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**Assessment for Higher-Order Thinking Skills and Implications:
Meeting the Challenges of the Coming Millennium**

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Abstract:

Present assessment practices may 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. These are really not radical changes but have been practised before. 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. However, experienced educators will recognise that the assessment of real accomplishments and its implications for the curriculum, teaching and learning situation, school environment; may involve fundamental shifts in the way we think about education. This may be the 'quantum leap' that is spoken of by the local politicians. Hence to revert and enrich the practice and incorporate some of these changes may not be easy.

To change only the assessments without the accompanying changes in curriculum, teaching and learning and the school environment, would not be that effective. But hopefully, a start could be made, since there is a call now for different approaches to learning and assessing higher-order thinking skills. Assessment should take into consideration the production of knowledge, encouraging in-depth understanding with implications for curriculum review, the teaching and learning situation and the educational environment where the instructional process takes place.

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Assessment for Higher-Order Thinking Skills and Implications: Meeting the Challenges of the Coming Millennium.

1. INTRODUCTION

The former Education Minister, Mr Lee Yock Suan, in a conference on managing human resources in the 21st Century (The Straits Times, 1 July, 1995) mentioned that the Education System will move gradually away 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 changes 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. But students should also possess the basic knowledge. 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 will not be spoon-fed, but would be empowered to be responsible for their own learning. Assessment need not be confined to just paper and pencil-type only, project work, assignments, open-book examinations and other forms of assessment can 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. Very recently, the present Minister of Education, Mr Teo Chee Hean (The Straits Times, 27 Feb 1997), mentioned 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.

The policy-makers have set the trend towards change and development. We should review, reflect and think of ways and means of how we could teach and assess our students better so as to promote thinking and learning skills. Fundamentally, it is how one views achievement and what criteria can we use to assess these forms of achievements to meet the challenges of the fast-changing world.

2. TOWARDS ASSESSING MORE AUTHENTIC ACHIEVEMENTS

Students, teachers/lecturers and schools/colleges are increasingly pressured to demonstrate their achievement for accountability purposes. Students are ranked and compared to peers and others in terms of their achievement. Teachers and lecturers are appraised in comparison with peers according to students' achievement and evaluation of their teaching. Schools including institutions of higher learning, are ranked in terms of their students' achievement. What is this thing called 'achievement' that everyone is referring to? Recent developments have pointed to an emphasis on teaching for understanding more sophisticated academic content and higher-order thinking. Current

indicators of achievement such as grades (given in schools and higher institutions), scores on assessments, national and international examinations; are criticised not only for neglecting to assess such qualities but also for failure to provide specific information of what students actually know and can do. What kinds of achievement should be promoted and how should they be assessed?

The concern here seems to be not with the technical problems of designing assessments that measure validly and reliably of what has been taught. This has been taken care of quite adequately by advances in Psychometrics using classical as well as modern test theory. Instead we should consider the more fundamental question of what general forms of achievement ought to be promoted and how to assess them. What counts for success currently is often considered trivial and contrived. Students are mostly good at regurgitating and reproducing facts and figures. This can depress students' engagement in learning, undermine teachers' commitment to work and lower public support for education. In contrast, the cultivation and documentation of more 'authentic' achievements can invigorate the instructional process of teaching and learning and enthuse and motivate public support. Ultimately, the quality of assessments rests upon the extent to which the outcomes measured represent appropriate, meaningful and worthwhile forms of human endeavours and accomplishments.

3. WHAT ACHIEVEMENTS?

To get a better idea of the more authentic achievements, let us look into the accomplishments of successful adults and professionals -- scientists, musicians, novelists, doctors, engineers, lawyers, architects, athletes and the like. Clarifying the characteristics of their work will shed light on the more authentic achievements. Essentially, the more authentic achievements of established and accomplished personnel have at least the following attributes:

1. Production of Knowledge
2. Disciplined Inquiry
3. Value-added Qualities

3.1 Production of Knowledge

People in the diverse fields above, face the primary challenge of producing, rather than reproducing knowledge. They express this knowledge in the form of discourse and performances; i.e. through the production of original forms of thinking and conversation, through repairing and building of physical objects, through artistic, musical and athletic performances. We do not expect our students to attain levels of competence comparable to skilled adults and professionals like the above, but we certainly would want them to develop in that direction. To progress on this journey, students should set sights on more authentic expressions of knowledge and should hone their skills through guided practice in discourse, in experimenting with and manipulating objects and in preparing for artistic and musical performances. In contrast, the conventional curriculum demand students to identify the discourse and performances that others have produced. For example, recognising the difference between nouns and verbs, distinguishing between capitalism and socialism, matching authors with their works; labelling rocks and body parts; and verifying things that others have done; and etc, etc. Where are the originality and creativity that are the essence of the production of knowledge? How do we create the atmosphere for the production of knowledge to occur?

3.2 Disciplined Inquiry

A second feature of the more authentic achievements of successful personnel is its reliance on disciplined inquiry. This seems to consist of at least four attributes:

1. Use of Prior Knowledge
2. In-depth Understanding rather than Superficial Awareness
3. The Production of Knowledge in Integrated rather than Fragmented Form
4. A Commitment to Pursue Something to the End

3.2.1 Use of Prior Knowledge

For new knowledge to be significant and valid, it must be based on prior knowledge that has been accumulated through previous workers in the field who had established facts, vocabularies, concepts, theories and conventions for the conduct and expression of the inquiry itself. Re-inventing the wheel may not be a good idea and could be counter-productive, but building on and developing further on existing knowledge should be the stance to take. Reliance on prior knowledge does not, however, guarantee development and transfer. The ultimate aim of disciplined inquiry is to move beyond former knowledge, through constructive criticisms and development of new paradigms, new frontiers. Most of the work in school and tertiary institutions today, consists in transmitting prior knowledge to students and asking them to reproduce it, rather than helping them to use it to produce knowledge! Reproduction, regurgitation and replication alone will not produce new knowledge, but examination and re-examination of prior knowledge with a critical eye and with the objective of innovative development, will to a certain extent, open up new frontiers. How can we develop in the students, not only to receive and reproduce, but to receive, examine critically and then produce?

3.2.2 In-depth Understanding

Disciplined inquiry tries to develop in-depth understanding of a problem, rather than passing familiarity with or exposure to bits and pieces of information or knowledge at the surface or superficial level. Prior knowledge is mastered, therefore, not primarily to become literate about a broad survey of topics, but to facilitate complex understanding on relatively limited, special problems in greater depths. Such detailed understanding is particularly necessary for the production of new knowledge. In contrast, many of the cognitive tasks, at present, ask students to show only superficial awareness of a vast variety of topics. Teachers are often only interested in short correct answers which often manifest itself in several ways in the students' behaviour. To develop in-depth understanding, students should be given time to express themselves, even when answers are not exactly correct and teachers should guide the students in discourse, providing cues to stay on course and be relevant, guiding and nurturing. Superficial understanding through surface learning should be replaced with the more in-depth understanding through deep learning (Archbald & Newmann, 1988; Wolf, Bixby, Glen & Gardner, 1991; Biggs, 1993). How should assessment procedures change to assess in-depth understanding rather than understanding at the surface level only? How should assessments change to tap on the higher-order thinking skills?

3.2.3 Production of Knowledge in Integrated Form

To produce knowledge one must assemble and interpret information, formulate ideas and make critiques which cannot be easily retrieved from the existing knowledge base. All of these require the ability to organise, synthesise, evaluate and integrate (all higher-order thinking skills) information in new and meaningful ways. Success in such tasks is

unlikely, unless students learn to look for, to test and to create relationships among pieces of information or knowledge that otherwise appear unconnected and fragmented.

To understand scientific theories, literary and artistic masterpieces, architectural and mechanical designs; or philosophical arguments; they must ultimately be encountered as wholes, not parts or collections of knowledge fragments in bits and pieces. For example, teaching students only the separate roles of each dramatic character will not develop real understanding of a play. The characters must be studied in the context of the overall pattern of plot, literary technique, historical and philosophical positions. Similarly, a real understanding of a molecule or an atom should integrate the parts into broader conceptions of matter and energy and their importance and usefulness in the real world situation. (Archbald & Newmann, 1988). Too often tests of achievement ask the students to show recollection of unrelated knowledge fragments: like definition of terms, short descriptive identification of people, things, events or numerical solutions to problems. Students demonstrate proficiency by giving short responses as in class quizzes or worksheets, where answers bear little relation to one another. How can we ask students to create and integrate ideas, formulate hypotheses and develop tentative alternative solutions like in the real work situation? How can we encourage students to gather, collate, synthesise and interpret data to produce new knowledge?

3.2.4 Commitment to Prolonged Study

All of the above seems to be fine, but the students must demonstrate a certain amount of commitment to pursue certain things until the end. Disciplined inquiry should not stop short of accomplishing something new and substantial. It should lead to new things and uncover new frontiers of knowledge. Commitment can be cultivated and emulated. Teachers are role models in this aspect of disciplined inquiry, not easily giving up on something, but continue to pursue in something that one believes in. Too often, things are left undone or half-done because of certain constraints, the 'easily-give-up' approach should be replaced by the 'never-say-die' approach to achieve something substantial. Students should be encouraged to discover ways and means of pursuing further, exploring new ways and of finding alternatives to achieve new things. How can we help our students to cultivate this sense of commitment in the classroom situation? How can we develop exercises that require students to commit themselves in self-discovery and produce new knowledge?

The features and attributes of disciplined inquiry do not necessitate students make seminal contributions to academic disciplines, professions and the arts, although this will be ideal. The point is that students are capable of engaging in these forms of cognitive work when the work is adapted to their levels of development. And that real accomplishments will be enhanced, if the tasks on which they are evaluated, advance production of knowledge over reproduction and if the process of production approximates those attributes of disciplined inquiry. Assessment in Science, for example, could place more emphasis upon the development, execution and reporting of a single experiment over a period of time, rather than many experiments over short periods of time, where the product is emphasised more than the process. In studying literary work, one might aim towards students clarifying and defending their own views of alternative interpretations. In all these, students must demonstrate a sense of commitment to something meaningful that they are interested in to achieve more than they or others anticipated. There should be room for unanticipated outcomes as well as emergent outcomes to surface for new knowledge to be produced and developed.

3.3 Value-added Qualities

The final distinction between real accomplishments and traditional achievements in schools/colleges is that real accomplishments have esthetic, utilitarian and personal value apart from documenting the competence of the learner only. When people write news articles, poems; when they develop blueprints; when they create paintings or a piece of

music; they try to communicate ideas, to produce or to impact on others beyond the simple demonstration that they are competent. Achievements of this nature have added-value which is missing in tasks contrived only for the purpose of assessing superficial knowledge such as spelling quizzes, laboratory exercises or typical tests and examinations.

The exercises, tests and papers that students complete to earn grades usually have no use except as evidences of mastery for reporting to the students, parent and school authorities. Examples of activities that have value-added qualities would include scientific study of local ecological and environment issues; students' literary publications; students using knowledge to tutor others; students' survey of opinions on current issues; public performances involving music, arts and science exhibitions. Can we design assignments, projects and other assessment procedures to enable students to add value to their achievements in schools and other institutions of higher learning?

To summarise, real accomplishments require students to engage in disciplined inquiry to produce knowledge that has added value beyond simply displaying competence in schools/colleges. Mastery of this sort is unlikely to be demonstrated in familiar testing and grading exercises. Instead, it is more often expressed in the completion of long-term projects and assignments which result in discourse and performances of interest to students and their peers and the public at large. The mastery gained in this kind of achievement in schools is likely to transfer more readily to life beyond school, which increases the returns of our investments in schooling. These should invigorate the instructional process, teaching and learning and further enthuse and motivate public support (Archbald & Newmann, 1988; Biggs, 1992; Resnick & Resnick, 1992; Stiggins, Griswold & Wikelund, 1989; Wolf et al, 1991).

4. IMPLICATIONS FOR THE CURRICULUM

In the conventional approach to curriculum planning, educators tend to prescribe a broad range of knowledge, skills and values that they believe students need to function successfully as adults. These goals are translated into lists of subject matter to be covered and items to be tested, which represent pieces of knowledge from the main academic disciplines of History, Mathematics, Sciences and Literature. This tendency to design curriculum in the form of a comprehensive map of all the important subjects led to the 'coverage disease', steam-rolling through the syllabus. This could result in fragmentation in the students' intellectual work and sanctification of superficial exposure over critical understanding, reasoning and thinking.

In contrast, criteria for real accomplishments imply that ultimately curriculum goals be articulated not through lists of knowledge, understandings, abilities that we expect students to acquire, but instead should describe the kinds of discourse and performances that we expect students to demonstrate. This means that to be eligible for inclusion in the curriculum, traditional and proposed content must meet a new standard. It will no longer be sufficient to claim simply that recommended knowledge and skills will contribute to vocational success or personal fulfilment, in addition, it must be argued that the proposed curriculum content is necessary for the production of discourse and performances that define real accomplishments (Archbald & Newmann, 1988; Resnick & Resnick, 1992).

Will assessment-driven curriculum lead to trivialisation and fragmentation of learning, as has been the case with the previous applications of tests and examinations -- both local and international? The criteria for disciplined inquiry to produce knowledge of interest to students, peers and the public at large, offer strong protection against the prospect of teaching toward endless lists of superficial outcomes. Regardless of the subject taught, the criteria for real accomplishments have implications for the kind of human interaction

among teachers and students that seems required for students to produce knowledge of value. While curriculum cannot change overnight and sometimes the process of change takes a long time, it can be modified to incorporate the ingredients of real accomplishments. Curriculum reviewers should realise that the present curriculum could be loaded with too much material to be covered only at the superficial level. Reviewers should spend time to identify those elements that are the essentials, where knowledge can be build upon, connections could be made 'wholes' rather than fragments and themes to be delve into with greater depth. Curriculum should free the users from the bondage of having no time to explore except to complete, it should allow the teachers and students to exploit for maximum benefits.

5 IMPLICATIONS FOR TEACHING AND LEARNING

A critical factor to help students understand and learn in-depth is integration or coherence. This is the glue that holds the bits and pieces of information or ideas together and prevents them from being fragmented and randomised. Integration of knowledge helps students remember and understand and apply what they learn to real life situations. Much of the instruction that students received now is fragmented and incoherent and it does not make good sense. They may know the bits and pieces of what they learn, like the earth rotates about its axis, but they often are unable to access and use that knowledge to relate the earth's rotation to the positions of the sun and interpretations of night and day. If information is not integrated then it does not make sense and students cannot remember or use it meaningfully.

The notion of integration centres around the need to teach key ideas or themes. These themes serve as the anchors upon which students can connect the various bits and pieces of knowledge, ideas, concepts and skills which are required for meaningful learning to take place and new knowledge to take root. Themes allow for a richer set of connections in the student's mind than less central or fragments of information. For example, the theme 'cycles' addresses many important ideas in Science, History, Geography and many other subjects: the digestive cycle, the human development cycle, the water cycle, the carbon cycle etc. Each of these cycles involves change and repetition. Teaching these themes will expose the students to analyse what changes occur in the cycle, what physical or psychological elements contribute to the cycles and what kinds of cycles could develop from their prior knowledge and experiences.

Revolutionary new findings in brain research support what scientists and learning theorists have suspected for some time: the more connections one can make in relation to a topic, the more likely one is to remember and use that knowledge. This means that schooling should be structured to allow for and encourage multiple connections of important ideas to grow -- integration within areas of a subject as well as integration across subjects (like the example above). This involves designing curricular, textbooks, instruction, tests and assessments in ways that help students to see how new information connects to what they already know, to their lives outside school and to what they have learned previously in that subject as well as in other subjects.

To expand the number of connections students make, they should be given a variety of ways to learn like talking (involving in meaningful conversation), making presentations, debating, acting, building models, discussing connections to other topics and subjects, writing stories and reports. The more senses that are activated in learning, the greater the number of connections between existing knowledge and new knowledge. Simply exposing students to information will not cause them to understand or use that information. Instead, students must be provided with the experiences which allow them to learn at a much deeper level than is typically provided by the curricular and textbooks and workbooks. Learning at a deep level requires that more time be devoted to important topics and that the students be given opportunities to learn these topics in a variety of ways. This could mean fewer topics but discussed more in-depth.

Students are more likely to access and use what they have learned if they are aware of what they know and what they do not know. Writing or talking about something brings thoughts to a conscious level and allows them to become objects of reflection. Because most misconceptions are tacit, speaking and writing provide ways to bring to light and control or correct them. Another important characteristic is transferability, that is the students must be able to use their abilities in a variety of ways and situations. If a student can add and subtract in class but when they purchase something in the market and do not know the change required, then the skill is of no use. It is important that teachers, texts and assessments emphasise applying or transferring newly learned knowledge to a variety of situations. Teachers need to be more creative to encourage these kinds of skills to surface.

There must be a lot of discourse during teaching and plenty of opportunities for interaction and conversation to promote meaningful and active learning. A major prerequisite is the creation of a non-threatening atmosphere for such conversation and learning to take place. A major implication is the need for substantive conversation in instruction.

5.1 Substantive Conversation

Substantive conversation is different from conventional talk which usually has only two purposes in speaking to students. Apart from dealing with disciplinary issues, the teacher either wants to transmit an item of declarative knowledge, usually a definition or fact or to determine whether the student can reproduce it. The student's goal is to give the answer that the teacher is looking for. The teacher maintains control, in the sense of knowing, prior to the conversation, what pieces of knowledge will be communicated and what answers will count as adequate. This is not conversation, it is the old often repeated refrain that students are being subjected to for too long. The same monologue, not even a meaningful dialogue, that wittingly or unwittingly, is pushed down students' throats. The atmosphere is one that is quite threatening, where the student is quite powerless to make any defence of what is said or transpired (Archbald & Newmann, 1988).

In substantive conversation, the purpose for talking is quite different. Each person is trying; to express his/her point of view, often in order to persuade the other; to understand how and why the other holds a particular viewpoint or interpretation; or to arrive at a solution to a problem that neither has previously solved. In pursuing any of these ends, the teacher uses talk to integrate subject matter into the student's meaning system, and the student tries to understand how the teacher's messages might empower him/her in the world. In this sense, each is interested in what the other has to say, the course of the conversation is less predictable and each participant has some sense of ownership. To fulfill these purposes, substantive conversation requires sustained, continuous talk between two or more people. In school, the two key participants are usually student and teacher, but students can also learn through conversations with peers, other adults, well-programmed computers or use of INTERNET. Teacher-student conversation should remain central but to expand students' opportunities for expression and feedback, it will be necessary to rely substantially upon and to support these other resources as well. Substantive conversation provides the crucible for practice, for seeking new knowledge. Substantive conversation forces one to transform declarative knowledge into applied, integrated knowledge. The teacher's role of dispensing knowledge becomes one of facilitating and encouraging students to explore and integrate ideas in the production and development of new knowledge (Archbald & Newmann, 1988; Wiggins, G. 1992). Can this be done effectively in large class sizes?

6. IMPLICATIONS FOR EDUCATIONAL ENVIRONMENT

There are at least four working conditions essential for real accomplishments to occur:

1. Collaboration
2. Access to Tools and Resources
3. Learner Empowerment
4. Flexible Use of Time

6.1 Collaboration

Achievements outside school/college often depend upon the opportunity to ask questions of, to receive feedback from, and to count on others for help from peers as well as from authorities. In contrast, typical activities in schools/colleges require students to work alone. Working together is often prohibited because it is seen as a form of cheating. It is important, of course, for students to learn to work on their own rather than become overly dependent on others. But the opportunities to cooperate and building teamwork are consistently denied, this violates a critical process that adults, both experts and novices consistently rely upon for success.

Useful collaboration depends to a great extent on opportunities for substantive conversation, which itself requires special structural conditions. More time will be needed for teachers to talk and write in sustained ways with the individual students and for students to talk to each other. Substantive conversation also entails major shifts in the role of teachers and students. Teachers will function more as mentors and facilitators, less as depositories of static knowledge to be reproduced. Students will function more as constructors and producers of knowledge who rely on teachers and peers for help, less as absorbers or consumers of everything the teacher says. Can we create more conducive environments in the classrooms and around the schools/colleges, for more collaboration and interaction to take place? The cultivation of more fertile ground for new knowledge and new ideas to sprout, new and multiple connections to take root.

6.2 Access to Tools and Resources

When competent people complete significant accomplishments; from books to architectural designs, musical compositions; they usually depend upon efficient access to a variety of print materials and machines such as telephones, fax machines, computers and other laboratory equipment. The information required is too vast and changing to commit to memory or depending on only a single source. Possession of prior knowledge is essential to disciplined inquiry, but it is impossible to teach students all the relevant information needed to complete real tasks. The challenge is to teach students to learn how to use tools and resources to find appropriate missing knowledge. The schools/colleges here are well-equipped compared to others around the region, can we exploit these available resources to maximum advantage?

6.3 Learner Empowerment

Rather than always toiling under predetermined routines arbitrarily dictated by authorities, the active learner needs to influence the conception, execution and evaluation of the work itself. At the minimum, this entails flexibility over the pace and procedures of learning, opportunities for students to ask questions and to study topics they consider important. Students constructing and producing knowledge in the language they understand best. There are, of course, important limits on the extent to which students should control the learning of academic subjects. Certain facts, definitions, concepts, algorithms and process of verification must be assimilated according to standards and conventions established in the field of knowledge taught. But for this kind of learning to be translated into real products, students must enjoy some autonomy and discretion in its application. Empowering the learner and letting the learner to, in part, be responsible for his/her own learning and assessment are part and parcel of real accomplishments. The

participant-active-learner is often more motivated than the non-participant-passive-learner. Within limits, can our students be encouraged or empowered, to at least, become more responsible as well as responsive to their own learning?

6.4 Flexible Use of Time

The significant achievements of disciplined inquiry often cannot be produced within rigidly specified time periods. Adults, working to solve complicated problems; like to compose effective discourse or to design new products, rarely are forced to work within the rigid time constraints imposed on students, such as 45 minutes classes or three-hour examination periods. Achievements in non-instructional tasks, such as journalistic writing, interior designs or other fieldwork, involve deadlines and time limits, but, here the schedule tend to be determined more by the nature of the work than by the requirements of institutional management or administrative convenience.

The above conditions suggest several changes in the students' work. To stimulate collaboration and substantive conversation, more time must be allocated to individualised and small group instruction. More teacher-student and student-student interaction should be encouraged. Students' access to knowledge must be enhanced by greater use of technology (telephones, fax machines, computers, etc.) and opportunities to learn from sources outside school (special agencies, community centres, the science centre, the museum etc.) should be encouraged. Multimedia exposure and more fieldwork should be incorporated. Students need to exercise discretion and responsibility in the planning, execution and evaluation of their work which further underscores the need for individual as well as groupwork, along with assessment exercises that permit diverse ways of demonstrating competence. Instructional time should be organised to permit more sustained, long-term in-depth investigation, in contrast to fixed time slots designed for just survey or broad coverage superficially. Are we ready for this kind of change?

7. ASSESSMENT FOR THE COMING MILLENIUM

Assessment tasks calling for the production of discourse and performances, deep-level understanding, higher-order thinking and application to real-life situations will also require departures from conventional procedures. In considering the ways in which adult work is assessed, special importance are to be given to:

1. Criterion-based standards
2. Multiple indicators
3. Human judgements

7.1 Criterion-based Standards

The performances of artists, lawyers, surgeons or musicians and the products of journalists, architects, engineers, athletes are usually judged in relation to substantive standards which at one end, define minimal levels of acceptable quality and at the other, suggest where the frontiers of distinction or exceptional quality begin. Summary judgements can usually be made about whether the performance or product does the job or whether it is well or poorly received by the interested parties. Reviewers show varying degrees of enthusiasm for concerts, films, plays and books. The point is that criteria can be articulated that explain the difference between high and low performance, inferior and superior quality.

Norm-referenced achievement tests determine a student's level of success not by requiring any particular level of mastery on a specific task, but instead, by reporting the student's overall score in relation to other students' scores. Overall scores represent numbers of item correct. But, very often, the items consist of a set of diverse knowledge fragments, they do not define a central task or accomplishment on which to evaluate proficiency. Overall scores do not attempt to coherently represent students'

understanding or mastery of certain tasks. Success then becomes defined simply as scoring in the higher percentiles of the tested population. When teachers grade, they established a normed system which limits the proportions of students who can succeed or fail. Since neither scores nor grades, reflect standards with substantive meaning, success on them cannot represent real forms of human accomplishments. They only tell us the relative position of a certain individual compared to the group (norm) taking the test or examination, they do not tell us what is it that the person can and cannot do. Can we then design more criterion-referenced assessments and attach more importance to criterion-referenced interpretations of student achievements? Do we want to throw the baby and the bath water out i.e. abolishing the normed-referenced tests and examinations that had serve us so well in the past? Perhaps not, perhaps certain selection and placement functions can still attest to the usefulness of these measures and they could be improved upon. The more criterion-referenced measures could complement and supplement existing procedures to improve upon the present system, tapping on higher-order thinking skills and encouraging creativity.

7.2 Multiple Indicators

In making evaluative judgements about individuals or organisations, we often need more than one indicator of quality. Any single indicator such as percentile rank, a grade (A, B, C, D, etc...) or a T-score, limits the amount of information conveyed and is subject to error. Teachers, after all, assign grades based not on one test result, but several types of student performances (homework, assignments, projects, quizzes, tests, CA results, SA results and etc...). Unfortunately, these are often norm-referenced.

In making overall assessments about individuals' accomplishments, it is usually necessary to consider a variety of performances over time. Just as it becomes more informative to examine a full portfolio of work like an athlete's record performances over a whole season, several tunes in the musician's repertoire, different samples of the architect's designs over time or the artist's work exhibited in several places; the assessment of students will be more realistic if it permits observation of patterns of strength and weaknesses over a sustained period of time. Besides, human accomplishments and achievements are often very diverse and multidimensional in nature; covering the cognitive, affective as well as the psychomotor domains. Hence single indicators from single test or examination, no matter how efficiently carried out and derived, will be insufficient and inadequate to describe real accomplishments. It now becomes not only necessary, but essential to harness multiple performance indicators to help describe students more fully and adequately. Otherwise, we may be accused of making judgements or decisions on individuals, without sufficient evidence. Records of achievement and portfolios have been tried, some with success while others less successful, we should also try to adapt these procedures in our own situations.

7.3 Human Judgement

Whether a given performance or demonstration of mastery meets particular criteria is ultimately a matter of human judgement. The common approach to testing seems to suggest that, for the purposes of efficiency and objectivity, the human element must be kept to the minimum. Correct responses are prespecified and exercises are created that can be mechanically scored. But such 'selection-type' of responses and exercises lose authenticity not only because they offer no opportunity for students to produce knowledge of value through disciplined inquiry, but because they also deny students the opportunity of being evaluated directly by humans entrusted to apply criteria that summarise the quality of the students' work. No matter how good 'objective-type' of tests are, they are still the selection type with their attendant problems and limitations. In the 'supply-type' of assessments, elements of subjectivity may be introduced but the emphasis is for assessing real achievements (accomplishments), where we would maximise validity and try to optimise reliability (Archbald & Newmann, 1988; Linn, Baker & Dunbar, 1991; Bennet, 1993; Brookhart, 1993; Harlen, 1994; Webb, 1995).

8 CONCLUSION

Present assessment practices may promote superficial learning or learning at the surface level only. To encourage deep-level understanding and learning, higher-order thinking and application of learning to real life situations, some changes to the current assessment practices may have to be made. These are really not radical changes but have been practised before. Unfortunately, the accountability movement has built up considerable momentum for conventional forms of assessment, relying on tests and examinations tapping on rudimentary knowledge, leading to the reproduction and regurgitation of materials learned at the surface level. However, experienced educators will recognise that the assessment of real accomplishments and its implications for the curriculum, teaching and learning situation, school environment; may involve fundamental shifts in the way we think about education. This may be the 'quantum leap' that is spoken of by the politicians. Hence to revert the practice, to incorporate some of these changes may not be easy (Luckily, the local politicians have envisaged the process to be gradual). To change only the assessments without the accompanying changes in curriculum, teaching and learning and the school environment, would not be that effective. But hopefully, a start could be made, since there is a call now for more cooperative style of learning and assessing higher-order thinking skills.

A good deal of research is needed to deal with several problems like how to establish baseline standards of quality for real accomplishments, how to achieve higher reliability in measurements involving human judgements, how to define common standards across colleges/schools for better comparability, how to help educators reconceptualise curriculum to emphasise more depth than breadth, and how to train teachers and lecturers in alternative ways to teaching and assessing and most important, how to finance all the changes. Generating public and professional support for these ideas and engineering them into feasible, practical form will take time and considerable effort from teachers, administrators, policy-makers, politicians and researchers. But a start must be made for the 'quantum leap' to materialise, because great things need to start with small steps.

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