When asking the Student questions stand in front of him and let him focus on the question and not be worrying about processing the previous one.
- Play memory games and speak directly to their face. Repeat instructions, ensure they are understood.
- Reading aloud is likely to cause much distress and needs to be avoided.
- Tailor material and questions to suit the child's abilities.
- Set achievable goals and praise when the goals are met. Reduce the quantity of work set and aim for quality.
- Monitor young children carefully for response to the early stages of chronological awareness, especially rhyming and rhythm.
- Praise immediately any and all good behaviour and performance.
- Avoid ridicule and criticism. Remember that Dyslexic children find control difficult.
- 'Glue ear' (deficiency in the passages between ear and nose) causes hearing loss and will often affect language and literacy learning. Once in noisy surroundings the ability to focus is limited.
- Visual tracking problems in reading might suggest a check-up with an Optometrist. Eye exercises and/or coloured filters are often helpful with visual problems.



- Recent research has found evidence that a diet supplement Efalex containing essential fatty acids can improve brain and eye function. Watch for allergies (particularly cow's milk). If the child reacts adversely to artificial colouring, sugar or preservatives, consider a consultation with a Dietician or Naturopath.
- Diet, health and fitness. Dyslexic people should be encouraged to increase their intake of 'brain foods' such as fish oils, fruits especially bananas and kiwi, brown rice and brown bread, and fresh vegetables. They should avoid highly processed foods, fizzy drinks and fried foods when they are studying because these can interfere with efficient brain function. Water is very important to hydrate the brain.
- Encourage talents and interests as it is often just as important to strengthen the strengths as it is to remediate the weaknesses.
- Be mindful of difficulties with learning another language (e.g. Chinese, Tamil).
- Confidence, attitude and motivation. These are crucial and Dyslexic people need support to evaluate their strengths and weaknesses, as often they tend to focus too much on what they are not good at and neglect to celebrate what they are good at. It may be art, music, mechanics, computers, getting on with people and being creative.

- Mechanical aids such as Tape Recorders, Word Processors and Computers all have a role to play and the support they can provide must be explored realistically and constructively. The child has a long time ahead when it will be necessary to communicate and there are other ways than solely writing and spelling with the inhibitions and restrictions they impose.
- Learning to touch-type is recommended and there is a number of Software programmes available to practise reading, writing and spelling.
- School performance, organisation skills and self-esteem can be helped by learning Study Skills. Mind maps are an excellent way to visually support auditory memory difficulties.
- With homework be mindful of the fact that it may take him up to three times as long to complete an assignment. The time needed should be monitored. It will be difficult for him to achieve both quality and quantity in written work. So perhaps adjustments could be made to ask for one or the other, but not always both at the same time.
- If a child cannot learn the way he is taught, it is better to teach him in the way he can learn.
- Teachers should discuss with Parents relevant and appropriate examination concessions. A letter can be provided to support a parental application. Similarly, exemption from Chinese.
- Parents know their child and it is important in the early stages that they pursue provision as necessary for learning support. The answer "Your child is not the worst in class" is not acceptable.
- Remember always that the child is the same person whether at home or at school, so recognise that his Parent is your greatest ally and that mutual support on the part of parents and teacher can greatly assist a bewildered human being.
- Above all, learn as much as you possibly can about the problem.
- Encourage talents as it is often just as important to strengthen the strengths as it is to remediate the weaknesses.
- Avoid ridicule and criticism. Remember that Dyslexic children find control difficult and often don't understand humour.
- With continued encouragement and support from teachers and parents working together, there is every reason for optimism regarding future success.

Janette Skeath *is a consultant in private practice and her organisation, Enigma Variations, specialises in teaching youngsters with dyslexia. She may be reached at Tel: 6235 5600 or E-mail: janette.enigma@pacific.net.sg*

Attention Deficit Hyperactivity Disorder

Carolyn Kee

Jun Ming is in Primary One. He has difficulty completing his work, forgets his books, does not copy his homework and is frequently found doodling or playing with his stationery in the middle of lessons. He would walk around the room when the other children are at work, talking to them and disturbing them by throwing his rubbers at them or poking them. He appears alert and speaks fluently, but performs below expectations in his work and continual assessments. At recess time, he occasionally gets into scuffles with his schoolmates. He has a few friends who also tend to be inattentive, restless and disruptive. The rest of his class tends to avoid him and complain frequently about him. Jun Ming's mother is a tired, anxious-looking lady who apologizes for her child's behaviour but expresses frustration and helplessness at managing him. Jun Ming was referred to the Child Guidance Clinic and was diagnosed with Attention Deficit Hyperactivity Disorder.

What is Attention Deficit Hyperactivity Disorder?

Attention Deficit Hyperactivity Disorder (ADHD) is a condition characterized by serious and persistent difficulties in inattention, hyperactivity and impulse control, which occurs across different situations and arises from young, before the age of 7 years.

How can a classroom teacher identify a child with ADHD and refer him for help?

A classroom teacher can identify a child with ADHD by noting the following signs.

Signs of **inattention** include:

- being easily distracted by irrelevant sights and sounds
- failing to pay attention to details and making careless mistakes
- rarely following instructions carefully and completely
- losing or forgetting things like toys, or pencils, books, and tools needed for a task

Signs of **hyperactivity** include:

- restlessness, fidgeting with hands or feet, and/or squirming
- running, climbing, or leaving a seat, in situations where sitting or quiet behaviour is expected

Signs of **impulsivity** include:

- responding before understanding the whole question or instruction
- interrupting others
- having difficulty waiting in turn

How does having ADHD affect the child?

The ADHD child experiences difficulties in many different areas of his life.

In school, he may have the following problems:

- fall behind in his schoolwork
- perform below his intellectual potential
- get into trouble for not following school rules and disrupting the class

- have difficulty getting along well with their peers

At home, he is difficult to handle as he is constantly on the move, does not follow instructions well and may quarrel frequently with his siblings.

Because parents and teachers have difficulty managing him, they may be frustrated, critical and negative towards the child. This could result in the child being labelled as "bad", "lazy" or "useless", getting a lot of negative feedback and developing a low self-esteem. Some ADHD children become defiant and oppositional because they feel frustrated when they are not able to meet the demands that are thrust on them and experience excessive negative feedback as a result.

Is this a common problem?

Studies suggest that 3-5% of children have ADHD[1]. In 1994, only 39 cases of ADHD were diagnosed in the Child Guidance Clinic (CGC). However, in 2001, 397 cases were diagnosed. This jump in numbers may be due to increased social awareness of the condition as well as the increased expectations for children to be able to sit down and perform routine work which results in more and more ADHD children having coping difficulties. More boys than girls tend to have this condition with a ratio of about four to one.

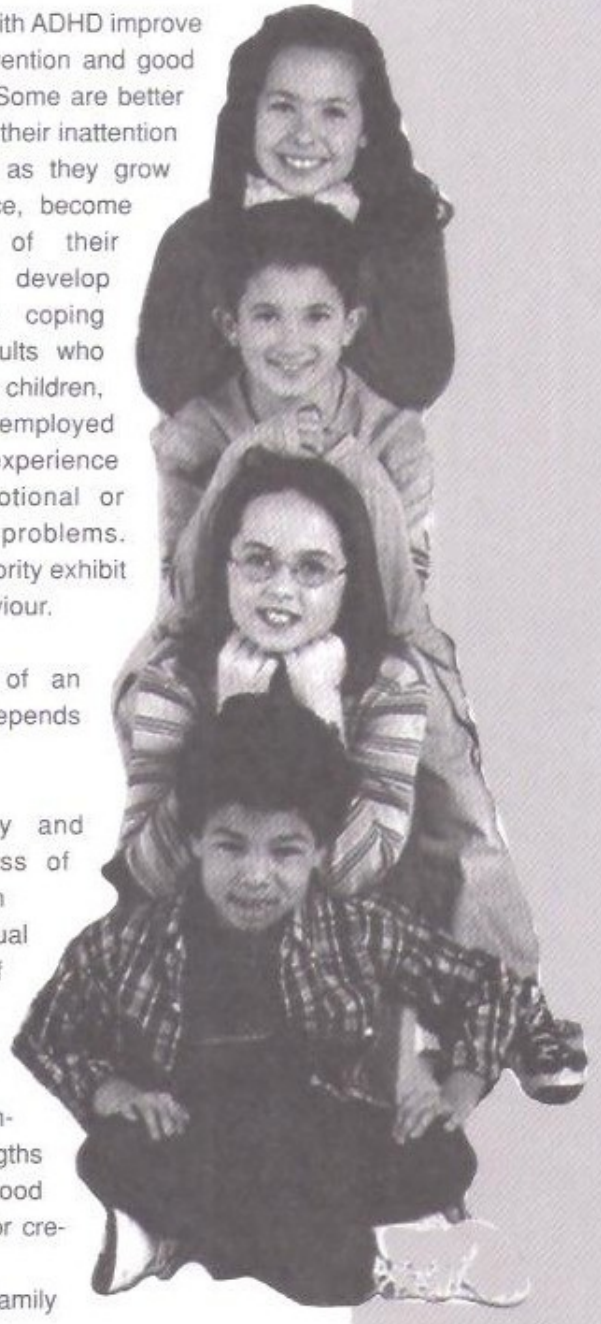
Why does a child have ADHD?

Research has yet to detect a single discernible cause for ADHD. Some factors related to the condition are:

- Family and genetic factors - ADHD tends to run in families and the ADHD risk is higher in a child whose identical twin has ADHD
- Prenatal and Perimatal complications, such as lengthy labour or traumatic brain injury
- Chemical toxins, such as lead poisoning
- Psychosocial stressors, such as chaotic family backgrounds, tend to aggravate the severity of the conditions
- Brain structure/function abnormalities – differences in the structure and function of the brain have been found in the brain scans of children with ADHD

Does a child with ADHD get better with time?

Many children with ADHD improve with early intervention and good family support. Some are better able to manage their inattention and impulsivity as they grow into adolescence, become more aware of their condition and develop more effective coping skills. Most adults who had ADHD as children, are gainfully employed and do not experience significant emotional or behavioural problems. However, a minority exhibit antisocial behaviour.



The outcome of an ADHD child depends on:

- the severity and pervasiveness of the condition
- the intellectual functioning of the child
- whether the child has compensatory strengths such as good social skills or creative ability
- whether the family

is supportive and accepting or critical and rejecting
- whether the child has other comorbid problems such as conduct, mood, anxiety or learning disorders

How is ADHD diagnosed?

There is no one test that can fully and conclusively determine that a child has ADHD. The clinical interview is the main method by which medical professionals internationally assess the condition. Information obtained in the clinical interview includes:

- report of the child's behaviour across various situations and activities
- onset, frequency, development and course of the problem behaviours
- birth and developmental history
- medical history
- family structure and history
- academic, social and emotional functioning
- psychosocial stressors
- observation of the child's behaviour during the session

Other information about the child's condition and functioning would be obtained from:

- school report
- behaviour rating scales
- psychometric assessments, if the child is suspected of having learning difficulties
- physical examinations, eg. screening for hearing or visual deficits

The final diagnosis is made based on all the information derived from these various sources.

How is ADHD treated?

A combination of medication and behavioural management has been found to be effective in helping children with ADHD. An important study done in the USA suggested that children with severe and disabling ADHD show significant improvement only with medication. However, children with mild ADHD can improve with behavioural management alone. The outcome of behavioural management depends very much on how closely parents can monitor the child and implement a clear and consistent system of rules, rewards and consequences. Parent education and family counselling can also help to reduce the frustration of parents towards the child and improve family relationships. Working with the child's school teacher helps to provide supportive structures for the child in school and alleviate some of the difficulties the child experiences.

What are some concerns about medication?

Parents are often worried that giving medication would be harmful to the child. They are concerned about side effects, that the child would become dull or "drugged out", or become addicted to the medication. Some parents express concern that the child would use his condition as an excuse for bad behaviour when he is not on medication.

The most commonly-used medication for ADHD, Ritalin, has been researched in more than 100 studies since the 1930's. It does have side-effects of appetite and sleep difficulties, but otherwise, is safe for use. Some children report feeling irritable or moody when they take the medication, but these symptoms usually diminish after a while or when the dosage is adjusted. Ritalin is effective in improving attention, concentration and self-control for about 4 hours, and should be taken before school starts. It washes out of the body daily and hence does not cause addiction.

While it is natural for parents and teachers

to be concerned about the effects of giving medication to the ADHD child, there is also a need to consider the consequences of not giving medication to help the child cope. An ADHD child has difficulty coping with schoolwork and relationships because of his poor attention span and poor impulse control. As a result, this could lead to the child constantly experiencing failure and negative feedback, which would affect his confidence and self-esteem in a negative way. This could lead to a downward spiral in which the child feels hopeless and gives up on himself. With medication, at least the child is able to absorb and process information better and perform better in school and in relationships. This could improve his self-esteem and give him hope in himself. Hence, there is a need to balance the pros with the cons of taking medication.

What about alternatives to medication?

Some parents experiment with alternatives such as:

- Dietary changes or natural supplements
- Herbal or homeopathic treatments
- Biofeedback
- Meditation
- Perceptual stimulation/training

As health professionals, we do not actively recommend such alternatives as they have not obtained scientific backing in terms of controlled research trials. Some parents have found some of these methods useful while others have not. They are often expensive or time-consuming without guaranteed success. However, we do not, as a rule, discourage parents from trying such methods as long as they do not cause harm or distress to the child. With natural supplements, it is also important to bear in mind that the full range effects of such products remain unresearched. While Ritalin (the medication commonly used to treat ADHD) has more than 50 years of research behind it, many of these products are relatively less researched. Even vitamins can be toxic in high doses, so one should always exercise caution when taking such supplements.

How can the teacher best help/ support such children?

Parents and teachers can help by:

1. **Understanding that the child has a problem and it is often difficult for the child to control his behaviour.**

   ADHD is like having a mosquito bite, knowing that you should not scratch it and yet not being able to resist the urge to scratch. For an adult, it may already be difficult to control that urge. For an ADHD child, it is as if the itch was magnified ten times. Understanding that the ADHD child has a real problem may not remove the problem, but you may find that you will be less angry with the child and can manage him in a calmer and more effective manner.

   It is important to recognise that the ADHD child has a medical problem. This is like a child with asthma. He would need help and support to cope effectively in daily life. Some accommodations may be needed to help him adjust better. At the same time, though, the ADHD child should not be overprotected. If he makes a mistake, he should be punished accordingly and not be excused on the basis of being ADHD. By setting limits and imposing consequences, we can help the ADHD child to control himself better and fit better into society.

2. **Setting your expectations according to what the child can do at the present time. Don't compare him or her with other children.**

What may be normal for other children may take a lot more effort from an ADHD child. Some ADHD children have difficulty completing even two or three questions of a homework assignment, much less three or four worksheets. It may help to reduce the amount of work given to an ADHD child or give them more time to complete the work.

3. **Looking out for the child's strengths and praising him or her for small improvements or successes.**

ADHD children receive constant negative feedback for incomplete work, failures and mishaps. It helps a lot when parents and teachers pay more attention to their strengths and successes, and makes the ADHD child feel good about what he does even if it is less than what a non-ADHD child can produce. This would improve their self-esteem and self-confidence. In turn, they may be more encouraged and motivated to try harder and improve themselves.

4. **Setting clear rules, firm limits and consequences for undesirable behaviour.**

Give the ADHD child clear instructions about what he should do, including details such as where he should do it and by what time. Let the child know what the rules are at home and in school and inform the child what would happen when rules are broken. Be consistent in carrying out these consequences and don't make threats that cannot be carried out.

5. **Breaking up big tasks into smaller parts and giving short breaks in between periods of work.**

When an ADHD child is given a large amount of work to do at a single time, he looks at the load and thinks, "I can't do it!" By breaking up the work into manageable bits and setting shorter time intervals for completing each part, the child feels less overwhelmed and is more willing to give it a try.

Because the ADHD child finds it very hard not to move, sitting down for a long time can be very tedious and tiresome. It helps to give the child some opportunities in which to stretch his legs, for instance, in class, he can be asked to walk up to the teacher's desk after completing each part of a worksheet, to obtain positive feedback as well as be given further encouragement for the next part.

6. **Giving opportunities to expend energy through physical activity or channeling energy into acceptable avenues.**

Some examples of ways in which the ADHD child could legitimately expend energy would be:

- Cleaning the blackboard
- Carrying books
- Helping to collect books

It also helps to teach the child to move in a less disruptive way, for instance:

- Doodling on a rough notepad rather than on the worksheet
- Wriggling fingers and toes, rather than shaking the entire arm or leg
- Whispering softly to himself rather than talking aloud to his classmates

7. **Removing distractions and making the environment work for you.**

Some ideas:

- Seat the ADHD child near the front

of the class to make it easier for the teacher to get his attention, monitor his behaviour and respond to his behaviour.

- Seat him next to a mature, responsible and tolerant child who can be a role model and buddy for him. This would also help reduce "blow-ups" in the class.
- Seat the ADHD child away from windows, boards, computers or other distracting items.
- Having a separate homework board may be useful for the ADHD child who takes too long to copy his homework.

8. Adding variety and using lots of visuals when teaching the child.

ADHD children are multi-sensory learners. Appealing to their visual, tactile and kinaesthetic senses would be more effective in capturing and sustaining their attention.

- Use pictures and bright colours
- Use music and rhythm
- Use computers and games
- Intersperse high interest with low interest activities
- Intersperse listening with hands-on activities
- Teach highlighting of key words in a question
- Incorporate experiments, field work, projects and other interactive and experiential activities (such as educational board and floor games and competitions), and utilize day-to-day experiences to illustrate points of learning

9. Getting the child's attention.

ADHD children often become distracted and daydream in the middle of lessons. Teachers can get and hold the child's attention in the following ways:

- Establish eye-contact before starting a lesson
- Speak in clear, concise, understandable statements
- Include the child's name or experiences when giving examples to illustrate points
- Get the child to repeat back instructions to ensure he has heard it correctly
- Use non-verbal signals to get attention, such as a tap on the shoulder or on the desk

10. Teaching and helping the child to organize his or her things.

Some ideas:

- Make it a practice for the child to copy homework in a homework diary. Check to ensure it is done.
- Keep materials (pencil, paper, ruler, etc.) all in one place.
- Use colour-coding as a way of helping the ADHD distinguish the books, folders and files relevant to the different subjects.
- Use folders to organize completed work, work to be done, and work to be handed up.
- Teach the child routines and procedures, eg. take out only one folder at a time, put it under his desk, return everything to that folder after use, before taking out the next folder.

11. Teaching the child to wait.

Some ideas:

- Get the child to put up his hand before speaking.
- Slowly stretch waiting time by getting the child to wait a few

seconds longer the next time.

- Teach the child to distract or occupy himself in less disruptive ways when he has to wait, eg. count the number of blue cars that go pass.

12. Believing in the child and building a good relationship with him or her.

ADHD children can improve with support and understanding. Surfacing his strengths, giving him leadership roles and responsibilities, and giving him opportunities to demonstrate his talents can do a lot to give him the self-esteem and confidence he needs. When there is a need to discipline, do so with compassion and with a respect for the child's dignity. This can be done by pulling him to one side and talking to him in private. Teachers, especially, have immeasurable influence on the growth of a young child and can do so much to open doors for a troubled child.

What kinds of special arrangements can such children get from their schools or the MOE for examinations?

ADHD children have been able to receive special arrangements from their schools to take exams in a quiet, separate room and to have a longer time to do their exams. For nationwide exams such as PSLE or GCE N/O levels, applications have to be made to MOE through the school. Supporting evidence of the child's condition and difficulties has to be obtained from relevant professionals. Diagnosis of ADHD alone does not qualify the child for these special arrangements. Instead, a discrepancy between the child's ability and achievement after intervention should be evident. Cases are assessed on an individual basis and the final decision is made by the examinations board. Children who obtain such special arrangements will have their certificates annotated in accordance to international practice.

Where can parents/teachers turn to for help/support when they have ADHD children?

Parents can seek help for an assessment from a paediatrician or psychiatrist. The Child Guidance Clinic is one of the places where children with ADHD can be assessed and treated. It is located at the Health Promotion Board Building, 3, Second Hospital Avenue, #03-01, Singapore 168937. To make an appointment, you can call 64353878 or fax your request to 65343677.

Note

The author would like to acknowledge Dr. Daniel Fung and Mrs Chew Kah Kee from whom some ideas for this article were derived.

Reference

1. Diagnostic and statistical manual of mental disorders - fourth edition. Washington DC: American Psychiatric Association, 1994.

Carolyn Kee *is a senior psychologist with the Child Guidance Clinic. She has been working with ADHD children and their parents for a number of years and conducts workshops to empower parents with skills for managing their ADHD children. She is currently pursuing a postgraduate degree in the UK.*

Rev It Up, Radio! in Pasir Ris Crest Secondary School

Ng Pak Tee

Introduction

In the UK, there is a thriving student media market: student press, radio, websites and even small TV operations. In particular, student radio is no small thing. As ever, the appeal of radio is its immediacy. Student radio can challenge mainstream radio as it is not restricted by commercial pressures and will take risks. Student radio is rapidly becoming the lead medium on campus. An average reach of 16 per cent per week and an estimated reach of 56 per cent per term beat all commercial stations, according to tracking body Continental Research. There are 56 stations in the UK providing a breeding ground for new radio talent. Moreover, over the past two years, student radio has been able to offer nationwide shows, such as the national student chart. This gives the music industry an insight into new music trends that was previously impossible to obtain. This sector has also seen increased investment, improved transmission, more training, and more on-campus marketing support for student stations. (Dubberly E., 1999)

In Singapore, a student radio is almost unheard of, at least not in the secondary school setting. But if a secondary school would like to develop its students to be creative and entrepreneurial by learning and doing something radically different from the standard school curriculum, setting up an in-house radio station sounds like a wonderful opportunity. *"Rev It Up, Radio!"* at Pasir Ris Crest Secondary School (PRCS) is such an opportunity.

At PRCS, the students have set up their own cool radio station *"Rev It Up, Radio!"*. *"Rev It Up, Radio!"* is an innovation project undertaken by Ms Foo Siew Yong during her attachment to **Pasir Ris Crest Secondary School** from March to September 2002, as part of her course work for the Leaders in Education Programme (LEP). The LEP, a state-of-the-art leadership programme at the National Institute of Education (NIE), prepares a specially selected group of vice principals and Ministry of Education (MOE) officers for school leadership, emphasising on knowledge creation and innovation. The *"Rev It Up, Radio!"* experience is a good case of students benefiting from a programme that is radically different from the standard school curriculum, learning things that they can hardly learn from textbooks and examinations. It is a case of students doing new things and breaking new grounds.

Overview of "Rev It Up, Radio!"

"Rev It Up, Radio!" – the Cool Radio Station at PRCS had its soft launch on 19

Aug 2002. It was officially launched by Dr Ng Eng Hen, Minister of State for Education and Manpower, on 6 Sep 2002 during his visit to the East One Cluster to view the Arts Aesthetics Programmes in the schools of that cluster. "Rev It Up, Radio!" is a radio station run by the students for the students and teachers of PRCS.

"Rev It Up, Radio!" has a 45-min weekly broadcast which is usually aired on Mondays from 1.50pm - 2.35pm. Its weekly theme is carefully chosen to reflect any special events during the week. For instance, *"Rev It Up, Radio!"* had the theme of 'Honouring Peace and Brotherhood' for its programme on 20 Sep 2002 to commemorate the tragedy to humanity that happened a year ago on 11 Sep 2001. *"Rev It Up, Radio!"* also had a special programme to celebrate Teachers' Day. Hence, in conceptualizing the programmes for the months, members of the pioneer student crew have to take into consideration not just the school calendar of events but also be knowledgeable about world or national events.

The radio station also has programmes that are based on the tastes of teens and the objective of exposing them to various genres of music as well as history of music. One of the programmes called *"Teenz Alive!"* featured two segments – *"PRCS' Top 5 Hit List"* and *"Blast from the Past"*. The aim of *"Teenz Alive!"* was not just to feature current pop songs but also to widen the students' knowledge of the history of rock and roll. The school also has plans to broadcast a classical music programme called *"A Touch of Class"* and this will feature two segments called *"Viva la Classics"* and *"Around the World"*.

The rationale for setting up the station is that in a world driven by information and communications technology (ICT), the ability to gather, analyse, synthesise and present data that captures the intended audience is a necessary and premium skill to have. *"Rev It Up, Radio!"* has given students real-life opportunities to run radio programmes that are of interest to them, demonstrate their leadership abilities, and acquire competencies and dispositions to be effective team players. It allows the students to do things that are "out of the box", thereby nurturing their creative and entrepreneurial spirit.

Pasir Ris Crest Secondary School

What gave Ms Foo the idea of a radio station and motivated the students and staff of PRCS to make it happen?

Firstly, PRCS has an excellent music programme. Under the leadership of Mrs Teo Khin Hiang, the school has been developing music as one of its niches based on the following beliefs:

- All students, regardless of their socio-economic background, should enjoy the richness and diversity that music provides. A love for and appreciation of music also contribute to the holistic development of students, which will in turn contribute to a gracious society;
- The discipline acquired through music education will have a positive effect on the students' behaviour and achievements in other subjects, e.g. Mathematics.

In the formal curriculum, all PRCS students have two periods of music lesson instead of one period, which is common in many schools. The music curriculum enables the students to study Music Theory and play either the keyboard or guitar at the lower secondary level. In addition, the students are exposed to different genres of music such as classical, jazz, blues and ethnic music. At the upper secondary level, the students are also exposed to computer-generated music and can compose their own tunes using midi-sequencing

technology. A number of original tunes composed by PRCS students were featured in the school's opening ceremony on 12 July 2002.

From 2002 onwards, the school is formally listed with the Music Elective Programme (MEP) schools as one of the centres offering 'O' Level Music. It is the East One Cluster Music Centre, which aims to develop fully the potential and interest of students in music through organising music appreciation, enrichment and 'O' Level music programmes for students in the cluster. To date, more than 2500 students have benefited from the Centre's music programmes and its facilities – 4 special music rooms and the only school to have an audio library in Singapore. Last year, the Music Centre also organised the Choir and Instrumental Public Performance for cluster schools as a platform for students in the East One Cluster to showcase their talents.

In a recent survey carried out to gather the students' perception of the strengths of the school, 97% indicated that they like the school's music programme, giving reasons such as:

- They like learning new skills;
- Music helps them to relax and concentrating better; and
- Music helps them to understand other cultures.

Setting up the Radio Station

A series of promotional activities was carried out to arouse the interest of the staff and students prior to the setting up of the station and these activities coincided with the themes of the various programmes, for example:

- Name the Station & Logo Design competition;
- Vote Your Favourite Name for the Pop Programme;
- Donate a CD promotion;
- Name Your Favourite Current Pop Song for the PRCS Top 5 Hit List;
- Pop quiz for soft launch;
- PRCS Oscar Awards 2002 for Teachers' Day, Class TQ (Thank You) Cards for Home Tutors, and chocolates for non-Home Tutors and office staff. (Jointly organised by *"Rev It Up, Radio!"* and the Students' Council.)

To recruit the student production crew, a half-hour advertisement was carried out to invite students to apply for the following vacancies in the radio station: producers, presenters, researchers and marketing personnel. 32 students responded to the half-hour marketing done on 10 May 2002 and 16 deejays-producers were auditioned with 10 making the cut. These students were chosen based on the following criteria:

Rehearsing the script.

- Enthusiasm and charisma
- Oral communication ability
- Knowledge of music, songs and artistes
- Voice quality
- Ability to handle the unexpected

Dedicated external trainers were found to help in training students to market, broadcast and handle sound systems. Professional experts from organisations such as Mediacorp, WKRZ 91.3, Power 98 FM, A*Star and the Esplanade shared their trade secrets in the various aspects of using radio as a broadcasting medium. Six members of *"Rev It Up, Radio!"* also co-hosted Power 98's "You Asked For It" programme live on 27 Aug 2002, together with incumbent hosts Jeremy Ratnam and Justin Ang. Through the *"Rev It Up, Radio!"* project, the students learned to:

- Cater to the varied taste of students and

teachers in music as well as shape their tastes;

- Develop effective teamwork skills and attitudes, self-confidence, ability to think on one's feet and good presentation skills;
- Conceptualise and implement the theme and content of each weekly programme, and the various marketing and promotions events needed; and
- Work with different professionals in authentic settings.

Marketing crew working on a poster.

Impact of the Project

Given an opportunity, teenagers can prove their abilities in handling business out of the normal classroom curriculum. The team of deejays, producers, marketing crew, research crew and station manager proved that they have the ability, creativity and entrepreneurial spirit to develop high quality radio programmes.

Moreover, from the experience, many have grown to be very good team players, displaying characteristics of these four essential elements of effective teamwork

- Sharing in the team's goals (We not I);
- Taking personal responsibility (I do my part);
- Having mutual accountability (We sink or swim together); and
- Celebrating the team's success (We support and encourage one another).

In fact, the students have developed their own *"10+1 Commandments of Rev It Up, Radio!"*:

- Leave your ego at the door.
- If you are in the working room, you are actually required to work.
- You got to speak English... we can understand each other better...
- Strictly NO EATING in the studio ... and yes I am talking to you...
- A deadline is an actual date.
- Be responsible for your action; there is no "It wasn't me"...
- Respecting one another is important.
- Workload is meant to be shared.
- Mistakes are to be learnt from, NOT repeated.
- Always remember: think WE not I.
- There is a time for everything... to play... to be creative... but when we are on air, FOCUS!

"Rev It Up, Radio!" really hit it off with the students. There were many encouraging handwritten remarks from the rest of the students like "PRCS Radio Station Rocks!" and "Rev It Up, Radio Rulez!". The support given to the radio station was overwhelming. In the "Donate a CD" promotion, 155 CDs have been received to date. When the radio station came on live, the number of song dedication and requests averaged 13 per hour. Such was the good business of the station.

The experience has been fun and enriching for the students, who have also grown in confidence and wisdom. They also have reflected upon what they have experienced and learned as part of the project. Some of the reflections:

Liyana Md Khafiz, 15 years old (Brilliant Scriptwriter-cum-DJ):

"Nothing comes easy. You have to work very, very hard if you want to achieve high standards. When Nadiah and I were planning for the soft launch, I thought that it would be easy but I found out how wrong I was. We had to come back on Saturday and Sunday so that we could plan and rehearse for the soft launch. But all of it was worth it. When you work extra hard to achieve a goal, eventually you will succeed and if you

don't, you just have to try, try and try again... I love this radio station. It is the only place where you can present your ideas and make these ideas a reality. The great part of is that I am able to share what I have come up with, with the whole school."

Chu Jie Sheng, 14 years old (Excellent team player, researcher and sound engineer):

"I'm happy to be in this activity. I learnt a lot about music and it helps me better my relationships with others. I know how to work as a team and how a radio station works. I will definitely work in the radio line when I grow up."

Jasmine Tan, 14 years old (Excellent Deejay):

"Come to think of it, it really is a long way here. It all started with a dream or rather a tiny mustard seed - like faith which spring out this healthy tree!... (Ever) since we've tried broadcasting, these few days were big time cool! Gosh, I can't wait to host the show with Rahman and hopefully I get to go to Power 98. I love this radio station, so it will be a dream come true for me to go to the station! The person whom I would really like to thank would be Ms Foo as she really helped us up and make our station so hot!"

Conclusion

"Rev It Up, Radio!" has shown potential for future expansion and development. There is a highly passionate, committed and intelligent pioneer group of student leaders and a core group of teachers who will continue to facilitate the project with the possible engagement of a creative consultant.

There is a possibility for the radio station to merge with the Video Club and PA team to form a Media Club, which will produce video magazines highlighting school events. There is also a possible development of an Internet radio website with additional features such as video and news bytes. RADM (NS) Teo Chee Hean, Minister for Education and Second Minister for Defence, said, "An innovative project often has a multiplier effect and will spawn further innovative ideas." (Singapore Government Press Release, 2002) There is a possibility of many other spin-offs from the radio station down the road.

Norman Pattiz, president of the Broadcast Education Association and chairman of the Westwood One Company in the US had wanted to discuss with several universities to form a school of radio, one that taught students the nuts and bolts of the business (Hudis M., 1996). Using *"Rev It Up, Radio!"* as a successful model, Singapore can have its own radio entrepreneurs right from secondary school.

At the end of the day, *"Rev It Up, Radio!"* is not just about a radio station in school. It is about students learning and doing something different. Through the project, PRCS has given its students the environment to dream and experiment. It has provided the fertile grounds for entrepreneurs and leaders to be born.

References

Dubberly, E. (1999) Why student broadcast is a sound investment. *Marketing Week*, London, Vol. 22, Issue 25, pp. 14.

Hudis, M. (1996) Pattiz pushing for radio curriculum. *Mediaweek*, Brewster, Vol. 6 Issue 33, pp. 25

Singapore Government Press Release (2002) *Speech by RADM (NS) Teo Chee Hean, Minister for Education and Second Minister for Defence, at MOE Excel Day 2002, held on Saturday, 21 September 2002, at Changkat Changi Secondary School.* Singapore: Media Division, Ministry of Information, Communication and the Arts

Dr Ng Pak Tee *is Assistant Professor, Policy and Management Studies Academic Group, National Institute of Education, Nanyang Technological University, Singapore.*

Association for Supervision and Curriculum Development (Singapore)

SINGAPORE

MEMBERSHIP FORM

NEW APPLICATION ❒ RENEWAL ❒ UPGRADING MEMBERSHIP ❒

If this application is for renewal or upgrading, please provide previous Membership No: ( ). Thank you.

Name (as in NRIC): _____

Mailing Address: _____

_____ Postcode: _____

Contact No: (Home): _____ (HP/Pager): _____ (Office): _____

(Fax): _____ Email: _____

Organisation/School: _____

Occupation: _____ Sex: _____ Race: _____

Membership Category: *(please tick against type of membership selected)*

Types of Membership	Fees Payable	Please tick
ORDINARY Membership *For those interested in supervision, curriculum and instruction*	S$30.00 per annum	
INSTITUTIONAL Membership *For schools, institutions, libraries or educational societies*	S$300.00 per annum	
LIFE Membership *For individuals*	S$500.00	

Payment:

CHEQUE: Enclosed, please find my cheque number _____ of S$ _____ in payment for ORDINARY / INSTITUTIONAL / LIFE membership with ASCD Singapore.

Please make cheque payable to "**ASCD (S)**" and return completed form together with payment to:

The Treasurer
ASCD Singapore Secretariat Office
c/o Tele-Temps Pte Ltd
1002 Toa Payoh Industrial Park #06-1475 Singapore 319074
Tel: 6250 7700

For official use only: Date Received: _____ Remarks: _____

Computer Updated: ❒ Card Issued: ❒ O/Receipt No: _____ Membership No: _____

Photocopies of this page are acceptable.

Teachers' Clipboard...

"Teach your students to use what talents they have; the woods would be silent if no bird sang except those that sing best."

- Anonymous -

"Every person is gifted in some area. We just have to find out what."

- Evelyn Blose Holman -

"I've come to a frightening conclusion that I am the decisive element in the classroom. It's my personal approach that creates the climate. It's my daily mood that makes the weather. As a teacher I possess a tremendous power to make a person's life miserable or joyous. I can be a tool of torture or an instrument of inspiration. I can humiliate or humour, hurt or heal. In all situations, it is my response that decides whether a crisis will be escalated or de-escalated and a person humanised or de-humanised."

- Haim Ginott -