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Teacher Practices in Mathematics Classrooms with At-risk Students

Akhila Sudarshan

Khin Maung Aye

Nanyang Technological University, Singapore

The aim of this study was to examine the instructional practices of mathematics teachers teaching at-risk, Normal Technical (NT) students. This study was part of an intervention project which aimed at improving student performance and engagement as a consequence of teachers' improved capacity to plan and teach according to the strengths and specific pedagogical needs of NT students, based on Wiggins and McTighe's (2004) framework of Understanding by Design (UbD).The research team worked with 18 Secondary 1 (Grade 7) and secondary 2 (Grade 8) Mathematics, English and Science teachers of the Normal Technical stream from 4 neighbourhood schools in Singapore. The data for this paper stems from the lesson observation of the 6 mathematics teachers from.the pre- intervention phase of the project. Our preliminary findings showed that the NT classrooms are teacher centered and teacher directed learning being the predominant form of knowledge dissemination. The students tended to accept the knowledge delivered by the teacher as truth without any critiquing. We propose that instructions which focus on making students see the relevance of mathematics in their real life will in turn will help them appreciate and enjoy what they learn in school .

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Introduction

Students are considered to be at-risk when certain factors such as low socioeconomic status, language and cultural differences and dysfunctional family situations are present which increase the probability of the students dropping out of school (Johnson, 1998). The term at-risk has found wide-acceptance in literature and Vatter (1992) has listed some of the characteristics of at-risk learners : poor academic performance, high absenteeism and discipline problems, low aspirations and parents or guardians with low expectations. In the context of learning of mathematics by at-risk learners, Carey et al. (1995) point out that for these learners, mathematics is perceived as a hierarchy of skills to be learned in a particular sequence. In a manner consistent with the label of having lower ability, the at-risk students are taught less mathematics and are presented with skill oriented, direct instruction and pratice rather than concepts or problem solving skills (Campbell & Langrall, 1993). The strong influence of teachers' beliefs on their classroom practices is well-known (Stipek, Givvin, Salmon, & MacGyvers, 2001) in literature. Expectations about students is an important component of the teacher's beliefs in the classroom and Brophy (1985) asserts that low expectations from at-risk students influence the teacher's classroom practices and may adversely affect student performance. In this paper, we examine the instructional practices in a Mathematics classroom for at risk students in Singapore. In the Singapore context, we confine the definition of at-risk to mean at risk of dropping out of school.

The success of the Singapore educational system is exemplified in impressive performance of its students in international assessments such as TIMSS and PIRLS. A hotly debated aspect of this educational system is the streaming/tracking of students in secondary schools, based on their academic performance in the Primary School Leaving Examination (PSLE), at the end of 6 years of primary schooling. The high scorers in this examination are placed in either Special (SP) or Express (EXP) stream, while the low scorers are placed in the Normal stream. This Normal stream is again differentiated into Normal Academic (NA) stream and Normal Technical (NT) stream, NT students being the lowest scorers in this exam. The NT stream was introduced in 1994 with the aim of providing at least ten years of general education to the academically low achieving students and those at risk of dropping out, estimated to be 15% or 7000 students from each cohort (Ministry of Education, 2000). This study focuses on the instructional practices adopted by Mathematics teachers in the NT classroom. The study was conducted during the pre-intervention phase of a two-year intervention project aimed at improving Singaporean Normal Technical (the lowest ability stream) teachers' knowledge and skill in designing and implementing authentic and effective pedagogies in three lower secondary core subject areas (science, mathematics and English language). As a backgrounder, it is necessary to have an understanding about the Normal Technical Course and its place in the Singapore curriculum and also have an idea about the typical profile of the NT student. In the following sections, we trace the development of the NT course in the Singapore educational system and briefly describe the perceptions and expectations from an NT student in Singapore.

The Normal Technical Course

Singapore's Normal Technical (NT) Course was established in 1994 to provide low performing/high attrition risk students (Ng, 1993), with differential instruction in preparation for post-secondary vocational and technical training, (approximately 15 to 20% of each year's cohort). The weakest performers on Singapore's Primary School Leaving Examinations (PSLE) are assigned to the NT stream. The NT stream is intended to help students complete 10 years of basic education and provide students with a good foundation in English and Mathematics so that they could go on to the Institute of Technical Education (ITE) after the N level examinations in Secondary 4.

Current educational pathways (See appendix.1) available in the Singapore education system can be traced back to the "New Education System (NES)" recommended by the Goh Committee in 1979. In its report, the committee defended streaming as a "logical consequence of the fact that different children have different capacities to acquire knowledge." It further stated that "the [existing] system has been structured such that only the brightest 12 to 15% of schoolchildren can cope" and so "to subject the less able students to the same regime of learning has been the chief defect of our educational system in the past" (pp. 1-5). Thus, the committee decided that "for a child who is not meant for academic endeavours, streaming would help to ensure that he acquires basic literacy and numeracy, as well as preparation in training for a skill" (Yip & Sim, 1994, p. 16).

In 2004, 10 years after the inception of the program, the Ministry of Education (MOE) reviewed the NT curriculum. To keep NT students in school and motivated to learn, recommendations were made for curriculum and teaching to include more “practice-oriented” approaches; more curricular links to daily life applications; and more student centered activities like group work, oral presentations, creative and hands-on activities (MOE, 2004). IT applications are stressed in the NT syllabi. Unlike in other streams, NT students are provided with Elective Modules (EM) designed to explore their career interests. In addition, new policy settings have increased flexibility for lateral transfers in secondary school and allowing better performing NT students to take one or two subjects at a higher level. These policy changes focused on improving student motivation, attendance, and pathways to academic and vocational achievement. Three years on after the first NT review—to underscore its commitment to improving the NT experience through increasing curricular customization—MOE announced that it will provide more resources to all secondary schools with Normal Course students (Shanmugaratnam, 2007). Recent ministerial statements call for “leveling-up” reforms to improve student motivation, attendance and to permit more alternative pathways to academic and vocational achievement.

Unfortunately, the NT Course retains the negative connotation associated with its technical and vocational roots. The term ‘technical’ announces less of the character and curriculum of the NT Course and more of its connection to its industrial past and the limited options awaiting NT students. Despite the efforts to make the NT course responsive to the challenges posed by globalization and a changing world economy, the issues of equity voiced at its inception persist. And, according to some recent media reports, expectations for Normal Technical students to perform well are still very low. Public perception of the NT Course has been predominantly negative, connoting NT students with school dropouts, delinquency, and limited futures. It not uncommon to hear the observation that, “They just have to sit for ‘N’ level exams to go further to ITE. Even then, only 80% proceed” (Ser, 2004). Our work with teacher participants in this project surfaced administrative expectations that placed heavy demands on teachers not to ‘fail’ NT students. The result was that NT students were not held responsible for their learning and that day-to-day teaching and assessment was regularly ‘watered down’ to ensure that all would pass.

Although there has been a move to increase available NT students' educational pathways, low expectations coupled with narrowly defined vocational outcomes raise uncomfortable issues. It is impossible to talk of those at the bottom of the Singaporean educational system without acknowledging the tensions that exist within the wider society and educational culture which play out in schools and classrooms (Luke, 2005)—principally, the tension between striving for excellence at the top while attempting to provide improving standards of education for all. This is a matter of pressing importance in all educational systems where there are apparent and wide gaps in performance among children of varied social and cultural backgrounds.

Who are the NT Students?

NT classrooms are diverse, rather than homogenous. Although NT students are streamed based on their weak academic performance on the Primary School Leaving Exam, the difference among students may be quite wide, with accompanying differences by subject.

Although there has been a decrease over the past five years, males consistently outnumber females in the NT stream by a ratio of approximately 3:2. The gender imbalance in the NT stream may have implications on social interaction, classroom climate, and teacher's expectations, pedagogy, and management style. However, data on percentages of female vs. male NT teachers is hard to find. Seemingly disproportionate numbers of male teachers are assigned to the NT classrooms.

Slightly more than three quarters of NT students reside in flats with four rooms or less. If residence type is taken as proxy for socioeconomic status, then the majority of NT students are from low SES backgrounds. Only 16% of students who qualified for the Gifted Education Programme live in similar residence types. Seemingly, children from privileged homes are more likely to be found in other streams (Chia, Toh, & Li, 2005).

NT students largely come from homes that do not speak English as the first language and have one or more parents with lower than average educational qualifications. Low competence in English language is one of the most commonly cited reasons given by students for their inability to understand lessons in school (Chang, 1997). Not speaking English at home disadvantages NT students because they are less likely to get help from home. Further, every other NT student is likely to have a father whose highest educational qualification is secondary school and/or mother whose highest educational qualification is primary school. Parents' highest educational qualification on student achievement is but one factor of the "combined familial resources," which also include financial, social and cultural capital that have implications on the success of the NT student as he/she navigates the educational terrain (Kang 2004).

The NT curriculum focuses on strengthening students' foundations in English and maths in preparation for the national General Certification 'N' level examinations. Their academically oriented and examination-driven teaching conforms to how Asian pedagogy is characterized in general (Gopinathan, Ho, & Tan, 1999; Luke et al., 2005). NT classrooms share similarities with under-achieving streamed or tracked cohorts elsewhere. Although these students are lumped as academically weak, achievement across the cohort may vary greatly.

These perceptions affect the self-esteem of many NT students. One student from the pioneering cohort recalled, "Often, the students in the other classes would point me out and say, 'He's Normal Tech', as if I was stupid and good for nothing. They upset me a lot" (Lee, 2004). Success in Singapore's education system is largely attributed to an individual's own willingness and capacity to work hard, "I believe if a person is determined to get something done, he can do it. How we respond to failure actually shapes us," said David Ho, one of the top two NT students in 2004's N-level exams (Ho, 2004). Conversely, it those who do not do well have only themselves to blame. Deficit theories attempt to explain the "underperformance" of NT students. The student's home or family background—"single-parent", "broken", "dysfunctional", and "poor" families—are often cited as the reason why a child is not doing well in school. Teachers overwhelmingly offer the home as a factor for students' low achievement (Ng, 2004).

After examining the detailed background and profile of a NT student, it can be inferred that the NT student closely matches the description (Dunn, 2004) of the at-risk students reported in literature. In order to understand the implications for teacher instruction in the NT Mathematics classroom, we present a brief review of literature available on mathematics instruction for at risk students.

Literature on Mathematics Instructional practices for at risk students

The association between teachers' beliefs and instructional practices related to mathematics instruction was studied by Stipek et al. (2001) and their findings indicated that teachers had a coherent set of beliefs which predicted their instructional practices – the more traditional beliefs (focus on procedures and getting correct answers and good grades) were associated with more traditional practices (follow textbook and answer sheets to correct students' work). These beliefs could be changed by guided reflection on classroom experiences.

In a study aimed at examining the effects of intervention on mathematics achievement of low-performing intermediate grade students, Ketterlin-Geller et al. (2008) list six instructional strategies as potentially beneficial for students considered as being at risk for failure : a) visual and graphic depictions b) systematic and explicit instruction c) student think-alouds d) peer-assisted learning e) formative assesment data provided to teachers and f) formative data assessment data directly provided to students. They recommend that students benefit when they are encouraged to think aloud while they work or share their thinking with peers.

Synthesizing research on the effects of interventions to improved the mathematics achievement of at risk students, Baker, Gersten, & Lee (2002) concluded that the principles of following the principles of direct or explicit instruction can be useful in teaching mathematical concepts and procedures. However, these students did not seem to do well at authentic problem solving and discussion of mathematical concepts without solid preparation of the underlying mathematical foundation. The authors argue for a mix of explicit instruction in procedures and ample opportunity to apply procedures to open-ended problems with real world relevance,

Evidence from a Higher Order Thinking Skills program targeted at teaching thinking to at risk elementary students show that workbooks and traditional forms of seatwork are not likely to stimulate the thinking ability of students. Computers, team competition and drama was used to stimulate students' curiosity about problems presented (Pogrow, 1988).

Hawkins, Doueck, & Lishner (1988) reported the effects of instructional methods on acedemic achievement, behavior, and social bonding of seventh grade students who were low achievers in math and concluded that changes in the methods used by mainstream classroom teachers in daily instruction can generated more positive attitudes among students and reduce school misbehavior.

Methodology

This study was part of an intervention project which aimed at improving student performance and engagement as a consequence of teachers' improved capacity to plan and teach according to the strengths and specific pedagogical needs of NT students, based on Wiggins and McTighe's (2004) framework of Understanding by Design (UbD). The aim of this study was to examine the instructional practices of mathematics teachers teaching under achieving , Normal Technical(NT) students. The research team worked with 18 Secondary 1 (Grade 7) and secondary 2 (Grade 8) Mathematics, English and Science teachers of the Normal Technical stream from 4 neighbourhood schools in Singapore.

The data for this paper was derived from the observations of 6 mathematics teachers during the pre- intervention phase of the project. Of these 6 participants, 2 were male teachers. One of the male participants and 2 female participants were in their late twenties with less than a year's of teaching experience. The remaining male teacher was in his early thirties with more than 10 years of teaching experience. The other two female teachers were in their fifties having more than thirty years of teaching experience. Among the participants, two teachers had a basic degree in Maths, two were qualified engineers and one had a degree in Physical Education. The remaining participant had a high school qualification.

Though a few teachers joined the project voluntarily, most of the time, the principals of the respective schools took the decision to involve certain teachers in the project.

Instrument Used

The preliminary findings reported in the following sections are based on data collected from 34 mathematics lessons using an adapted version of Singapore Coding Scheme (Luke, Cazden, Lin & Freebody, 2004). The coding scheme consisted of a number of items with a 4 point (0-3) Likert scale response format which was used to capture the important features of classroom teaching and learning activities. (See Appendix 2 for Singapore Coding Scheme). For the purpose of this study, variables described in the coding scheme which could be grouped under two broad categories – Lesson framing and Knowledge Dissemination were selected.

Findings and Discussion

Lesson Framing

Under the category of ' Lesson Framing' , we included the variables which describe how the classrooms were socially organized for the student teacher discourse to take place. Some of these variables are seating arrangements, "phases"- activity structures and type of student/teacher talk in the classrooms.

Most of the time, the physical arrangement of the mathematics classrooms observed was in the form of students sitting in single or double columns. This arrangement did not seem to encourage group work among the students.

In the coding scheme, each lesson was divided into many phases which were characterized by their distinct nature of activity structure. For an activity to qualify as a phase, this activity was required to have a minimum duration of 5 minutes. Coding for phases helped in gathering information on how lessons were organized to facilitate teaching and learning. In the original coding scheme (Luke, Cazden, Lin & Freebody, 2004), there were 10 different phase types such as *Whole class lecture(Monologue)*, *Whole Class elicitation and discussion, Whole class answer checking, Individual seat work* and so on. Our adapted version had an additional phase called the ' *Down Time'*, during which there was no specific activity. Examples of *Down time* were - teacher turning up late for the lesson, disruptions during the lesson etc.

The 34 mathematics lessons observed accounted for a total of 149 phases. The number of phases in a math lesson ranged between 1 and 9 with a mean of 4.38 phases per lesson. The findings showed that the dominant phases were Individual seat work (25.1%) followed by Monologue (23.9%). Whole class answer checking or IRE (*Initiation- Response- Evaluation*) recorded 16.4 % of the total time. A significant amount of time (16%) was documented as downtime - no specific activity taking place in the class. Other activities such as Whole class elicitation and discussion (8.2%) and Small group work (6.9%) were also observed during the math lessons. A small percentage (3.5%) of Test taking was also recorded. The small percentage of the test taking phase was due to the fact that class observations were not conducted during the examination period.

Table1. Phase Type

Phase Type	**Percentage**
Downtime	16
Monologue	23.9
Whole class Elicitation and Discussion	8.2
Whole class answer checking/ IRE	16.4
Individual Seat Work	25.1
Small Group Work	6.9
Test Taking	3.5

The data in Table 1 indicate that NT math lessons were mainly Teacher centered with majority of lesson time dominated by ‘Teacher Talk’ .Whole class discussion involving students was only 8.2 % compared to 23.9% of Monologue. A small amount of lesson time(6.9%) was devoted to group work which points to lack of opportunities for the students to engage in group activities and the emphasis on individual seat work (25.1%).

The data on classroom discourse (Table 2) highlights the high proportion of time (69.94%) devoted by the teachers on curriculum related talk during the lessons. A significant amount of time (14.76%) was spent on regulatory talk in an attempt by the teacher to get students to be on task. We observed many issues relating to classroom management in these NT classrooms. Students did not seem to pay much heed to what the teacher had to say. In spite of the high percentage of curriculum talk, the teachers’ discourse was often interrupted by the disruptive behavior on part of the students. An exception to this was a male teacher’s (who also happened to be the discipline master of the school) classroom where usually order was maintained.

Table2. Type of Talk

Type of Talk	Percentage
Organizational Talk	8.9
Regulatory Talk	14.8
Test Strategy Talk	1.7
Curriculum related Talk	69.9
Informal Talk with Teacher	4.5

The focus in Math classrooms was therefore largely on curriculum related talk and intermittent regulatory talk which made up to almost 85% of the classroom talk.

The Singapore coding Scheme defines the 'source of authoritative knowledge' as 'what the teacher explicitly refers to as the source of knowledge'. Some of these sources of knowledge could be the 'teacher', 'student', internet', 'textbook', 'test/ exam' etc. The findings (Table 3) showed that the teacher was the major source (78.4%) of authoritative knowledge in NT mathematics classrooms of Singapore. The classroom observations showed the tendency of students to rely on the teachers completely for the right answers. Only a very few instances of students (19.3%) taking the responsibility of being the source of knowledge was observed. Most of the time students appeared to be content being passive recipients of the knowledge given by the teacher.

Table3. Source of Authoritative Knowledge

Source of Authoritative Knowledge	Percentage
Student	19.3
Teacher	78.4
Test/ Exam	2.3

From Table 4, we can see that the common tools used by teachers were white board (45.7%) and worksheets (22.4%) and that of students was worksheets (48.1%). A typical Mathematics lesson was the classic 'chalk and talk' method where the teacher worked out the sums on the white board for the students to copy down. This was followed by a worksheet with more of the same type of problems for the students to work on as individual seat work. Before the end of the lesson the teachers worked out the same worksheet problems on the white board to 'for the sake of students who would not have attempted the sums on their own. This practice was so well entrenched that the students tended not to put in sufficient effort in the classroom knowing well that the teacher would eventually give all the answers.

Table 4. Teachers'/Students' Tools

Tools	Teacher's Tool (% of time)	Students' Tool (% of time)
Nil	20.9	13.0
White board	45.7	-
OHT/Visualiser	10.0	-
Textbook	1.0	24.5
Worksheet	22.4	48.1
Blank paper	-	14.4

Using the coding scheme, data was collected for the category – students' produced work. The data reveals that the students' response in the classroom was in the form of short oral response (32.9%) or short written answers (38.5%). Most of the time, students' response was in the form of a "Yes" or "No" or a numerical answer.

Table5. Students' Produced Work

Students' Produced work	Percent
Nil	3.6
Short oral response	32.9
Sustained oral response	1.8
Multiple choice/fill in the blanks	.6
Written short answers	38.5
Sustained written text	3.7
Combination text	10.8
Others	8.1

The teacher also appeared to be satisfied with these answers and did not use available opportunity to elicit detailed explanation or engage the students in discussion. Very little extension of student responses in the form of arguments, views or opinions were observed.

Knowledge Dissemination

Under the broad category of Knowledge Dissemination, we have included the variables – depth of knowledge, knowledge criticism and knowledge manipulation**.**

The type of knowledge disseminated in the NT classroom has been found to be of the type – fact/rote/basic (69.9%) which implies that most of time, the teacher was devoted to transmitting the basic knowledge to students. The next category of knowledge transmission was found to be procedural knowledge which occurred during approximately one-third of the lesson. Occurrences of conditional / when, which involve deeper understanding of the subject at a conceptual level was infrequent (approximately 30%). As we can see from Table 6., advanced concepts in mathematics were rarely discussed in the classroom.

Table 6. Depth of knowledge

	Fact/ Rote/ Basic	Procedural/ How to	Conditional/ When to	Advanced Concepts
Nil	8.0	22.7	69.2	83.7
A little	.9	18.5	1.0	13.9
Sometimes	21.2	24.4	22.2	1.6
Almost always	69.9	34.4	7.6	.8

A typical NT classroom devoted most of its time to basics then moved on to doing worksheets which gave the students some drill in the procedures to be worked out. The teachers and students were rarely seen to go beyond this procedural level to expand the concepts to an advanced level.

Under the sub-category knowledge criticism, we have recorded evidence of truth – where knowledge is regarded as having 'one right answer'; comparison – where ideas are compared and contrasted by the students ; critique – where students question the source or validity of claims made in the classroom.

Our findings (Table 7) show that the teacher's claims in the classroom are almost always taken as the truth by the students without any scope for questioning the claims made by the teacher or engaging in any debate / discussion to contest them. These observations reinforce the scenario of passive acceptance of knowledge by the students and the lack of engagement in exploration of concepts beyond what was covered by the procedural requirements of the worksheets. On the other hand, teachers were rarely seen to create opportunities to encourage students in questioning any of the ideas presented.

Table 7. Knowledge Criticism

	Truth	Comparison	Knowledge Critique
Nil	5.4	73.9	88.9
A little	3.2	13.3	3.4
Sometimes	1.7	8.6	6.8
Almost always	89.6	4.2	.8

Under the sub-category of Knowledge manipulation, we look for evidence of how students process or manipulate the knowledge presented in the classroom. At the very basic level is the regurgitation of facts or 'Reproduction" and this phenomenon is seen to occur most of the time (70.9%).

Table 8. Knowledge Manipulation

	Reproduction	Interpretation	Application/ Problem solving	Generation of new knowledge to students
Nil	9.5	57.9	65.7	91.4
A little	7.2	16.7	20.6	2.1
Sometimes	12.4	20.8	13.7	6.5
Almost always	70.9	4.6	-	-

In fact, the NT classroom does not seem to take the next step of "interpretation" of the knowledge generated in the classroom. Only 4.6% of the time does the classroom engage in interpreting the basic facts of a topic or explore the various implications. The teacher thought it was 'sufficient' for the students to be able to recall the procedure and successfully attempt to use the procedure to complete the worksheet. Understandably, the NT classroom made little attempt to move into real life applications of problem solving or generation of new knowledge.

Summary and Conclusions

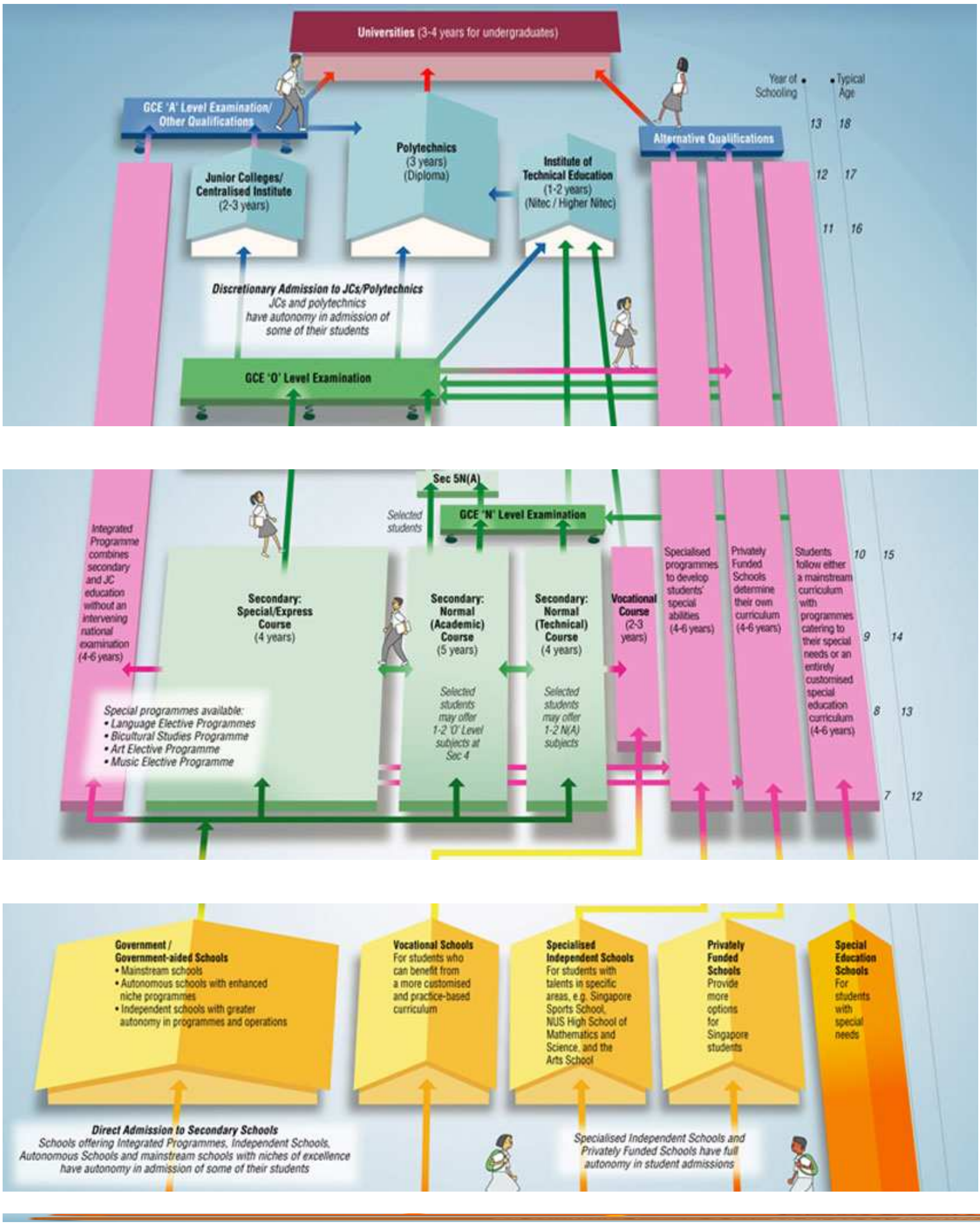
Our study on the instructional practices of teachers in the NT classrooms have given us insight into how mathematics instruction takes place. The main feature of the instructional practice is the dominance of teacher centered and teacher directed learning that was based on delivering factual or basic information about a particular topic in the classroom followed by doing worksheets which provided drill in the procedures to be used. Most of the observed talk was curriculum related and in the form of teacher monologue. A lot of regulatory talk was also observed and was usually directed at addressing issues of class management and maintaining order in the classroom. The teacher happened to be the sole source of authoritative knowledge and this teacher's version was accepted by the students as the truth. Not many opportunities were created in the NT classroom where the ideas presented by the teacher were discussed or questioned. The whiteboard was the most frequently used tool in the classroom and a lot of procedural problem solving was done on the whiteboard and then dutifully copied down by the students. As the teacher provided the worked out solutions on the whiteboard, in most cases the students did not attempt to actually solve any of the problems, but waited for the teacher to put up the answers on the whiteboard and copied them down in their notebooks. Both the students and teachers were comfortable with this routine and this was observed for the entire duration of the study. Student responses in the NT classroom were typically in the form of short written or oral answers which limits exploration or extended discussion of solutions obtained.

Implications

In the NT classrooms, it has been observed that the teachers emphasized on basic skills and imparting procedural knowledge rather than concepts and application. As pointed out by Johnson (1998), the teacher of at risk students must be well prepared and eager to apply the best instructional practices and processes. A professional development program for teachers needs to be put in place which will equip them to expand their pedagogical repertoire to meet the needs of at risk students. This development program should also help teachers address class management issues. As pointed out by Fuchs, Fuchs and Bishop (1992), increasing teachers' skills in managing difficult behavior may increase to capacity of the teachers to adapt their instruction to the needs of at risk classrooms, which in turn will result in better student achievement.

Meaning oriented instruction should be the focus of at risk classrooms for students to see the relevance of mathematics in their real life .Teachers should make a conscious effort in crafting activities and tasks which will help the students appreciate and enjoy what they learn in school and see the relevance of .these lessons in their daily lives. For example, Vatter (1992) proposed setting up of individualized projects for at-risk students with hands on learning experiences which are tied in with the real world. Students who are exposed to teaching which emphasizes on understanding are likely to grasp concepts which require higher order thinking.

Appendix 1: The Singapore Education Landscape (Ministry of Education, Singapore, 2006)



Appendix 2

Singapore Coding Scheme

FRAMING	hour	min
Time Begin:		
Phys Arrange:		
Class Size:		
Topic(s):		
Lesson Number:		
Date:		
Sequence of Activities:		

Phase:	
Taped Grp Interaction:	

Proportion Engaged:	

Talk:	
Percentage Talk:	
Organisational:	
Regulatory:	
Test Strategy:	
Curriculum-related:	
Informal Talk with Teacher:	

	hour	min
Time End:		

KNOWLEDGE CLASSIFICATION		
Source of Authoritative Knowledge:		
Stated Teacher Rationale for Phase:		

Teacher's & Student's Tools:		Other
Teacher's Tool:		
Student's Tool:		
Student's Produced Work:		
Materials:		

Depth of Knowledge:	
Factual/Rote/Basic:	
Procedural/ How to:	
Conditional/ When to:	
Advanced Concepts:	

Knowledge Criticism:	
Truth:	
Comparison:	
Knowledge Critique:	

Knowledge Manipulation by Students:	
Reproduction:	
Interpretation:	
Application/Prob Solving:	
Generation of Knowledge New to Students:	

TASK FRAMING		Other
Type of Task		
Explicit performance criteria		

Scaffolding	
Content Scaffold	
Procedural Scaffold	
Strategic Scaffold	

OPTIONAL ADDENDA	
Notes:	

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