Review of Educational Research and Advances for Classroom Teachers
REACT (Review of Educational Research & Advances for Classroom Teachers) is a publication of the National Institute of Education, Nanyang Technological University, and aims to keep student and experienced teachers, senior school personnel, principals and educational administrators abreast of recent advances in research in education. It effectively presents reviews of two or more research studies related to a particular area of interest, and discusses significant implications for school and classroom practice. In the interest of communicating with a wide readership of practitioners in education, technical details of research and subject jargon is reduced to a minimum consistent with the integrity of the data. Further details of original research reports and studies are cited under Sources in each review.

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The views expressed by the contributors to REACT do not necessarily reflect those of the Editorial Committee or the National Institute of Education.
This second issue of REACT includes a total of seven interesting articles featuring a wide range of subjects relating to current curriculum and pedagogical issues.

The first article focuses on the ongoing debate about the advantages and disadvantages of co-educational or single-sex schooling for children, while the second concentrates on the current interest shown in student self-assessment whereby students set, mark and review their own work.

The third and fourth articles highlight the challenges facing teachers of children learning English as a second language. In a very revealing and stimulating article, the preferred rhetorical styles of different languages are examined and illustrated with authentic examples from Asian writers. Some of the difficulties of communicating in another socio-cultural context are discussed together with the implications for teachers of second language writers. In the fourth article the concept of diglossia, with reference to the English-speaking community in Singapore,
discussed and the question of whether teachers should tolerate the use of ‘Singlish’ is debated.

Mathematics is the focus of the fifth article which reviews abacus instruction in promoting the development of mental calculation in mathematics. The encouraging results of an ongoing pilot study in local schools with primary three pupils are presented together with the feedback from teachers involved in the training programme.

The remaining two articles highlight two very topical issues: instructional technology and physical fitness! Problems facing teachers in their 'new' role of selecting and evaluating appropriate educational software for use in schools are discussed together with suggestions for them to follow. The last article critically examines current practices adopted by local schools' Trim and Fit programmes, in the context of relevant scientific research, and discusses how our young can be gainfully engaged in daily physical activity.

Our special electronic issue entitled "Using IT In The Classroom" is underway, and will be launched next February, 1999. For further information and an update on this 'bonus' issue, plus a preview of articles featured in our last and current issues, call up our School of Education Website at: http://www.soe.ntu.edu.sg:8000/react/

Linda Gan
Executive Editor
REACT
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THE ADVANTAGES AND DISADVANTAGES OF COEDUCATIONAL AND SINGLE-SEX SCHOOLING

Review by Ian Smith

INTRODUCTION

Based upon media reports, many parents, students and even teachers believe that coeducational schooling is good for boys and bad for girls. Articles appear regularly in the popular press as a result of surveys of parents and students on the topic. Some are of the opinion that coeducational schools benefit boys, because girls have a “civilising” effect on the otherwise unruly behaviour of boys, especially in the early years of secondary school. In contrast, another perspective in favour of single-sex schooling for girls involves the view of many parents that boys distract their daughters from concentrating on their studies, so they prefer them to attend an all-girls school where they are not faced with this issue.

In the past decade many single-sex schools in the United States, Australia and the United Kingdom have been forced to amalgamate or accept students of both sexes for economic reasons. Their enrolments were dropping to a level which threatened their existence. Concern was expressed by parents, alumni and teachers that this change would have a detrimental effect on student achievement and school atmosphere. One solution has been to establish single-sex classes within coeducational schools. There is an urgent need to evaluate such innovations to learn whether they are cost-effective.

This article examines the research evidence on the coeducational/single-sex schooling debate and will draw conclusions and implications for teaching and school organisation.

REVIEW OF RESEARCH

Coeducational/single-sex schooling comparisons are hampered by the problem of selecting equivalent schools of each type of gender-based student enrolment. In other words, because single-sex schools are more likely to be non-government, fee-paying schools, their students often come from higher socioeconomic backgrounds, with parents who are more directly involved in their education, than students attending coeducational government schools. Students in single-sex schools tend to be more high-achieving, perhaps in part because of their home background. Therefore, the students who attend these two types of schools are not equivalent when they enter them and so comparisons between them are problematic. Nevertheless, there has been a number of studies comparing schools within the same educational system (e.g., single-sex and coeducational schools in the Catholic school system). In addition, there are also studies where students have been randomly allocated to either single-sex or coeducational classes within the same school. On the basis of these comparisons,
there are some conclusions and implications that may be drawn.

It has been consistently found that boys typically attract more of the teacher's attention than girls do in coeducational classes (e.g., Gilligan, 1982; Spender, 1982). In her book *Invisible Women*, Spender claimed that girls, especially in the junior secondary grades, are reluctant to express their views in front of boys. Gill (1991) reported that increased interaction between teachers and male students occurred when the teacher was inexperienced. Experienced teachers were fairer in giving equal time to girls and boys. On the other hand, the reluctance of girls to speak up in class does not necessarily mean that girls are not learning in the classroom. In an extensive classroom observation study. Gill (1992) found that boys asked more trivial questions than girls in order to gain the teacher's attention, whereas the girls were more likely to seek clarification from their friends or their seating partner.

The pioneering research of R.R. Dale in English grammar schools in the 1960s concluded that "the progress of boys is probably improved by co-education while that of girls is not harmed" (1974, p. 269). Dale's research has been criticised on the grounds that its findings are dated and biased. Certainly, his conclusions were restricted to the type of school he examined: grammar schools which were academically elite schools. Nevertheless, the results of a more recent Committee of Inquiry into the teaching of mathematics in England and Wales concluded that "although it is possible to identify some girls' schools in which levels of mathematical attainment are high, it is often the case that there are other factors, such as the fact that the school is selective, which may provide the explanation" (Cockcroft, 1982, p. 64). Research in England and Wales by Steedman (1985) and in Northern Ireland by Daley (1994) has confirmed that, when school and student background factors are controlled, single-sex schooling does not result in superior academic performance for girls in public examinations.

Australian research on the effects of coeducational and single-sex schooling also found few differences in achievement. For example, a longitudinal study was conducted in a secondary school which randomly allocated 7th and 8th grade students into coeducational or single-sex classes for instruction in mathematics. When the students were tested over a two-year period. Rowe (1988) found no gender differences in mathematics achievement based on the type of mathematics class, either coeducational or single-sex. He did report, however, that girls expressed increased confidence in being able to learn and use mathematics when they attended single-sex classes. A subsequent re-analysis of his data casts questions on this latter finding because no gender differences were found in either mathematics achievement or in attitudes towards mathematics (Marsh and Rowe, 1996).

Smith and his colleagues (Marsh. Smith, Marsh and Owens, 1988; Smith, 1994, 1996) studied two secondary schools which became coeducational after being either an all-boys' school or an all-girls' school. They found that the transition to
coeducation produced no changes in grade 10 performance in either mathematics or English over a five-year period. It did produce significant increases in both boys' and girls' self-concepts of their abilities, a phenomenon which was evident ten years later, despite other changes in both schools.

A recent U.S. comparison of single-sex and coeducational Catholic secondary schooling found that single-sex Catholic schools were not favorable settings as far as girls' achievement was concerned (LePore and Warren, 1997). Rather, any advantages in academic achievement from attending single-sex schools were gained by boys. The gender differences were explained in terms of pre-existing differences in prior achievement and social class background between the boys and girls before they enrolled in their particular school.

In Singapore this issue has not attracted systematic research. There appears to be an acceptance of the status quo, which is that the majority of schools are coeducational, with a small number of single-sex schools which are mainly non-government girls' or boys' schools. While the prestigious Raffles Girls' School produced more students in the top 10 in the 1997 "O" level examinations than its friendly rival, The Raffles Institution, the outcome appears to vary from year to year (Straits Times, 3 March 1998). Again, pre-existing differences in student achievement and quality of teaching may be better predictors of academic achievement in these two schools than whether it is a girls' or a boys' school.

**CONCLUSION**

Most reviews of the academic advantages of single-sex over coeducational schooling conclude that there are no clear winners in this race. Acausal relationship between type of schooling and academic achievement has not been established. There may be social advantages in students attending a coeducational secondary school in that it reflects the coeducational society into which the students will graduate. There is research evidence that student self-concept is increased by attending a coeducational school. One researcher (Harris, 1986) found that students who had attended single-sex schools took longer to adjust to the coeducational atmosphere of a university. Nevertheless, even if coeducational schools have some social advantages over single-sex schools, this does not mean that all students should necessarily attend such a school. There are many reasons why parents choose a particular school for their sons and daughters. Excellent schools may be coeducational or single sex. At the present state of our knowledge, the best evidence suggests that, as far as academic benefits of coeducational and single-sex schools are concerned, the result is a draw. There are no clear advantages of one type of school over another. Most educators would recommend, then, that schools try innovative strategies to produce excellent results so that their graduates are happy with the total experience of their secondary education. Educating the "whole child" is a worthwhile goal of any school, irrespective of whether it is coeducational or single-sex.
IMPLICATIONS

1. Coeducational or single-sex school type is a broad category which may not indicate whether a particular school is excellent.
   Other factors, such as the leadership of the principal, quality of the teachers, a goal-oriented curriculum, and a friendly: supportive atmosphere have been found to be stronger indicators of school excellence.

2. When choosing a school for their children parents should consider the "total package" offered by each school being considered.
   Whether it is a coeducational or a single-sex school is just one of many factors which parents need to take into account when choosing a school for each of their children. The main question to be answered is which school provides the best match between its qualities and the goals and values that are considered essential for the child to achieve in its education. Drawing up a priority list of essential and desirable features may serve to clarify the parents' thoughts about school choice.

3. There may be social benefits to be gained from attending a coeducational school, especially if the child comes from a family where all the children are of one sex, either all girls or all boys.
   Studies have shown that in a good coeducational school the students treat each other as friends, rather than as members of the opposite sex. There is a lack of gender stereotyping. This practice may lead to a smoother transition from secondary school to university or to the world of work.

4. There may be some academic benefits for a girl or a boy to attend a single-sex school if they are at risk of having their studies disrupted by the presence of the opposite sex in the same school.
   Some students may be distracted by members of the opposite sex and may form relationships which interfere with their concentration on their studies. In such cases there is a need for counselling to encourage such students to adopt a balanced approach to their academic work and their social life. A single-sex school environment may reduce the risks of distraction in the first place.

5. In both single-sex and coeducational schools teachers need to reinforce a spirit of gender tolerance.
   Such tolerance respects the rights of both girls and boys to be free from harassment or gender stereotyped comments, school policies and actions which limit the opportunities of both sexes to reach their potential.
SOURCES


USING STUDENT SELF-ASSESSMENT IN MATHEMATICS

Review by Paul Shutler and Lachlan Crawford

INTRODUCTION

Setting assignments, marking student work and filling out reports are among the most time consuming and yet least rewarding of a teacher's activities. One solution to this problem which has emerged in the 1990s is student self-assessment, whereby students set, mark and review their own work. This paper first briefly reviews what motivates teachers to introduce student self-assessment. It then describes three methods for implementing student self-assessment and the likely benefits. Finally some of the common obstacles to implementation are discussed. The focus of this article is on self-assessment in mathematics because the literature is quite well developed in that area. Nevertheless, the same principles apply equally well to any subject, and studies have been carried out in many other areas (Boud & Falchikov, 1989).

INITIAL MOTIVATIONS

The most commonly expressed argument in favour of attempting student self-assessment is the desire to promote greater learner autonomy, that is when students begin to take responsibility for their own learning. Csongor (1992) and Stallings & Tascione (1996) argue that when students engage in self-assessment they learn more about themselves, this improves their self-confidence and hence encourages them to become independent learners. Conversely, as argued by Swan (1993) and Adams & King (1995), rising student-teacher ratios imply that teachers no longer have the time to mark every student's work in detail, and involving the students directly in the assessment process helps to make good the deficit.

The second argument in favour of student self-assessment is that it improves metacognition, which is the ability of students to reflect critically on their own thought processes. This argument features in Curriculum and Evaluation Standards for School Mathematics (NCTM, 1989) which advocates a shift away from the rote application of algorithms to rote application of standard problems and towards mathematical power, a term which encompasses among other things the ability of students to apply their mathematical knowledge to solve non-standard problems. It is known (Schoenfeld, 1985, Campione, Brown & Connell, 1989) that metacognitive ability is essential to mathematical power, but that traditional assessment practices fail to encourage metacognitive skills. Kenney & Silver (1993) and Swan (1993) argue that self-assessment aids students in developing metacognitive skills and hence improves mathematical power and problem solving ability.

The third motivating factor is what might be termed the cycle of improvement, the process through which students review their own work, analyse their mistakes, and hence improve their subsequent performance. This use of self-assessment is highlighted in Assessment Standards...
for School Mathematics (NCTM, 1995) in the section on monitoring of student progress. Although in principle we know that it does not matter who makes the assessment of our work, in practice we do not like to be told that we are wrong, especially by someone in authority over us. For the same reason, teacher assessment is frequently regarded by students as summative rather than formative (Swan, 1993) and this acts as a disincentive to improvement. Student self-assessment, on the other hand, allows students to detect their mistakes by themselves in a non-judgmental and non-threatening way, and this encourages improvement (Anderson, 1993).

METHODS AND BENEFITS

Grading

The most commonly employed approach to student self-assessment is simply to ask students to grade their own work. This immediately raises the obvious question of how students are to be able to tell right from wrong. After all, if they were able to mark their own work accurately surely they should be able to score full marks in the first place!

The standard answer to this question is to adopt subjective grading by means of a scoring rubric (Stallings, 1992, Petit & Zawojewski, 1997). Scoring rubrics generally consist of a list of qualities which are characteristic of each grade or score. One very simple example might run as follows: "A = completely correct, B = only careless errors. C = some conceptual errors; D = many conceptual errors." By comparing their work with the rubric and finding the characteristics which provide the best fit, students are able to assign their work a mark or grade. This kind of grading is clearly more akin to that used to mark essays than to the traditional point count marking usually employed in mathematics, hence the name subjective. Such rubrics, which are usually much more sophisticated than the simple example given above, must nevertheless be written in a way which is comprehensible to the students.

Some examples of how subjective grading has been implemented in practice are as follows. Csongor (1992) instructs her students to spend the last five minutes of every test applying the rubric to their answers in order to assign themselves an overall mark. The students are encouraged to make any corrections which suggest themselves. They then hand up their work for the teacher to mark using the same rubric and a comparison is later made between the two marks. Stallings & Tascione (1996), on the other hand, ask their students to grade their work using a rubric only after the teacher has looked at their work and highlighted the places where they have gone wrong. They are also required to explain the reasons behind their errors and to write out full corrections. Again comparison is made with the grade which the teacher would have assigned. More advanced approaches (Petit & Zawojewski, 1997, Assessment Standards for School Mathematics NCTM, 1995) use a separate rubric for different aspects of a student's answer, such as initial approach, correctness of analysis, ability to interpret the answer, etc. Such multidimensional grading carries more useful information than a single grade but can be cumbersome to use in practice.

Some of the benefits which have been obtained using subjective grading
(Csongor, 1992, Stallings & Tascione, 1996) are as follows.

1) After an initial learning period, students generally become quite capable of grading their work reliably, i.e. the student grade is very close to that which the teacher would have assigned.

2) There is a substantial reduction in test anxiety and consequent improvement in self-confidence, especially among less able students. Taken together these imply that the goal of increasing learner autonomy can be achieved.

3) Student performance improves for exactly the reasons given under the cycle of improvement motivation. Students simply get into the habit of checking their own work and correcting it before it gets to the teacher even when self-assessment is not formally required.

4) The dialogue which takes place between the students and the teacher over which is the correct grade to assign has been found to provide considerably better insights into what students find difficult than is the case when only the teacher marks the work. This is especially true when it comes to deciding whether an error is merely careless or in fact conceptual, something which is quite difficult to discern based on the written work alone. This certainly helps the teacher to judge metacognitive ability better, but whether or not it results in an improvement in that ability has yet to be shown.

Student Constructed Tests

Another approach to student self-assessment is to invite students to create their own test questions or assignments. Clarke (1992) divides his class into small groups, each of which produces a few test items. The teacher edits these to create a complete test which the whole class then attempts. This results in a much greater sense of participation among the students and a higher level of interest in the answers and the subsequent discussion. This is consistent with the aim of improving learner autonomy. Swan (1993), on the other hand, encourages every student to create an entire test of their own, complete with model answers and a grading scheme. This does have the effect of improving overall performance in that it encourages the students to review the syllabus and structure in their own minds the relationships between the various topics. The disadvantage here is that there may be too much material for every student to contribute something to the class test.

Progress Review

The final approach to student self-assessment is for students to use a checklist, rather like a scoring rubric, to review their progress. This can be performed in-task, immediately post-task or periodically through the year. Although akin to journal writing, it is usually more structured and assessment oriented. Kenney & Silver (1993) encourage the use of metacognitive self-monitoring questions in-task, and significant improvements in performance can result. Clarke (1992) suggests a monthly review in which students highlight their specific technical strengths and weaknesses with a view to improvement in the medium term. This can provide significant insights into the students' learning problems. Finally Csongor (1992) uses a quarterly journal in which students rate the quality of various aspects of their work without recourse to technical details. This has been found to be a remarkably reliable indicator of a student's overall performance, as well as helping students
take greater responsibility for their own learning. It is interesting to note that short term progress reviews contribute most to the cycle of improvement. medium term reviews contribute most to the improvement of metacognitive skills. while long term progress reviews primarily assist in promoting greater learner autonomy.

OBSTACLES TO IMPLEMENTATION

There are a number of obstacles which may have to be overcome to ensure a successful implementation of student self-assessment. The first is that self-assessment is a skill and, like any other skill, sufficient time must be allowed for students to acquire it. Csongor (1992) and Kenney & Silver (1993) point out that while some students possess this skill naturally, most do not. By providing the right experiences, however, they show that all students can develop a significant capacity to assess themselves. This goes against the common belief that self-assessment is possible only for more mature students, which would explain why the bulk of the research into self-assessment appears to have been carried out at the tertiary level (Boud & Falchikov, 1989). In fact, as Lester (1989) points out, metacognitive skills develop hand in hand with cognitive learning. which implies that the acquisition of self-assessment skills appropriate to primary and secondary levels is both possible and desirable.

The second obstacle is that a conducive environment is essential to the development of self-assessment skills. According to Csongor (1992) and Anderson (1993), it is only by creating an environment of respect. understanding and tolerance that students can be helped to overcome their natural fear of being wrong. Despite the considerable long term benefits discussed above, self-assessment can initially be quite a painful experience; especially in success-oriented cultures.

The third obstacle is the problem of student motivation. Even if the right environment exists, students may still fail to persevere with self-assessment in the short term if they do not experience immediate benefits. Wilson (1994) gives an attractive cautionary tale which describes one teacher's attempts to introduce journal writing. The attempt failed simply because the journals earned the students no explicit credit towards their overall grade, and so they refused to participate. As an antidote to this, Csongor (1992) offers bonus points for those students whose self-assessed mark comes sufficiently close to that of the teacher. Stalling; & Tascione (1996). on the other hand. re-grade the students’ work after they have made their corrections and give the revised grade a significant weightage in the overall assessment. They also allow the original grade to improve if the student can make a convincing case for reassessment.

The final obstacle to be overcome is that students may simply regard self-assessment as yet another activity which the teacher will assess. a sort of meta-assessment. As Anderson (1993) points out. students may be so used to seeing the teacher as the sole judge that, even with regard to self-assessment, they will still look to the teacher to tell them if they have done it correctly or not. The teacher may have to tolerate uncritically work which would otherwise be marked wrong simply in order to get the message across to the students that the rules have changed.
CONCLUSION

Although a teacher may initially be attracted towards student self-assessment as a reaction against the tedium of marking student work, there are three positive reasons for attempting it: improving students' self-confidence and hence encouraging them to become independent learners; improving students' metacognitive skills in order to increase their mathematical power and problem solving ability; and encouraging students to critically evaluate their own work and hence engage in a cycle of improvement. Despite the obvious objections, it is in fact perfectly possible to develop techniques whereby students are able not only to mark their own work reliably but also to set their own tests and assignments and to report on their own progress. The kind of benefits which result, and which more or less justify the reasons for attempting it, include: reduction in student test anxiety; improved self-confidence and participation; greater insights into students' problems and metacognitive development; and improved overall student performance.

IMPLICATIONS

In view of the research cited in this article, teachers who intend to involve their students in self-assessment may like to consider the following.

1. **Invite** students to grade their own work, to **explain** the reasons for their mistakes and to write out corrections.

2. Allow students to contribute their own questions for class tests and to create their own tasks for assignments.

3. **Encourage** students to report periodically on their own progress, highlighting their strengths and **weaknesses**.

4. **Teach** **self-assessment** skills explicitly as these do not come naturally to most students.

5. **Create a tolerant environment** to overcome **students'** natural fear of being wrong.

6. Give explicit credit for **self-assessment** in order to encourage students to persevere with it in the short term.

7. **Lead students** to understand that self-assessment is not simply another activity which will be assessed.
SOURCES


REACT • NOVEMBER 1998
LEARNING TO WRITE ACROSS LANGUAGES AND CULTURES

Review by Kwah Poh Foong

INTRODUCTION

In the process of learning to compose in a second language, second language writers (L2) will inevitably rely on the writing practices that they have acquired in their first language (L1) to help them communicate their ideas. Research in L2 writing has shown the influence of L1 in students' texts as well as strategies used in the writing process. In his pioneering work on contrastive rhetoric, Kaplan (1966) hypothesized that the rhetorical system of one language and culture could be different from another. Native speakers of different languages and cultures employ different rhetorical devices to organize information, relate ideas, and indicate the purpose of text. The work of other contrastive rhetoric researchers (Eggington, 1987; Purves, 1988; Hinds, 1990; Connors, 1996) have provided further evidence on preferred rhetorical styles between cultures and the influence of L1 rhetorical patterns on L2 writing. Similarly, research in genre analysis (Swales, 1990) and intercultural communications (Scollon and Scollon, 1995) have indicated differences in discourse patterns and conventions in different discourse communities. However, researchers have stressed that in addition to the preferred rhetorical patterns of presenting ideas, second language learners also possess other rhetorical strategies to help them communicate. As second language teachers, we need to be aware of our students' preferred rhetorical styles to help us understand the difficulties that students may have in communicating in another socio-cultural context. Such insights are also valuable in helping us develop learning tasks that could help our students understand the differences in preferred rhetorical styles between their L1 and L2.

The aim of this paper is to review and focus on studies that examine the preferred rhetorical patterns of Asian and English as a Second Language (ESL) writers' texts and discuss some pedagogical implications for teachers of second language writers.

CONTRASTIVE RHETORIC RESEARCH ON ASIAN WRITERS

Work done on contrastive rhetoric focuses on two areas of research: analysis of translated texts and analysis of students' essays.

I. Research on Asian Translated Texts

Studies in contrastive rhetoric of translated texts from native languages have provided some evidence on Asian preferred rhetorical patterns. These texts were translated sentence by sentence without manipulating the original organizational framework. These studies seem to suggest that the Chinese, Japanese, and Korean rhetorical styles share a similar four-part pattern. Hinds (1990) did extensive work on Japanese translated expository prose and some work on Korean and Chinese prose. These studies indicated that the preferred rhetorical pattern of Japanese is ki-shoote-n-ketsu, which has originated from classical Chinese poetry. Similarly, the
work of Liu (1990) on translated Chinese texts also revealed the basic four-part structure of chi-cheng-juan-he. Eggington (1987) analyzed Korean texts and found that the preferred rhetorical structure, ki-sung-chon-kyul, appears to be similar to Japanese and Chinese rhetorical patterns. The four-part rhetorical structures of Japanese, Korean, and Chinese are compared and shown below.

The first two parts of this rhetorical structure do not appear to pose any problems to native readers of English. What is contrastive and interesting here is the third part—the "turn" or the introduction of an indirectly related or contrasting subtheme. It is the introduction of a subtheme or turning viewpoint that would interfere with the thematic logical progression of the text and create some confusion for English-speaking readers as it violates the logical expectations of the text. In the English rhetorical pattern, after the introduction of the thesis of the essay, the reader expects the rest of the supporting ideas to be directly related to the thesis. As a result, the inclusion of a subtheme that does not seem to be directly related to the thesis, would be perceived as irrelevant and digressive by readers of English.

2. Research on ESL Students' Texts

In analyzing expository paragraphs written by foreign students in the United States, Kaplon (1972) found the discourse structure of Chinese and Korean students' writing to be indirect and non-linear. According to him, the students' texts were

"...marked by what may be called an approach by indirection. In this kind of writing the development of the paragraph may be said to be "turning and turning in a widening gyre." The circles or gyres turn around the subject and show it from a variety of tangential views, but the subject is not looked at directly (p.301)."

Similarly Choi's (1988) comparison of Korean and American students' argumentative writing in English showed that essays of Korean speakers exhibited a non-linear structure.

In her study of Chinese students, Matalene (1985) illustrated how an essay written by one of her Chinese students in China exhibited some characteristics of

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<th>Chinese</th>
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<tr>
<td>chi</td>
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<td>Exposition of main theme</td>
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<td>sung</td>
<td>Development of theme</td>
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<td>juan</td>
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<td>Introduction of a subtheme or 'turn' that is not directly connected to the main theme.</td>
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<td>he</td>
<td>ketsu</td>
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the ba gu form, the eight-legged essay

The standard pattern of this form is:

"Exposition of the theme [which] was followed by a discussion of its significance; then came the argument itself followed by the 'turn'in the argument; at the end, carefully balanced conclusions were set forth" (p.797).

Fagan and Cheong (1987 p.25) investigated the rhetorical patterns used by ninth grade Singaporean Chinese students in their written compositions and provided evidence to show the rhetorical influence on students' writing. From their analysis of sixty compositions, they found that about 50% of the compositions exhibited the rhetorical pattern of Chinese Classical Poetry of chi-cheng-juan-he, which had a four-part pattern: "beginning, development, introduction of a related or contrasting subtheme, and a conclusion".

Another rhetorical feature exhibited in students' essays is that the purpose or thesis of the text is either rather ambiguous or not known to the reader until the final paragraph, which Hinds (1990 p.98) refers to as "delayed introduction of purpose". Kirkpatrick's (1992) study of Chinese written request letters also indicated that the requests appeared toward the end of the letter. Kobayashi (1984) studied essays written by American and Japanese students and found that American students preferred the general-to-specific pattern while Japanese favoured the specific-to-general pattern. Placing the purpose at the end of the text could confuse English-speakers on the purpose of the essay. In most English expository essays, one would expect the purpose or thesis of the essay to be introduced at the beginning and be logically developed throughout the essay without any shift in focus, following a linear pattern of development. Below is an example of a Chinese ESL student's essay exhibiting the preferred rhetorical pattern of chi-cheng-juan-he.

Different types of wedding ceremonies in China and Singapore

[Chi - Exposition of the main theme] When people talk about a country's culture, usually they will talk about one or a few things to show the particular culture instead of talking about every segment of it because a certain culture may include too many things to describe in details. In my essay, I intend to talk about the differences between the wedding ceremonies in China and those in Singapore to show one side of China's culture different from Singapore's culture from my own experiences in both countries.

[Cheng - Development of theme] I have been in Singapore for only half a year and I didn't attend any Singaporean's wedding ceremony. What I have learned about the ceremonies in Singapore is from a lecture held in NIE a couple of weeks ago and one of my friends in Singapore who has attended several wedding ceremonies. The wedding ceremonies in Singapore are quite simple compared with those in China (which will be talked about in my essay later), and the procedure of one wedding ceremony is similar to the procedure in China (because of limited space, I can't tell you in details). The newlyweds always send out invitations to their relatives and good friends before the wedding ceremony and have a simple dinner party for both the hosts and guests.
What about the wedding ceremonies in China? I have taken part in several wedding ceremonies in my hometown. From my experiences I find that the most different point (compared with the wedding ceremonies in Singapore) is the scale of the dinner party. Usually in a wedding ceremony in China, ten or more tables are needed for the guests! The food and beverages are luxurious. So we can see such a wedding ceremony must cost a lot money. Yes, it's true. But it's known to everyone that the level of living conditions in China is not high. Then how can people afford such expensive wedding ceremonies? They save money. In some poor areas in China, parents often begin to save money for their children's wedding ceremonies since the children are born!

[Juan - Introduction of a subtheme or turn that is not directly related to the main theme] Do you think the money and time spent on such extravagant wedding ceremonies is worth. Every knowledgeable person will so "No!". A wedding ceremony is only a type of rite to show that the bride and groom will become a couple after the ceremony. It is actually a waste to spend a lot of money on a wedding ceremony and to spend a lot of time on saving the money!

Things become more serious when a kind of competing atmosphere is created. People keep comparing whose wedding ceremony is more luxurious, and they want to hold the most luxurious wedding ceremony in their area.

Why not use such a large amount of time and money to do other useful things for society? Why not use them to make our living standard higher? why spend them on such a meaningless thing? I think from this point, such luxurious wedding are monies [which] are obstacles of China's development. They prevent our society from developing fast!

[He - Conclusion] Before I came to Singapore, I didn't learn the harm of the luxurious wedding ceremonies in China. After half a year's life in Singapore seeing the rapid development of Singapore, and after learning about Singapore's wedding ceremonies, I think now one of the most important things for us Chinese to do is to remove the traditional opinion regarding the wedding ceremonies so important and to make these ceremonies much simpler. Then I'm sure China will develop much faster.

In this essay, the writer's intention of the essay appears to discuss the differences between the wedding ceremonies in China and Singapore as reflected in paragraph 1 [chi]. In paragraphs 2 & 3 [cheng], the writer develops the thesis by describing the differences. The turning of viewpoint begins at the end of paragraph 3 and the argument begins in paragraph 4 which questions the worth of spending money and time in extravagant wedding ceremonies. The writer further develops his argument against spending time and money on weddings in paragraphs 5 and 6 [juan]. This shift could confuse native readers of English with regard to the purpose of this essay. At the beginning, it is stated that the essay is going to be a discussion on differences of wedding ceremonies, but the focus is shifted to an argument. Only in reading the concluding paragraph [he] is the writer's opinion and intentions known. It appears that the author's intention is to argue against elaborate wedding ceremonies rather than to discuss ceremonial differences as suggested in the beginning. Therefore, this student writer prefers an inductive pattern in which the purpose of the essay is introduced at the end of the essay.
CONCLUSION

Research in contrastive rhetoric has indicated how different languages could have different preferred rhetorical styles and shown how the basic rhetorical patterns of three Asian languages could be reflected in student's writing as well as translated texts. Such research has also provided insights into the writing practices of different cultures which could influence how students write. If the way we present our ideas is important in making our meaning understood, second language learners have to be made aware of such cross-cultural rhetorical differences. Not knowing them may result in miscommunication or misunderstanding because of the ambiguous nature of language.

 IMPLICATIONS FOR LANGUAGE TEACHERS

In teaching learners to write across languages and cultures, it is important for teachers to bear the following considerations in mind.

1. Be aware of L1 and socio-cultural influences that students bring to their learning process.
   Such awareness could sensitize teachers to the needs and feelings of students learning to communicate in a discourse system with different conventions.

2. Understand that L2 learners have to cope with a heavier learning load when compared to L1 students.
   Besides having language difficulties, these students need to struggle with the unfamiliarity of the conventions of another language and culture. It would be unfair to perceive these students as cognitively inadequate or unintelligent when they do not write according to the readers' expectations of a particular discourse community.

3. Raise students' awareness about the differences in their L1 and L2 writing through specific genre analysis and discussion of readers' expectations.
   Students should not be made to think or feel that one discourse pattern is better than the other. Teachers do not need to impose the cultural values of native English speakers on their students, but rather raise their awareness of different factors that are involved in structuring the text, which would include the readers' expectations of certain organizational patterns.

4. Integrate genre analysis as part of the revision process after students have generated their own ideas and written their drafts.
   This could prevent highly controlled and guided writing which does not promote invention and creativity.

_React. November 1998_
SOURCES


INTRODUCTION

The concept of diglossia was developed by Ferguson (1959). It describes a situation where two languages or language varieties occur side by side in a community, and each has a clear range of functions. One of these varieties, the H-variety (standing for 'High'), is adopted as the standard variety and is used in official situations, such as government broadcasts, religious services, and teaching; and the other, the L-variety (for 'Low'), is used in informal situations, such as local markets and conversations between friends. The focus of this article is to discuss how the concept of diglossia might be appropriate to describe the Singapore English-speaking community, and to consider what approaches can be adopted by teachers towards the use of the L-variety in schools.

Examples of diglossia that have been widely quoted are:

- the Arabic community, where each region has its own colloquial variety, but classical Arabic is still taught in schools and is regarded by many as "more beautiful" and therefore more appropriate for written texts;

- the Tamil community, where the language taught in classrooms and used in literature is sharply different from the colloquial variety.

In all these societies, there is high prestige in demonstrating an ability to use the H-variety, but not everyone has sufficient education to achieve this. However, all members of the society use the L-variety at home and when chatting with close friends. In fact, use of the H-variety instead of the L-variety in an informal situation would be regarded as quite absurd.

DEFINING CHARACTERISTICS OF DIGLOSSIA

Three characteristics of a diglossic situation can be identified:

- the circumstances under which each variety is used are clearly defined, so there is little mixing between the two;

- the two varieties are clearly separate linguistically, so that at one time a speaker may be speaking either the H-variety or the L-variety, but never something half-way between the two;

- everyone can speak the L-variety, and will do so in informal situations, such as with friends and family members; but not everyone can use the H-variety.

However, the strict separation between the two varieties has been questioned, for example by Fasold (1984), so even in the
archetypal diglossic Arabic and Tamil societies, there may be more of a continuum between the H and L varieties than was once supposed.

**RESEARCH ON STYLES OF ENGLISH IN SINGAPORE**

Pakir (1991a, 1991b) describes the usage of English in Singapore with a model of 'expanding triangles', such that the style of English adopted varies according to two variables: the proficiency of the speaker, and the formality of the occasion. According to this model, the most proficient speakers have the largest triangle, with the greatest range of styles, while less well-educated speakers have a smaller range to modify their speech in formal situations.

Poedjosoedarmo (1995) develops this model, observing that the triangle representing well-educated speakers does not necessarily share the same base as that for less proficient speakers, because the better-educated may never use the most colloquial variety of English; and the model needs to be modified further to allow for variation due to such factors as age, gender, and ethnic origin (Deterding and Poedjosoedarmo, 1998 p.149).

Instead of describing such variation along a continuum, Gupta (1992) prefers to describe the Singapore English-speaking community as exhibiting diglossia, as she observes that many members of this community are proficient in two distinct varieties of English:

- **SSE** (for 'Singapore Standard English'): an H-variety which is close to the standard variety taught in schools.
- **SCE** (for 'Singapore Colloquial English'): an L-variety that is widely used in informal situations. This colloquial variety is commonly known as 'Singlish'.

Many students quite naturally switch between these two varieties, as, for instance, when moving from the classroom where they use SSE, to the canteen where they immediately switch to SCE to chat with friends, and this behaviour supports a diglossic model.

Gupta (1994) charts the progress of four young children, two girls in one family and two boys in another, as they develop the ability to switch between SSE and SCE in appropriate situations. She shows that while the children make little difference in the language they use with different speakers at a very early age, by time they are five, they are rather more likely to use features of Standard English when talking with Gupta (an expatriate) than with their sibling or mother.

The 'expanding triangles' model suggests some problems with describing the Singapore English-speaking community as truly diglossic.

- It is not clear that the two varieties are completely distinct. There may be more of a continuum between them, because, for example, some members of the community whose level of education is not very high have an H-variety that is halfway between SSE and SCE.
- There are some members of the community who never use the L-variety. This is particularly true of some of the older generation of
English-educated people, who may have a strong aversion to the use of SCE, though it seems to be used by almost all young Singaporeans in some situations.

Even though the Singapore English-speaking community may not meet all the defining characteristics of a strict definition of diglossia, if we accept that diglossia may be used to describe situations where the separation between the two language varieties is not absolute, then the concept may be useful in describing the linguistic situation in the English-speaking community in Singapore, or at least the young generation of this community.

ENGLISH IN THE SINGAPORE CLASSROOM

Regardless of whether we can describe the Singapore English-speaking community as strictly diglossic or not, it is undoubtedly true that many students use SCE (Singlish) regularly, and many but not all students may have the ability to switch to a more standard variety of English under some circumstances. What attitude should school teachers adopt towards the use of SCE?

Trudgill (1995 p. 185-188) identifies three possible approaches to dealing with the use of non-standard dialects in school:

1. elimination of non-standard speech: teachers at all times try to prevent students using their non-standard varieties, and correct every occurring instance of a non-standard feature. Some teachers even go as far as punishing students who refuse to conform in the use of the standard variety;

2. bidialectism: teachers accept that the non-standard variety will continue to be used in informal situations, but try to encourage the use of the standard variety for some situations in school, particularly for written work;

3. appreciation of dialect differences: if children suffer because they use a non-standard variety, this is the fault of society, not of the children. It is society's attitudes that should be changed, not the language of children.

The first of these approaches is extremely common in schools, not just in Singapore, but in England as well. The problem is that it is unlikely to be successful in many cases, because it is very hard to change the way that people speak, particularly as there is strong peer pressure among children to use the same speech habits as their classmates, not their teachers. This approach may also be destructive, as it is implying that students are inferior on the basis of the way they speak.

The third approach, of trying to change society, is exceptionally idealistic. While many people believe that society should indeed be changed, we have to recognise that this is not going to happen in the short term, and while society is the way it is, the future prospects of students are harmed if they are unable to use a variety of English that is close to the standard. Not only will they suffer when they take their examinations, they will also lose out when they have to speak in formal situations, such as attending job interviews. Only extremists would be willing to sacrifice the future prospects of their students for ideological reasons.
For this reason, the second approach, of teachers accepting the existence of two varieties of English, but trying to encourage the use of a standard variety for some purposes, is the middle path between the two extremes, and it is the approach that is most likely to be successful. It is even possible for teachers to encourage students to be proud of their own indigenous variety of English while simultaneously stressing that access to the standard variety is vitally important for future success. And teachers can furthermore recognise that the ability to switch appropriately between the H and L varieties of English when required demonstrates sophisticated behaviour that shows a good understanding of the linguistic demands of the society we live in.

**CONCLUSION**

As a colloquial variety of English is widely established among young people in Singapore, it is not possible to eliminate it. At the same time, however, students need to be aware that the ability to use a more standard variety easily and competently in some situations is absolutely essential for their future. Acceptance of the two varieties, and encouragement for students to select the most appropriate variety for each situation is therefore the most moderate and practical approach.

Attempts to eliminate Singlish entirely by punishing students who use it, and recommendations that Singlish should be adopted in the classroom, represent two extreme positions, both of which should be avoided.
Variety of English is widely used among young people in Singapore. It is not possible to eliminate it, however, students need the ability to use a more easily and competently in examinations. Acceptance of the two varieties for students is therefore the most practical approach.

Late Singlish entirely by students who use it, and that Singlish should be taught in the classroom, represent two extremes, both of which should be avoided.

### IMPLICATIONS

A colloquial variety of English seems to be becoming established as the informal language of choice among many young Singaporeans. Teachers need to consider carefully how to deal with this non-standard variety. If we follow the suggestions of Trudgill (1995), we can conclude:

1. **It is impossible to eliminate Singlish.**
   Attempts to eliminate the use of colloquial English by Singaporean schoolchildren are almost certainly doomed to failure, and are likely to be counter-productive.

2. **Proficiency in standard English is essential for everyone.**
   Use of standard English will certainly continue to be required for exams and also in many formal situations in Singapore. Anyone who is not able to use standard English when required will be at a disadvantage.

3. **Teachers should encourage the use of standard English in the classroom.**
   To ensure that their pupils develop proficiency in standard English, teachers should encourage them to use it at all times in the classroom and when writing.

4. **Teachers can be tolerant towards the use of Singlish outside the classroom.**
   While pupils should learn to use standard English in the classroom and when writing, teachers can adopt a tolerant attitude towards the use of colloquial English by their pupils in informal situations outside of the classroom.

5. **Pupils can be proud of their ability in the two varieties.**
   Pupils can be given a sense of pride in their effective use of the two different varieties in suitable situations. Successful use of colloquial English in informal situations and standard English in the classroom and when writing demonstrates sophisticated linguistic behaviour.
SOURCES


LEARNING ABACUS: WHAT COGNITIVE PROCESSES DO PUPILS USE?

Review by Foong Pui Yee

INTRODUCTION

The implementation of abacus instruction for all primary schools as a directive from the Ministry of Education in Singapore was initially met with surprise and some resistance from teachers who had no idea what it was and how it should be taught. Many were of the opinion that it was unnecessary to encumber children with an ancient device in this hi-tech age. The abacus was introduced into the Singapore primary school mathematics curriculum in 1995 as a learning aid to promote the development of mental calculation and to stimulate interest in the learning of mathematics. By the end of 1998 all Primary 7 and Primary 3 pupils will be trained in the use of abacus for addition and subtraction as an enrichment to the conventional methods of computation that they have been exposed to since primary one. This article gives a background to abacus instruction in local schools and research findings on its effect in mathematics learning.

THE ABACUS AND ABACUS INSTRUCTION

The origins of the abacus are not well known. Invented about five thousand years ago it was used universally for centuries in

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Figure 1: Structure of the Soroban (Cheong & Sin, 1996)
Asia, the Middle East, Russia and Europe. The abacus was modified to its form of seven beads 1800 years ago in China. It eventually found its way to Japan during the 16th century where it was adapted and modified to five beads for increased speed and accuracy of calculations. The Japanese version of the abacus known as soroban uses a five bead structure with one row of beads above the dividing bar and four rows below it as shown in Figure 1. In the old days before the emergence of cash registers and cheap pocket calculators, the abacus was an indispensable tool for day-to-day commercial activities in many parts of Asia, especially in China, Japan, Taiwan and in Singapore among the Chinese merchants.

Although the importance of the abacus has diminished in this hi-tech age, the soroban version still survives in Japan and Taiwan in two forms: as an instructional tool in general education and as a special tool for competition on speed and accuracy in mental calculation. Basic abacus operations are taught to all Japanese children at grades 3 and 4 for addition and subtraction, as well as how to represent a number on an abacus (Hatano, 1997). In Taiwan, children are first introduced to the abacus as part of their grade 4 school mathematics curriculum. Children in both countries who wish to become experts undertake more intensive training by enrolling in after-school programmes. Many are motivated by an elaborate qualification system where participants are ranked through frequent examinations with the ultimate aim of achieving grand expert status as national champions. The abacus as a tool in elementary school education and as a national recreational competition in these two countries, has a long tradition mainly because it is considered as a valuable cultural property. Many parents believe that extra abacus instruction out of schools will foster diligence and self-discipline, which are considered important Asian values. They also believe that abacus dexterity will enhance calculation and estimation ability. In Japan many high schools and some junior highs have abacus clubs where players practise at least a few hours everyday to compete in matches and tournaments.

THE SINGAPORE EXPERIENCE

Abacus instruction in Singapore schools only began in 1995 based on a pilot study, involving 1113 Primary 3 pupils from 7 experimental schools and 7 control schools. The objectives of the study were:

- to measure the effectiveness of abacus training on mental calculation and understanding of place value concepts;
- to assess possible affective outcomes related to mathematics such as pupil interest, confidence and perception of ability.

Findings of the study (CDIS, Nov 97) were positive. Pupils in the experimental schools showed significant improvement in mathematical achievement tests. All pupils in the study sat for a pre-test and a post-test on a mathematics achievement instrument that contained questions on mental calculation and place value concepts.
The results of this pilot study can be supported by another study in Japan by Amaiwa and Hatano (1989) as reported in Hatano (1997). Fifty-three 3rd-graders who had been learning abacus operation, were compared to 57 classmates who did not attend abacus lessons. They were assessed on two speed tests of basic calculation, and paper-and-pencil tests of multi-digit addition, subtraction, open sentence problems (e.g. __ plus 8 is equal to 41, ___ - 7 = 27), word problems and comprehension of the exchange principle between columns. The results showed that the abacus learners were much faster than the non-learners in basic calculations and on finding a complementary number to ten. They were also much better in performance on multi-digit subtraction problems, open-sentence problems and writing an expression for word problems than those who had no abacus training.

In the Singapore pilot study, a questionnaire measuring pupils' attitudes towards mathematics was administered before and after the experiment. It showed that the experimental group reported higher levels of interest and confidence in mathematics than their peers in the control schools. These positive results provided the incentive for the introduction of abacus skills in the syllabus. It was introduced to Primary 3 pupils in phases starting with 15 schools in 1995, and another 35 schools in 1996 and all schools in 1998. The Curriculum Planning Division of the Ministry of Education developed an 11-hour instructional programme with workbooks, guides and teaching aids for
teachers and pupils. Five basic skills for manipulating the beads for addition and subtraction had to be taught to pupils, following the recommendations in the Teacher's Manual produced by Cheong and Sin (1996).

COGNITIVE PROCESSES USED IN ABACUS LEARNING

Abacus learning as a topic in the syllabus of elementary school mathematics might be seen by many in western countries as irrelevant and limited in instructional value if it is judged by the outcome of proficiency in computational skills at the expense of conceptual understanding. In mastering the abacus for mental calculation, rules and role memory are important components that are often viewed as inferior in the age of electronic calculators and computers. Mathematics educators were forced to rethink the role of traditional paper-pencil algorithm for arithmetic and suggested a shift to conceptual understanding and problem-solving strategies if students were to use the calculators efficiently. However, criticism arose about the possible over-reliance on calculators. It was feared that children in their early learning of numbers and operations might not develop an adequate understanding of relationships between numbers. There has therefore been a move back to basic skills. Computation and mental computation are basic skills used across a wide variety of cultures. Practice for proficiency in skills has its place in mathematics education, although too much emphasis may be detrimental to conceptual learning. Most would agree that computation ability achieved through meaningful learning is instrumental to problem solving ability.

Studies by Ilatano, (1997) and Stigler, (1984) have shown that abacus learners tend to do well in elementary school and this “success” may give them confidence in their mathematics ability. What cognitive processes are involved in the learning of abacus operations for arithmetic computations? Studies on expertise in abacus operations need to be seen from two perspectives.

1. The abacus experts who perform mental calculation by moving “beads” on the “mental abacus” can find product of two 5-digit numbers in under 10 seconds. Their aim is to improve their skills for competition and the effects of practice on mathematical thinking are irrelevant for them.

2. The elementary school children learning abacus in the context of arithmetic. It is in the second category that researchers and educators are interested in finding the significance of practice on the abacus for the development of mathematical concepts.

In abacus lessons, children are taught the theory of abacus operation in terms of bead and finger movements. There is a large cognitive component in what would be viewed as primarily a motor skill where specific finger movements are stressed in manipulating the beads (see manual by Cheong and Sin, 1996). Calculations with
An abacus are at an intermediate level of abstraction between calculation with Dienes base-ten blocks on the one hand and the written calculations on the other. Unlike the Dienes blocks, the abacus beads are all of the same size and a unit bead may represent one, ten or hundred depending on its position. Hence learning how to operate an abacus may help children acquire the notion of place-value. Children must first acquire an understanding of the operations such as addition and subtraction, and facility in knowing the complementary numbers in bonds of 5 and 10 before they can use the abacus for calculation. The abacus acts as an external memory and computational device. It registers a number as a configuration of beads and one can produce the answer to a given operation by manipulating the beads. When using the abacus to add or subtract numbers, children may have to subtract while adding or add while subtracting. Therefore, in learning to use the abacus for addition and subtraction, both these operations are taught at the same time.

The type of conscious cognitive processing that goes on in an individual learner will depend upon the philosophy of the teacher. Some teachers encourage beginners to "reason out" the correct move based on their understanding of place-values and number bonds of 5 and 10 when they are uncertain of how to proceed, without strict fingering movements. Here the role of the abacus is a hands-on manipulative which engages children's thinking while they learn the meaning of the mathematical ideas of adding and subtracting multi-digit numbers with and without carrying or "borrowing". Other instructors of the abacus would want children to achieve "mental abacus" calculation and insist on strict fingering movement and bead movements based on the rules taught and expect children to commit them to memory. This is usually the approach adopted in the intensive abacus programmes for children who want to be expert operators. However, within the time-frame of eleven hours allocated in the school mathematics curriculum for abacus learning in Singapore, it is not possible for children to achieve "mental abacus" calculation ability that will require many hours of practice. Nevertheless there is a growing trend similar to situations in Japan and Taiwan where Singaporean parents are sending their children for extra abacus training after school hours (Straits Times, June 14, 1996).

CONCLUSION

In the process of implementing abacus instruction in Singapore, training courses have been conducted to equip primary school teachers with the necessary abacus skills and appropriate teaching strategies. Schools which have been implementing the abacus instructional programme for the first year have been monitored closely through school visits by the mathematics unit officers. Cheng (1998) reports that the teachers' evaluation of the workshops showed they have enjoyed and benefited from the training. The teachers noted that the programme has benefited pupils in strengthening their number bonds, instilling self-discipline and building up their confidence in mathematics.
IMPLICATIONS

In order to provide useful information for gauging the success of the programme after it has been fully implemented further research is necessary in local schools to:

1. Gain valuable feedback from teachers on the problems of implementing abacus instruction in schools.

2. Investigate what difference abacus learning makes to pupils learning arithmetic and how it enhances their mental computation skills.

3. Study the philosophy and concerns of teachers towards teaching abacus to mixed-ability classes.

SOURCES


Straits Times (June 1996). "Ancient mental calculus to improve mental agility". Singapore.
INTRODUCTION

The launch of the IT2000 master plan in education in April 1997 has led to an increase in use of computers and related educational software for teaching and learning in Singapore schools. Singaporean teachers will have to take on yet another new role, that of software evaluators, before they can successfully use the new materials available. Although teachers have traditionally been evaluating print material and textbooks as part of their teaching duties, the business of software evaluation presents new and challenging issues. This article will discuss a number of issues that are related to software evaluation and review some of the implications for teachers in Singapore schools.

SOFTWARE EVALUATION

A major problem in software evaluation lies in the software. By and large, English language CD-ROM software produced for language learning is often developed in English-speaking countries for monolingual speakers of the language. Software packages for English as a second language (ESL) speakers are not easily available; bilingual software packages with English and the appropriate native languages are even fewer. In Singapore, because local software production is still in its infancy, there is no choice but to rely on foreign countries to supply the software. An obvious problem that can arise is the possibility of cultural incompatibility where content and pedagogy are concerned. Another problem is the variety of English and the level of language used.

Gill, Dick, Reiser, & Zahner (1992) reported that the most prevalent approach to selecting software is to review evaluations published by software evaluation services. Independent reviewers do most of these evaluations through the use of a checklist. These reviewers are required to make subjective decisions about the accuracy of the content and the effectiveness of the package for the classroom. In addition, they also have to rate its technical strengths and weaknesses. Gill et al. has questioned the reliability of such reviews, but this approach is still used because of its convenience. It is also the fastest way to provide some information about any new piece of software.

This same strategy for software selection is popular in Singapore too, but the problem is magnified many times because many of the reviews and evaluations are done in contexts that are outside Singapore, notably in Western, native-speaking English countries. For example, many software programs developed in the United States tend to use examples that are familiar to American audiences. These may pose problems to learners in Singapore and in other societies who are not as familiar with the examples provided. Reviewers who are unfamiliar
with these contexts or who are not writing with these readers in mind will not point out these problematic issues in their reviews.

Software reviews that are available to guide teachers in their selection are almost always not directed at our teachers nor at our school population. Although there may be generic learning situations and activities that are applicable across situations, these are limited in their use, and reviews (except Singaporean ones when available) do not point out the exceptions to Singapore teachers. Thus software rated as excellent elsewhere may not be useful in other contexts because the teaching-learning situations may not support its use.

Similarly, the pedagogy or learning objectives inherent in such software may not be appropriate in these contexts. Needless to say, the students who end up using the software are also different from the audience the writers had in mind when they first conceived of the package.

Because of this, there is a need for teachers themselves or for local reviewers to review the software with the local context in mind. But when this happens, reviewers tend to rely on established checklists of criteria since none have been developed locally. The relevance of these criteria is questionable, but more of this later.

SOFTWARE EVALUATION VS. SOFTWARE REVIEWS

A number of issues can be identified in relation to the very notion of software evaluation. The first has to do with what the process of evaluation entails. For some, evaluation is a process of description and appraisal of software by teachers or reviewers while for others the process includes pre- and post-testing and observations of student use (Centre for Educational Research and Innovation, 1989). The former notion of evaluation (a process of description and appraisal of software alone) is probably the most popular. However, it is the latter process, which includes pre- and post-testing, that provides the most useful information for teachers. These two strategies also reflect a formative vs. summative approach to evaluation. In a formative evaluation according to Knussen, Tanner, & Kibby (1991 p.14) the concern is with progress towards achieving the goals of an
educational innovation and thus the process of description and appraisal is deemed adequate. A summative evaluation is concerned with the effectiveness of a programme upon completion in relation to its stated aims, and this makes pre- and post-testing a core component of the process. Most publications feature formative evaluations of software - summative evaluations are rarely available to the public.

SOFTWARE EVALUATORS

The issue of who the evaluators are is also important. Heller (1991) pointed out that evaluation is often carried out by a wide range of individuals and groups ranging from students, classroom educators, administrators and librarians as well as members of professional associations. These reviews are, as expected, subjective views that are much influenced by the individual's knowledge, expertise and interest. A study by Jolicoeur & Berger (1986) showed that there was little correlation between recommendations given by two review services, while Callison and Haycock (1988) found weak correlation between program ratings given by teachers and pupils. Heller (1991, quoting Burt, 1985) and Knussen, Tanner, & Kibby (1991, quoting Lawton, 1980) identified teachers as the most appropriate persons to evaluate the software because they are the end users, and they know best the context and condition under which the software will be used. However, teachers rarely have the time to do extensive reviews of software before using it in the classrooms. They, therefore, tend to rely on published reviews as guidelines.

CRITERIA FOR EVALUATION

What to evaluate in a software program is yet another issue. Reviews could focus on the technology, the content, or the pedagogic presentation or all three. Naturally, the reviewers' strengths and interests play an important part in determining the focus of the review, but this will also mean that the review will only be of use to certain groups. This brings us back to the issue of the criteria to be used in software evaluation. The criteria used for evaluation will reflect the predominant concerns of the reviewer or the context for which the review is to be used and this often results in an emphasis on different criteria. An obvious solution to this is to have a comprehensive set of criteria covering all major aspects, but this is not practical as the task will become more time consuming for evaluators and users. For example, the New South Wales Department of Education in Australia prepared a set of criteria for teachers, which had seventeen evaluation areas, which in turn generated one hundred and twelve criteria! (Rowe, 1993).

Technology

While the criteria for technical aspects may be applicable across many contexts, we need to remember that the technology available in different contexts also varies. However, the same cannot be said for content and for pedagogical presentation. Where content is concerned, we need to take the subject or the academic discipline into consideration when evaluating the software. For example, software dealing with history or geography requires a different set of evaluation criteria than
those dealing with say science or language. Content software (for subjects like science or history) should contain up-to-date and correct information, and this software could be used for reference alone. However, information is less important in language software, but opportunities to use language meaningfully are vital. Needless to say, the accuracy of the language is also important. Language software also needs to provide good integration of the four skills in their activities, a criterion which merits lower priority in a content software. So far, most checklists ignore such differences in disciplines. Instead, a generic list of criteria is produced and is used to rate the effectiveness of all software programs. This is not helpful to teachers looking for ways of evaluating discipline-specific software. The very task of allotting a number of points to each criterion also makes a farce of the whole evaluation process. The sum of the points does not necessarily tell you how effective a software is going to be in the classroom.

Content and Instructional Design

Next, the content and instructional design of each software program have to be taken into consideration since what is produced in one cultural context may not always fit in with the educational curriculum or the cultural practices of teaching and learning in another context. For instance, the centralised curriculum in Singapore means that all schools must follow the established syllabus and use prescribed materials. There is often little scope for the inclusion of activities and materials that are not in the syllabus. Software programs produced elsewhere do not always have matching curricula content. Thus, the usefulness of a software is in the end dependent upon the creativity of the teacher-user, rather than what the reviews report.

Pedagogic Presentation

In addition, activities that are part of the software program may require pedagogical approaches that are not practised here or are not popular with teachers given the constraint of the curriculum and the class size. Or the software may favour certain pedagogic presentation styles that are culturally inappropriate here. A good example is found in Reading Galaxy or in Reading Blaster where a hip game host takes the children through the activities. Children unfamiliar with TV game hosts will have a problem relating to the software. This issue of cultural fit is important when considering any material for use in classrooms. Software evaluation procedures neglect this aspect and instead treat the activity as a neutral and culture-free process.

WHAT CRITERIA TO USE

Our position has always been not to prescribe criteria to teachers, although it is true that teachers need guidelines to help them select appropriate software. In our investigation into this issue of the type of software criteria that Singapore teachers use, we found that these are the top four criteria among pre-service teachers (Cheah & Cheung, in preparation).
These findings tell us that our pre-service teachers may prefer these criteria but their interpretation of each of these criteria also vary. For instance, the term "user-friendly" which is, by now, an overused and imprecise term, drew a number of interpretations ranging from "simple to use", "simple instructions", "help easily available", "easy to navigate", "useful icons" to "no technical knowledge required". This in turn illustrates another problem of relying on criteria listing as a guide.

Many researchers have developed lists of such criteria for evaluating software (see Gros and Spector, 1994; Heinich. Molenda, Russell & Smaldino, 1996). The only criteria listing generated by a research team is Bitter and Wighton's work (1987), and while these lists do provide useful insight into the process of evaluating software, they are often too lengthy and tend to be less than helpful for busy teachers. Bitter and Wighton's work for instance produced 22 separate criteria.

However, teachers may find it useful to heed the following four categories of minimum criteria proposed by Roblyer, Edwards, and Havriluk (1997 p 120):

1. Required instructional design and pedagogy: Does it teach?
2. Required for content: Is it correct?
3. Required for user flexibility: Is it "user-friendly"?
4. Required technical soundness: Does it work correctly?

**CONCLUSION**

With these issues in mind, it is clear that selecting a piece of software based on commercial or other published criteria can be problematic because of the different contexts and populations that the software has to be put to use in. What teachers value and need in each context can be very different, and this is dependent upon the set curriculum, the social and cultural contexts for teaching and learning, the established pedagogical procedures, and also the degree of freedom teachers have to innovate.
IMPLICATIONS

Bearing these issues in mind, there are several implications for teachers to consider when selecting software.

1. **When reading any write-up about software, it is always useful to ask if the write-up is a review, i.e. a description only or a proper evaluation.**
   Many reviews can be biased, or not very useful if they only describe the content of the software.

2. **Keep in mind where you found the write-up.**
   Is it from a journal which looks at educational issues? Think about where the reviewer may be coming from, and try to read the article with their goals in mind.

3. **Keep your teaching and learning context in mind when reading reviews/evaluations.**
   An award-winning software package may not work for you if you do not agree with its teaching and learning philosophies or if its content does not fit your curriculum goals.

4. **Try and list your objectives for using a piece of software.**
   Then try and match these to those in the software. Your criteria should matter most.

5. **Remember there is no such thing as an ideal piece of software.**
   Awarding a number of points to various criteria as a strategy to select a piece of software can be meaningless because the best software need not get the highest points if your criteria are not properly set out in the first place.

6. **Always keep the cultural issue in mind.**
   This could be a major stumbling block to learning.

7. **Ensure that the basic computer hardware requirements for the software are available when trying out the software.**

8. **Develop your own set of criteria for selecting software.**
SOURCES


RETHINKING TRIM AND FIT (TAF)
PROGRAMME STRATEGIES...WEIGHING THE
SCIENTIFIC EVIDENCE

Review by Michael Chia

INTRODUCTION

The association between over-fatness during the school-going years with over-fatness in adulthood cannot be disputed (Knittle, 1972; Rimm and Rimm, 1976). Evidence shows that more than 80% of overweight children become overweight adults (Abraham, Collins and Nordsieck, 1971). Current evidence shows that the younger and less over-fat the child is at the onset of the overweight treatment programme, the more marked and longer lasting are the results of the intervention (Parizkova, 1982). Therefore, the ongoing emphasis of identifying and combating over-fatness among Singaporeans, especially at an early age in primary school, must remain and is a sagacious health and educational policy. This paper highlights and puts into perspective some of the scientific evidence regarding the aerobic fitness and physical activity habits of over-fat and overweight young people and suggests some guidelines for schools’ Trim & Fit (TAF) programmes.

ASSESSING AEROBIC FITNESS OF OVER-FAT AND OVERWEIGHT YOUNG PEOPLE

Cursory observation tells us that over-fat and overweight young people do not do as well as their normal weight counterparts in performance, such as the 2.4 km run test. Is the inferior performance of these individuals the result of a deterioration of their aerobic fitness brought about by their excess weight or fat or is it due to the imperfections of statistical techniques used to interpret the data?

The gold standard measure of aerobic fitness is peak oxygen uptake (peak VO$_2$). This is simply the highest rate of oxygen use by the body while performing maximal exercise (e.g. running on the treadmill to volitional exhaustion). In absolute terms (L min$^{-1}$), the peak VO$_2$ of overweight young people is similar to, or higher than normal weight subjects (Armstrong and Welsman, 1997; Nair and Schmidt, 1996), but when divided by body mass using simple ratio standards (i.e. in mL kg$^{-1}$ min$^{-1}$), the aerobic fitness of over-fat and overweight young people is inferior to those of normal weight young people (Armstrong, Williams, Balding, Gentle and Kirby, 1991; Nair and Schmidt, 1996).

The use of simple ratio standards to normalise performance between individuals of different sizes, though widely used, is controversial. Heavier individuals are disadvantaged while lighter individuals are advantaged using the ratio model. This is because overweight and over-fat individuals have a greater proportion of their weight in the form of fat which itself contributes little
to the overall value of peak VO₂. The use of a log-linear model to compare aerobic fitness data between overweight and normal young people shows that the difference in aerobic fitness between normal and overweight young people is reduced markedly but is still less than that of normal weight young people (Armstrong and Welsman, 1997). Two studies have shown no difference in aerobic fitness between obese and normal weight young people when the test values were expressed in relation to lean body mass (Elliot, Goldberg, Kuehl, and Hanna, 1989; Maffeis, Schena, Zaffanello, Zoccante, Schutz, and Pinnelli, 1994).

Cooper, Weiler-Ravell, Whipp, and Wasserman (1990) reported that when body mass was supported such as during cycling exercise, the aerobic fitness of obese young people is comparable to those of normal weight young people.

**HEALTH BENEFITS OF SUSTAINED PHYSICAL ACTIVITY OR TRAINING FOR YOUNG OVERWEIGHT AND OVER-FAT YOUNG PEOPLE**

Apart from the direct effects upon increased caloric expenditure and body fat reduction, a physical activity programme that is sustained over a period of time confers other health and metabolic benefits on the overweight young person. Improvements in blood fat profile, glucose metabolism and overall coronary risk profile can be expected (Sasaki, Shino, Tanaka, Ando and Arakawa, 1987). Despite no alteration in body composition profile, a 20-week intervention programme of dietary restriction and exercise markedly decreased resting and sub-maximal exercise blood pressure (Rocchini, Katch, Andersen, Hinderliter, Becque, and Marlin, 1988). The same beneficial pattern of change was also noted for insulin sensitivity. Exercise was shown to control insulin resistance and reduce insulin levels in obese young people, particularly if combined with a low-fat, high carbohydrate diet (Barnard and Wen, 1994).

**PHYSICAL ACTIVITY OF OVERWEIGHT AND OVER-FAT YOUNG PEOPLE**

A review of the extant literature suggests that obese young people tend to be less physically active than those who are of normal weight (Bar-Or and Baranowski, 1994). The results from these studies have shown that:

- overweight and over-fat children are disadvantaged in activities that require them to support their body mass such as walking, running and jumping. However, in activities where their body mass is supported, they may be as able, if not more able, than their normal weight peers;
- children are more likely to see themselves as capable of being successful and manageable (and therefore more likely to adhere to the activity) in physical activities where they are not penalised because of their size;
- obese young people tend to be less physically active than those who are

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of normal weight. However, because of their greater body mass, obese or overweight young people may expend more energy than those of normal weight despite their lower levels of physical activity;

- exercise sessions for children need to be discontinuous, with short rest periods between activity bouts. As the pupils become more able, the duration of the exercise periods can be gradually increased;

- when children are given their choice of physical activity and they enjoy the experience, it is more likely that positive behaviour change will occur that could carry over into adulthood;

- apart from the direct effects upon increased caloric expenditure and body fat reduction, a physical activity programme that is sustained over a period of time confers other health and metabolic benefits to the overweight young person.

**CONCLUSION**

TAF programme administrators should note that orchestrating enjoyable and successful physical activity experiences for TAF members must be a prime objective. It ensures their future life-long participation in physical activity. Safeguarding the good health of our young people is investing in our nation's future. The way forward is to have young people gainfully engaged in daily physical activity. Daily physical activity is quality life insurance for our young people. Are your pupils adequately covered?
IMPLICATIONS

1. **Emphasise large muscle groups with the body weight preferably supported.**
   As a TAF strategy, it may be more appropriate to use cycling, canoeing, rowing or swimming as a mode of exercise, and a fitness assessment tool, when such activities are available, rather than a run or walk test.

2. **Include daily physical activity to raise estimated daily energy expenditure.**
   ATAF strategy worth emphasising is that every little bit of daily physical activity counts and results in 'extra' caloric expenditure. For example, doing household chores, taking the stairs, having more active play during recess, doing simple errands for the class like collecting and sending books to the staff room, all add up to additional daily caloric expenditure.

3. **Emphasise activity duration rather than intensity.**
   Physical education sessions should be structured to emphasise lower-intensity activity for TAF members. The discerning PE teacher can positively highlight what TAF members do well rather than focus on what they are awkward at. No one in class should be excluded from any physical activity because of a lack of skill. The PE teacher must modify the activity to meet the demands of different ability groups. The task set by the teacher must be fun, challenging and achievable. Good effort must be commended and encouraged. The positive longer-term impact of good effort noticed and affirmed by the teacher cannot be over-rated.

4. **Incorporate the child's preferred activities.**
   TAF programme administrators should not only be concerned with short-term results. They must temper their intervention programme with strategies for instilling a love for a more active lifestyle, by incorporating activities enjoyable to the participants. Favourable lifestyle habits take time to inculcate. When good habits are formed over a period of time, then there is a higher chance that lifestyle change is longer lasting than if the change is coerced or is too drastic.
5. **Persevere with the TAF programme, even when body mass and body mass index do not change.**

The TAF programme will accrue other health benefits to over-fat young people even when in the short term, BMI and body composition profile do not alter very much. The acid test of a successful TAF programme is not only the excess fat loss whilst the participants are in the programme, but whether the positive lifestyle changes take root after the cessation of the intervention programme.

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