THE CHANGING ASSESSMENT SCENE IN SINGAPORE

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Abstract: The present assessment system in Singapore schools was built to deliver an efficiency-driven education system. The students were required to study and take tests and examinations, especially paper and pencil type concentrated mainly on the cognitive characteristics. This type of an assessment system has served Singapore well in that the students have exhibited enviable content mastery. Singapore's education reforms now give priority to an ability driven system with new curricular designed to promote critical and creative thinking and the extended use if IT. The universities are also changing procedures for student selection. The expanded views of abilities and skills following developments in cognition and metacognition and multiple intelligences suggest that assessments should be more broad-based, relevant to real life situations, be both process- and product-oriented to provide a more varied and rich portrayal of students' learning. Alternative assessments in the form of performance assessment, assignments, presentations, project work, portfolios, open-book and resource-based tests are to be introduced in Singapore schools to allow for a greater range of skills like critical and creative thinking, problem solving, teamwork, collaborative and cooperative work and effective communication to be demonstrated. Future assessments may reflect more real-life situations, requiring students to solve problems, think critically and creatively, and make decisions more skillfully. This paper will examine the rationale for change, what changes are being proposed and issues involved in changing deeply entrenched assessment system.

Introduction

Education is a vital component of nation-building in Singapore; this is understandable given that Singapore has few natural resources. The aim of education in Singapore is to nurture talent and develop each and every individual to the fullest of his/her potential. The education system is a centralised one and all the schools in Singapore follow a common curriculum and all the students sit for high-stakes examinations after 6, 10 and 12 years of schooling. Education is seen instrumentally as an important investment for the future and like other countries, Singapore is reforming its education system to ensure economic competitiveness. Presently the emphasis in the curriculum has shifted to developing critical and creative thinking skills and applying knowledge in innovative ways; encouraging students to acquire and use information technology (IT) skills so that they will learn in an IT-enriched environment; and incorporating National Education (NE), a citizenship education programme to develop in students a sense of belonging and commitment to Singapore, thinking global but remaining local.

The Singapore Education System

The Singapore Education System is structured to ensure that every child in Singapore undergoes at least ten years of general education. This comprises six years of primary education and four years of secondary education. At the post-secondary level, students can enroll for a three-year technical-vocational education in Institutes of Technical Education (ITE), Polytechnics or pre-university education in centralised institutes or a two-year pre-university education in junior colleges (JCs) before furthering their tertiary education at the universities or joining the workforce.

Primary Education

At the primary level, students undergo a four-year foundation stage in education from Primary One to Primary Four and a two-year orientation stage in education from Primary Five to Primary Six. The emphasis at the foundation stage in education is on basic literacy and numeracy skills. Eighty percent of curriculum time is provided to give students a working knowledge of the English Language and a good grounding in mother tongue and Mathematics. Students at this stage also take subjects like Music, Art and Craft, Health Education and participate in Physical Education and Extra-Curricular Activities. In addition, Moral Education is taught to ensure that students have a clear understanding of core Asian values, intended to promote a sense of national identity. The school keeps track of individual student's performance at Primary One and Two and there is a school-based preliminary assessment at Primary Three. Parents are kept informed of their children's performance for the various subjects along the way and are advised on possible educational paths for them. To better prepare students for subsequent educational paths, students are streamed according to their abilities, interests and orientation at the end of Primary Four. The schools assess students' performance in English, the mother tongue (Chinese/Malay/Tamil) and Mathematics using tests supplied by the Ministry of Education (MOE). The MOE maintains an item bank where items are calibrated to ensure comparability of standards across schools. All the students then move on to the next stage of primary education in one of three language streams, offering different combinations of English and the mother tongue in the school. Parents are advised on the appropriate stream for their children. They have the final say as to the respective stream they want their children to be placed in Primary Five.

Following the streaming examination, students join one of three main language streams (EM1/EM2/EM3) according to their abilities. The first stream is for the academically able and linguistically talented students who take both English and the mother tongue (second language) at a higher level (Higher Chinese/Higher Malay/Higher Tamil). The majority of the students and this is about 72% (plus or minus 1%) of each cohort (figures taken from statistics, over the years) take English but with the mother tongue (Chinese/Malay/Tamil) at a second language level. The less able students also take English but with the mother tongue at the basic level (Basic Chinese/Basic Malay/Basic Tamil). This group normally constitutes less than 10% of each cohort. This stream is to enable students to focus their attention on the learning of English and Mathematics. A fourth stream involving the learning of mother tongue at the higher level (Higher Chinese/Higher Malay/Higher Tamil) and English at the basic level (Basic English) is also available (ME3), should there be a demand for it but very few students opt for this combination. The students follow a common curriculum for English and Mathematics at this stage but curriculum time for these two subjects may vary depending on the needs of the different ability groups. The orientation stage allows for further assessment of students' abilities, interests and aptitudes and facilitates lateral transfers between the language streams, where necessary. As schools monitor students' performance progressively, those showing superior performance in any of the so-called lower language streams can be recommended by their teachers to be laterally transferred to their preferred stream. At the end of Primary Six, all the students sit for a national placement examination called the Primary School Leaving Examination (PSLE) before proceeding to secondary education.

Secondary Education

Based upon the results of the PLSE, students are promoted to the secondary level. Here, following the structure at primary level, students have the choice of three courses designed to match their learning pace, abilities and inclinations. Students undergo four to five years of secondary education with different curricular emphases. The majority of the students and this is about 61% of the cohort,

undergo the four-year Special and Express courses while the rest enter the four or five year Normal course. Within the Normal course, students have the option of taking the Normal (Academic) (about 23% of the cohort) or the Normal (Technical) course, both of which lead to the Singapore-Cambridge General Certificate of Education "Normal" (GCE "N") level examination at the end of four years. Those students who are competent go on to take the Singapore-Cambridge General Certificate of Education "Ordinary" (GCE "O") level examination at the end of the fifth year. The Special course provides students with the opportunity to study English and the mother tongue at the higher level (Higher Chinese/Higher Malay/Higher Tamil). At the end of Secondary Four they sit for the GCE "O" level examination. The Express course also prepares students for the GCE "O" level examination but students here do not take mother tongue at the higher level. The curriculum for the Special, Express and Normal (Academic) courses includes English and English Literature, the mother tongue, Mathematics, General Science, History, Geography, Art and Crafts, Design and Technology, Home Economics, Moral Education and Music. At the Secondary Three level students can opt for elective subjects of their choice apart from the core subjects. The electives depend upon whether they are in the Arts, Science, Commerce or Technical streams. Students do at least one Humanities subject if they are in the Science stream and a Science subject if they are in the Arts stream. Students in the Normal (Technical) stream have the choice of Technical studies, Computer Technology and Basic Science.

Post-Secondary Education

Students on completion of secondary education can enter a junior college for a two-year pre-university course or a centralised pre-university institute for a three-year pre-university course. Admission to pre-university education is based upon a points system computed from their GCE "O" level aggregate results. Here they can opt for any of the three streams: Arts, Science or Commerce. They can also continue their studies at the Polytechnics or the Institutes of Technical Education. At the end of the pre-university course, students take the Singapore-Cambridge General Certificate of Education "Advanced" (GCE "A") level examination, the results of which will determine their eligibility for tertiary education. Graduates from the Polytechnics can also further their education at the tertiary level. Graduates from the ITEs can join the Polytechnics or join the workforce. The curriculum for pre-university education consists of the General Paper and a maximum of four GCE "A" level subjects besides the mother tongue. Subjects offered in the Arts stream include Literature in English, Economics, History, Geography, Mathematics, Art and Music. Subjects in the Science stream include Physics, Biology, Chemistry, Physical Science, Mathematics, Further Mathematics, Economics and Computer Science. Subjects in the Commerce stream include Principles of Accounting, Management of Business, Economics and Mathematics.

Tertiary Education

Tertiary education is provided by the two universities of Singapore: National University of Singapore (NUS) and Nanyang Technological University (NTU); while the National Institute of Education (NIE), an institute of the Nanyang Technological University provide professional training for teachers. The NUS offers degree courses in Arts and Social Sciences, Architecture, Building and Estate Management, Business Administration, Law, Science, Engineering, Medicine and Dentistry. Postgraduate studies are offered in all the eight faculties and there are four postgraduate schools, namely the Schools of Medicine, Dental, Management Studies and Engineering. The NTU offers degree courses in Accountancy, Business, Computer Engineering, Engineering and Communication Studies. At the postgraduate level, facilities exist for students to pursue higher degrees by research or coursework and dissertation. The NIE offers four-year degree programmes which lead to the award of the degree of Bachelor of Arts with Diploma in

Education/Physical Education or Bachelor of Science with Diploma in Education/Physical Education. NIE also offers non-degree programmes which lead to the award of Diploma in Education/Physical Education and programmes for university graduates which lead to a Postgraduate Diploma in Education/Physical Education. In addition postgraduate degree programmes are also available for students to pursue higher degrees at the Masters and PhD levels.

The Assessment System

The assessment system is well-established throughout the education system. Students' performance at each level of the school year is closely monitored. In a typical year, students sit for several continuous assessments (CAs), during the semester and semestral assessments (SAs), at the end of the semester. The CAs are meant for formative evaluation of progress during the course of instruction while the SAs are meant for summative evaluation of students' abilities at the end of the semester. Many of the CAs are criterion-referenced type of tests including diagnostic tests, used primarily to diagnose student difficulties and also ascertaining mastery of material covered with the purpose of helping them overcome their respective difficulties with remedial intervention as well as planning for enrichment exercises. The SAs are mainly norm-referenced type of tests used primarily to ascertain mastery at the end of a semester with the purpose of recommending promotion to the next level of instruction. At the end of four years of primary education, students meet the streaming examination which is school-based. This examination is again of the norm-referenced type used primarily for making high-stakes decisions on placement in the different streams. The items are chosen on the basis of high discrimination for this summative function. Based upon the students' cumulative academic record, the tests and examination results and the school's assessment of their performance, the Principal will recommend to parents the language stream appropriate for the students in Primary Five. It should be emphasised here that the decision at this stage is based on multiple assessment results and using multiple criteria from the manifold areas that the students are given opportunities to demonstrate their abilities to the full. Parents have the final say as to which of the streams they wish their children to be placed. Besides, lateral transfers are also allowed, depending on the merits of the cases.

At the end of six years of education, all students meet the first national examination, the Primary School Leaving Examination (PSLE). The PSLE is a standardised norm-referenced examination, taken at the end of the sixth grade. The PSLE comprises four norm-referenced tests, one for the English, one for mother tongue (second language), one for mathematics and one for science. The items in the PSLE are well-calibrated and drawn from a large pool of items in the item bank kept in the Ministry of Education. Those students who are in the EM1 and EM2 streams will take all the four subjects in the PSLE: English, mother tongue (Chinese/Malay/Tamil), mathematics and science. Those in the EM1 stream may take additional mother tongue paper at a higher level (Higher Chinese/Higher Malay/Higher Tamil). Students in the EM3 stream take only English, Basic Chinese/Basic Malay/Basic Tamil, and Mathematics. Those in ME3 stream take Higher Chinese/Higher Malay/Higher Tamil, Basic English and Mathematics (in mother tongue). The PSLE assesses the students' suitability for secondary education and place them in an appropriate secondary course: Special, Express or Normal. This is another high-stakes decision based on a well-standardised examination where content-related and criterion-related validity research have been continuously done to ascertain its quality. The reliability of the examination is also generally very high in terms of internal consistency, producing results of high credibility. The results were reported in terms of T-scores for each of the four subjects and an aggregate T-score for the whole examination. Continuous research has been done to equate the examinations over the years.

At the end of four years of secondary school, they meet the second national examination, the Singapore-Cambridge General Certificate of Education 'Ordinary' (GCE "O") level examination. This examination is jointly developed by the Singapore authorities together with Cambridge Examination Syndicate personnel. The curriculum for this four years study period is also developed jointly. Again this examination is of the norm-referenced type used primarily for selection and placement in post-secondary education – another high-stakes decision. Based upon the results of this exam, students can join the junior colleges or centralised institutes for pre-university education or the polytechnics or the institutes of technical education. At the end of two years of junior college education or three years of education in centralised institutes, they meet the third national examination, the Singapore-Cambridge General Certificate of Education "Advanced" (GCE "A") level examination. This examination is also of the norm-referenced type, jointly developed. Based upon the results of this exam, students will join tertiary education at the universities, where they will graduate with degrees in their chosen fields of study, after three, four or more years of study depending on the different requirements of the different faculties.

Some people may argue and even complain that students in Singapore are subjected to too many examinations. Actually it is not a case of too many or too little but a case of whether we regard assessment is an integral part of the instructional process. Assessment, we would argue is quite indispensable in teaching and learning. How else can we know whether or not our students have learned if not by using assessments in one way or the other. How else can we know to what extent we have been successful to bring our students to the next level of instruction if we do not have assessments to show us that the students have already achieved all the objectives before. How else can instruction proceed, if we do not use assessments to show the way that we are going and that we have arrived. Assessments are necessary in the instructional process and should be considered as such, not an accessory or an appendage but a vital organ to the education body, without which the body cannot function effectively and efficiently. Worst still, some people consider it as an after-thought. It should be an initial undertaking together with the planning of instruction, not in the middle nor the ending of the instructional process. It should also need not be threatening but helping if used correctly and appropriately. The question should be have we adequately and appropriately designed our assessments for the purpose that they are to be used. After all tests and examinations are instruments that one use to get indicators of peoples' abilities. Peoples' abilities are manifold, they have multiple intelligences and hence we should have multiple assessments to tap on the various indicators of their multiple abilities to help people to describe themselves more fully and adequately, so that they could be guided more pointedly to find a vocation more suitable to what is it they are able to do to the best of their abilities and find satisfaction in life for themselves. That is what Education is all about. The case for assessments is not more or less but what is necessary to produce the best results.

Over the years, it has been observed that students were doing well academically, getting more and more distinctions (As) in the last two national examinations. It was also observed that the students are becoming more and more exam-smart and very good at reproducing and regurgitating facts and figures and satisfying the requirements of the examination questions. Hence something has to be done in the assessment scene if any country and people would want to keep up to the demands of producing knowledge workers in the coming millennium.

The Need For Change

Singapore's policy makers and prominent educators have called for changes in both education and assessment. The former Education Minister, Mr Lee Yock Suan, in a conference on managing human resources in the twenty first Century (The Straits Times, 1 July, 1995) stated that the

Education System will move away gradually from the current emphasis on mastery of content to one that will give students more opportunities to acquire thinking and learning skills. He said that the shift towards thinking and learning skills will prepare students for the world of intense global competition and rapid chances in technology. He added that students have to learn to think independently and solve unexpected problems to survive and prosper in the years ahead, when knowledge and skills will become obsolete faster than before. Continuing this call, the Deputy Prime Minister, Mr Lee Hsien Loong when speaking to students at the opening of the Creative Arts Programme Seminar (The Straits Times, 29 May, 1996) for secondary and junior college students, reiterated that Singapore needs to relook at how its students are being assessed academically and improve the system to encourage creativity, innovation and independent thinking and learning. Pointing to the trend that more and more students are scoring distinctions in GCE "O" and "A" level examinations, he mentioned that present students need to go beyond being exam-smart and that the education system must encourage students to be creative, innovative and being able to solve problems. Interviewed by Insight (The Straits Times, 6 July, 1996), the Director of National Institute of Education (NIE), Prof. Leo Tan mentioned that change will be gradual; teachers will become facilitators and motivators of learning, managing learning, organising activities and creating opportunities for students to grapple with objects and ideas. Students would not be spoon-fed, but would be empowered to be responsible for their own learning. He suggested that assessment need not be confined to just paper and pencil-type only; project work, assignments, open-book examinations and other forms of assessment could be employed to test the thinking ability of students and other higher-order skills. At the Teachers' Day Rally (The Straits Times, 9 Sep 1996), the Prime Minister spoke about National Education and its ideals of equipping the young for the future, emphasising a shared sense of nationhood and how the past is relevant to the present and future. Amongst other things, the curriculum needs to be changed to be in line with present and future demands. In 1997 the present Minister of Education, Mr Teo Chee Hean (The Straits Times, 27 Feb 1997), stated that creative thinking is Singapore's target and students will need to be trained to think critically and creatively to solve problems instead of merely acquiring knowledge. There is a need to address how to achieve a good balance between content knowledge and creative thinking skills in the curriculum. In June 1997, the Prime Minister speaking during the 7th International Thinking Conference mooted the idea of 'Thinking Schools and Learning Nation' (TSLN), paving the way for changes in education to meet the challenges of the coming millennium.

The policy-makers in Singapore have set the policy directions. There is a need to review, reflect upon and think of ways and means of how we can teach and assess our students better so as to promote thinking and learning skills. Present assessment practices will promote superficial learning or learning at the surface level only. To encourage deep-level learning and understanding, higher-order thinking and application of learning to real life situations, some changes to the current assessment practices may have to be made. Unfortunately, the accountability movement has built up considerable momentum for conventional forms of assessment, relying on written tests and examinations mainly, leading to the reproduction and regurgitation of materials learned at the surface level (Archbald & Newmann, 1988; Wolf, Bixby, Glen & Gadner, 1991; Biggs, 1993). Educators will recognise that the assessment of real accomplishments and its implications for the curriculum, teaching and learning situation, school environment; will involve fundamental shifts in the way we think about education.

Anticipated Changes

The present assessment structure was built to deliver an efficient-driven education system. The students need to study and take tests and examinations, especially paper and pencil type concentrated mainly of the cognitive characteristics. Singapore to a certain extent has achieved and

may even surpassed that. But to prepare the young now for the ability-driven type of education, things may have to change. The policy makers have already provided the impetus for change. Added to the problems, Singapore came up tops in the Third International Mathematics and Science Study (TIMSS) when achievements of students were compared over 40 countries (Beaton, Martin, Mullis, Gonzalez, Smith & Kelly, 1996). Many people ask whether there is a need to change in the light of this measured "success". However, others argue that this is not a case of whether there is a need or not but more a case of when, because the whole world is changing and aware that present approaches may not catch up with the momentum of ever-increasing demands. Then should Singapore throw away the 'baby and the bath water'? It already has a good assessment system. Should it be completely replaced? Perhaps, some good alternative assessment procedures can be added to complement and supplement existing ones and gradually evolve multiple assessments. This may make for better decision-making about individuals to better prepare them for the challenges ahead.

Paper-and-pencil tests and exams normally tap on a limited number of cognitive skills. The expanded views of abilities and skills following developments in cognition and metacognition and multiple intelligences, suggest that assessments should be more broad-based, relevant to real life situations, be both process- and product-oriented to provide a more varied and rich portrayal of students' learning. Alternative assessments in the form of performance assessment, assignments, presentations, project work, portfolios, open-book and resource-based tests will be introduced to allow for a greater range of skills like critical and creative thinking skills, problem solving, teamwork, collaborative and cooperative work and effective communication to be demonstrated. This does not mean the more the merrier, but those few that schools will pick based upon their understanding of their students' abilities and the applicability in their own situations. At the same time the quality of these multiple assessments need to be taken into consideration to ensure validity and reliability of the results.

Recently a committee on university admission system was set up and it proposed that the criteria for selecting candidates for admission to local universities should go beyond the current reliance on the GCE 'A' level examination which measure cognitive abilities mainly. It recommended that the universities adopt a more holistic evaluation of a person's potential to fully benefit from university education. In addition, the use of Scholastic Assessment Test (SAT 1) for measuring reasoning abilities and project work which can inculcate and measure curiosity, creativity and enterprise and Extra-Curricular Activities (ECA) which include participation in sporting and artistic arenas, community service should be included as entry requirements of the local universities. This move should be lauded on the basis that people now realizes that high-stakes decisions based on only one examination result may not fully give sufficient indications of a person's manifold abilities. But from newspaper reports, the local public expressed apprehension on the use of a foreign test (SAT 1) for local use. They fear that there may be linguistic, social and cultural biases that may not be taken into consideration by foreign instruments. There is a provision in the committee's report though, that eventually a Singapore version of a reasoning test styled along the SAT 1 will evolve. This will be more welcome and appropriate and palatable, after all a test that is designed for a certain purpose for a certain locality may and may not be that appropriate for other purposes and other locality. Using multiple assessments in this case is in line with developments in theories on cognition and meta-cognition and multiple intelligences (eg. Vygotsky, 1978; Gardner, 1983). Any single criterion has its limitations and may not give a true picture of a person's manifold abilities and capabilities. Multiple criteria have the advantage of providing a more complete picture of an individual. Any test is an instrument to collect some information about some characteristics of a person and not all characteristics of a person can be demonstrated in a single test. Multiple assessments should be the preferred mode of collecting data, hopefully giving a fuller description of the individual. But the assessments must be of a certain quality to give valid and reliable results that

important high-stakes decisions about certain individuals can be more justifiably made. Inclusion of project work is another contentious issue. While project work is a good area to explore in terms of performance assessment where certain skills beyond paper-and-pencil could be measured, issues in terms of reliability of the results from such assessments may pose problems. The public must be convinced that reliable results are produced before they can be used for such high-stakes decisions. Establishing reliability from performance assessments has always been difficult. However, if it can be shown that several other skills are measured by project work not measured by conventional means then, results from project work should be incorporated to give a pretoria of information about an individual's manifold abilities. Establishing higher reliability in such measures can be done on a continuous basis to constantly improve upon their use and interpretations. ECA also fall into this category and unless reliable results can be ascertained then their use will be that useful. Multiple assessments is the preferred mode, but their use should not be at the expense of sacrificing quality. Quality in assessments must be maintained at all times, at least in terms of validity and reliability of the results.

People in Singapore and elsewhere, are beginning to realize that past assessment approaches concentrated mainly on assessing cognitive abilities in contrived situations. Future assessments may reflect more real-life situations, requiring students to solve problems, think critically and creatively, and make decisions more skillfully. In line with current constructivists' views about cognition and metacognition, and developments in theories of multiple intelligences, other frames of reference need to be looked into. The 'Dimensions of Learning' (Marzano, Brandt, Hughes, Jones, Presseisan, Rankin, & Suhor, 1988; Marzano, Pickering, & McTighe, 1993) reference seems a well-organized and practical place to start. Adaptations to the Singapore situation rather than new adoptions will likely be the approach. Singapore has the advantage to observe what has worked and what has not on a worldwide basis. It will decide on what should be the best strategy to adapt in the local context to ensure success.

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