

IMPROVEMENT OF TEACHING FROM IMPROVEMENT OF ASSESSMENT TEST: CHALLENGES

Madiah Khalid

Universiti Brunei Darussalam

The impact of assessment on the teaching and learning of mathematics has been much debated and discussed. This paper will in a small part, attempt to contribute to the discussion by particularly looking at Brunei perspective. The implementation of the new education system (The National Education System for the 21st Century – SPN 21) from early 2008 has made teachers struggling with the changes to be made in the classrooms. The paper will share with participants the nature of assessment before the introduction and the desired modes of assessment proposed by both the new SPN syllabus and the primary school mathematics syllabus implemented earlier in 2006. The focus will be on the challenges faced by school teachers in implementing the desired changes especially from the point of teaching and learning. This paper will include some findings from a survey of teachers' belief regarding assessment.

INTRODUCTION

Assessment is considered important in the process of teaching and learning because it:

- Improves students' learning.
- Identifies instructional, course, or assignment challenges.
- Improves instruction by identifying what instructional adjustments might be needed.
- Ensures grading is reflective of students' learning towards course objectives.
- Makes grading more systematic and objective.

(IAR, 2007)

Undeniably, assessment plays a big role in any effort to make children mathematically literate. To be mathematically literate means an individual can deal with mathematics involved in the real world problems (i.e. nature, society, culture – including mathematics) as needed for that individual's current and future private life (as an intelligent citizen) and occupational life (future study or work) and that the individual understands and appreciates mathematics as a scientific discipline (de Lange, 1999). However, it was observed that sometimes the way mathematics is taught does not mirror these characteristics. Students are still taught through traditional ways such as drill and practice because the nature of assessment that they undergo still requires rote memorization of procedures and their emphasis to present the correct answer. The presence of high stake testing, usually in the form of national examination which is summative in nature has a far reaching effects, positive or negative on parents, students and teachers, and the teaching and learning in the classroom.

Assessment is an integral component of any successful teaching effort. Research has shown that students engage with subject matter based in part on their expectations about how their achievement will be evaluated. How students are assessed determines how they learn. Assessment results in the setting of developmentally appropriate goals for the child. It should include information about how a child learns, not just what a child is able to do. In fact assessment is closely linked to learning objectives, which are tied to the instructor's philosophy of teaching and learning, and to teaching style. The types of assessments selected should measure the stated learning objectives and be consistent with course activities and resources. For instance, if the objective is to demonstrate critical thinking skills then the assessment is a problem analysis. Assessments, learning objectives, and learning activities should be clearly aligned. Assessment strategies should use established ways to measure effective learning and assess student progress by reference to stated learning objectives. The assessment formats should provide a reasonable way to measure the stated learning objectives. However, constructivist learning objectives are the hardest to assess and that is the teaching and learning philosophy that is current.

In recent times, many educational theorists, practitioners and policy makers have emphasised the need for assessment to be used to support student learning. Assessment is in many respects the glue that links the components of a course - its content, instructional methods, and skills development - changes in the structure of a course require coordinated changes in assessment. Testing can be part of a cohesive mathematics program that supports student learning. The test would need to be a good measure of the mathematics identified by the country as important (this is still a local decision). However, one danger is that even a 'good' test on a 'good' set of standards can be over-emphasized. There are many examples of wonderful open-ended problem solving test items that have been practiced to the level of becoming routine. Teaching mathematics occurs within a complex system that includes country standards, accountability testing, curriculum, teaching, classroom assessment, and other factors. All of these factors need to be considered in determining how to best improve student learning.

The rest of this paper will be further suggestions of procedures on ways to improve mathematics curriculum through assessment, followed by proposed changes in the new Bruneian curriculum, the challenges in making them a reality and finally on the result of a survey on assessment given to 300 secondary school teachers around Brunei.

IMPROVING TEACHING THROUGH IMPROVING ASSESSMENT

Black and Wiliam's 1998 literature review on classrooms, *Assessment and Classroom Learning*, states very clearly that improvement in classroom assessment will make a strong contribution to the improvement of learning (de Lange, 1999, p.4). Dossey (1990) also believed that the primary purpose of assessment is for the improvement of teaching. For this to be a reality the National Council for Teachers in Mathematics (NCTM) standards called for schools to:

- Enlarge the number of methods employed in assessing student achievement and disposition
- Make student assessment directly tied to teaching improvement
- Ensure that all aspects of the curriculum and its connections be assessed
- Instruction and curriculum be equally valued in any evaluation of a school program in mathematics

(Dossey, 1990, p.1)

A variety of methods of assessment could be used in assessing student performance and these include presentation, projects, investigation, journal, performance, portfolio etc. Unlike traditional assessment, these assessments are able to evaluate what students' ability to communicate, reason, make connections and use technology, thus making teaching and learning closer to the 'real-world' activities. They can also measure other 'common skill' qualities in a student such as attitude, teamwork and leadership qualities. It is surprising to see how much students can achieve when time, materials, references and technology are not barriers to the assessment process. These assessments are also known as formative assessment or classroom assessment. According to Baroudi (2007), formative assessment changes teachers' lesson planning and questioning practices, promotes greater ownership of learning on the part of students, and, ultimately, shares with them the criteria for quality.

ASSESSMENT IN BRUNEI MATHEMATICS CURRICULUM

One of the most recent call for reform to Brunei's mathematics curriculum for primary schools was introduced and implemented in early 2006 (Khalid, 2007). The curriculum document then recommended that assessment be conducted on a continuous basis through out the school year and assessment task should include "problem solving, mathematical thinking and creative work" (CDD, 2006, p. 6). The ground for formative assessment was built from this moment although teachers were still focusing mainly on class exercises and homework for the purpose of assessing formatively. With the introduction of the new National Education System for the 21st Century – SPN 21 in early 2008, student progress assessment was spelt out in detail. Assessment for students from year one to year three, is supposed to be made up of 60% continuous formative school-based assessment and 40% school-based examination, while for years four to year six, the proportion is 30% for continuous formative school-based assessment and 70% school-based examination (CDD, 2008a). The document also states the following:

"School-based Assessment (SBA) will play an integral part in the SPN-21 curriculum. It is important that assessment is conducted on a continuous basis throughout the school year. Whether it is formative or summative, teachers are expected to conduct quality on-going assessment of pupil learning outcomes. This assessment could be used for diagnostic and intervention purposes, and is an integral part of good teaching practices. Information gained can be used as a basis for the planning of teaching sequences, and the breadth and depth of learning unit in subsequent lessons. Learning difficulties that pupils have

encountered or misconceptions that they may have developed at an early stage should be identified so that immediate and effective remedial help can be given. Pupils with special needs will require adaptations and modifications according to their nature of their special needs". (CDD, 2008a, p. 3)

It is hoped that by implementing School-based Assessment, greater emphasis will be placed on student-centred learning and activity oriented pedagogy. It is also expected that more emphasis will be placed on the process of mathematical learning and less on drilling for passing examinations. Thus the complexity of a child's performance cannot be described by a single set of scores or a single type of assessment activity. Some of the different types of school based assessment that was suggested for teachers to carry out in a semester include: class discussions, oral presentations, project work, model-making, statistical surveys, written assignments, problem solving and mathematical thinking.

There is also a proposed change for the end of primary school examination. The examination will not be worth 100% as it was before the introduction of SPN 21. It was proposed that the centrally set examination will only be worth 60% now and the rest of the marks would come from mental computation (which is 5% from year 5 and 5% from year 6) as well as school-based assessment (15% from year 5 and 15% from year 6) (CDD, 2008b). Since the new SPN 21 primary mathematics curriculum focuses on children's mathematical processes like communication, connection, mental computation, estimation, problem solving, mathematical reasoning, visualization, creativity and the use of ICT (as seen in the curriculum framework of Figure 1), assessment at school level should at least include the assessment of these processes exhibited by pupils.

To develop classroom assessment, teachers should stress on:

- Developing questioning to support effective assessment for learning practice
- Involving children in their mathematics learning
- Assessment informing mathematics planning and teaching
- Setting goals and selecting or creating mathematical tasks to help students achieve these goals.
- Stimulating and managing classroom discourse so that both the students and the teacher are clearer about what is being learned.
- Creating a classroom environment to support teaching and learning mathematics.
- Analyzing student learning, the mathematical tasks, and the environment in order to make ongoing instructional decisions.

The question now is whether we are all ready for the implementation and what are the challenges in making it a reality.

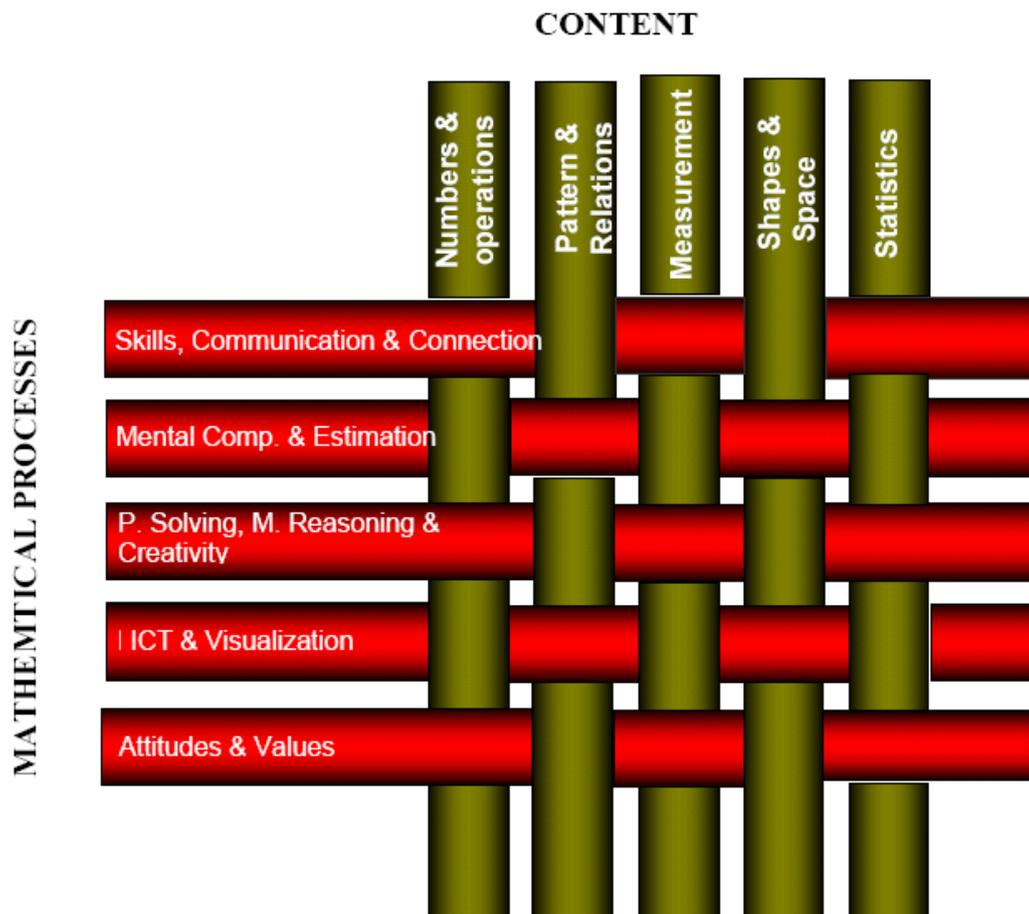


Figure 1: The Curriculum Framework

THE CHALLENGES

Putting everything that had been discussed so far together in an actual classroom is a challenge. The challenges usually come from the stake holders such as the administrators, teachers, students and the parents. Making changes to classroom assessment of a formative type is a big change for everyone involved especially for the teachers. Until recently, most assessment in mathematics are of the written summative kind – school-based examination at the end of each semester, or national-level examination (1 at the end of pupils primary year, one at the end of the lower secondary level) and the Brunei-Cambridge GCE O-level and A-level examination. Many stakeholders are not convinced that the newly promoted formative classroom assessment are of the same standard as those they were used to. Teachers are not sure how to assess their students formatively, children are not used to being assessed that way and some are not in favour of the changes, and parents are questioning if that is the way their children should be assessed. At the same time, teachers complained about very heavy workload and uncertainties in the assessment process; parents grapple to understand the new assessment process and report and administrators are not sure on how to standardize various assessments of various difficulty levels from different teachers. The process of moderation from different school grades will also be a

challenge because the school-based assessment forms a percentage of the overall grade.

As to the changes in instructional strategies, the real challenge will be the change from the traditional to the constructivist approach. The rich tasks and problems for classroom implementation need to be chosen carefully to create a constructivist class. Teachers are not used to performance based assessment although they might have been exposed to this at Universiti Brunei Darussalam. Some have not had the experience implementing them at all and are not used to design rubrics to assess students understanding for performance-based assessment. It can be concluded from a recent survey on teachers' belief in teaching and learning of mathematics with an emphasis of assessment that although they were aware of various assessment modes, many still do not seem to have the belief in formative or classroom assessment.

A survey was conducted on 300 high school teachers all over Brunei in June 2008 regarding their beliefs on assessment. They indicated the extend of their beliefs by circling 1 to 5 where 1 indicated 'to no extend', 2 indicated 'to a small extend', 3 indicated 'to a moderate extend, 4 indicated 'to a large extend' and 5 indicated 'to a very large extend'. Below are the graphs of some of the responses to the statements. It can be seen from Figure 2 that about 38% of the teachers believe to a large or a very large extend that assessment should be independent of both teaching and learning. About 80% believe to a large and very large extend that assessment is a process of determining how much learner have learned.

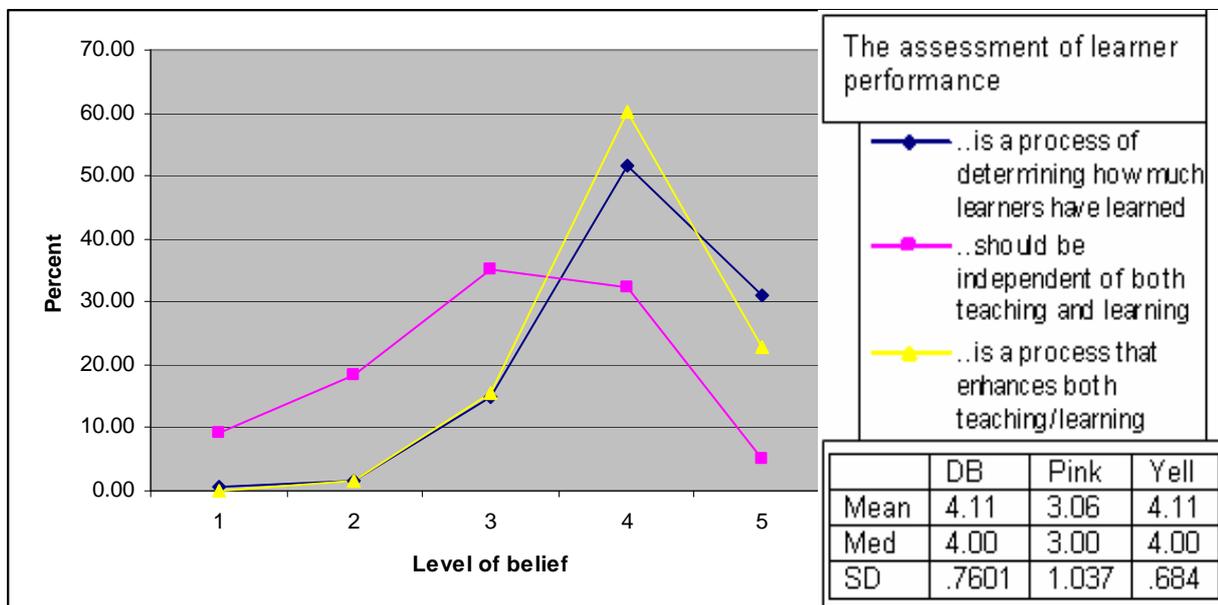


Figure 2: Teachers responses to statements about performance

From the graph shown in Figure 3, a large percentage (about 80%) of the teachers believe to a large and very large extend that 'assessment of learner performance should be assessed after teaching and learning has taken place', with about 75% believing that it should be done during the teaching and learning percentage.

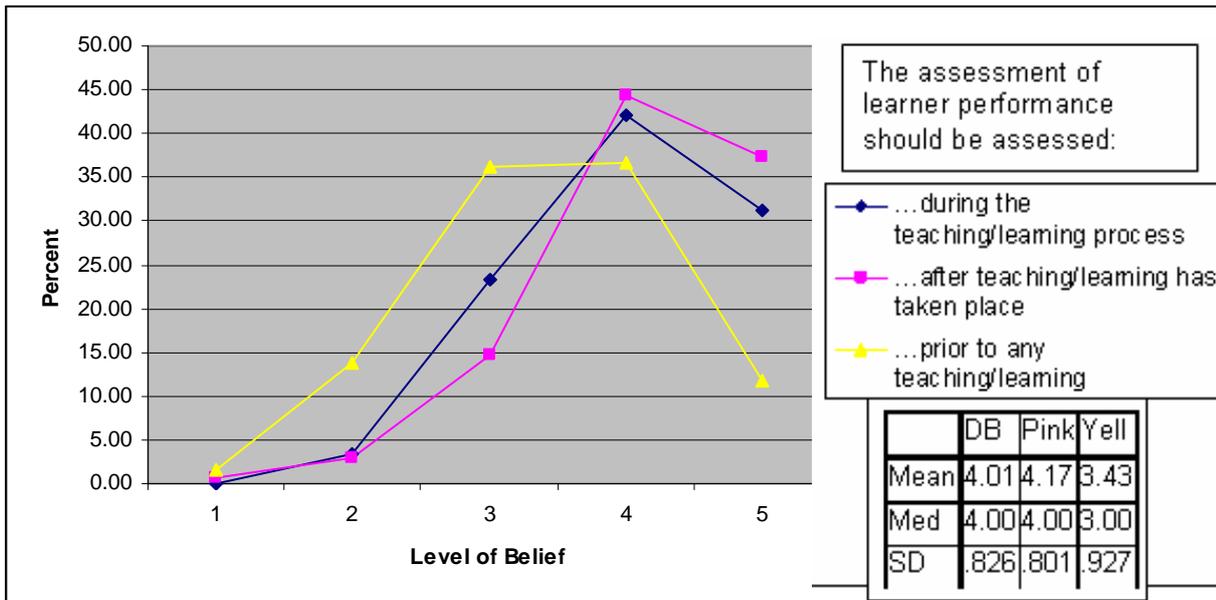


Figure 3: Teachers responses to when assessment is best assessed

As to the statement ‘using single method of assessment is sufficient to assess learners’ performance in mathematics’, only 17%, 43% and 32 believe to no extend, to a small extend and to a moderate extend respectively, while around 8% still believe in the statement to a large extend.

Figure 4 shows that about 80% of teachers’ belief to a large and very large extent that ‘Assessment of learner performance in mathematics should focus on learners’ ability to...,’ solve problems in a practical way, develop meaning from concept and think mathematically. About 70% believe to a large and very large extent that the focus be on communication and about 55% believe the focus be on group work.

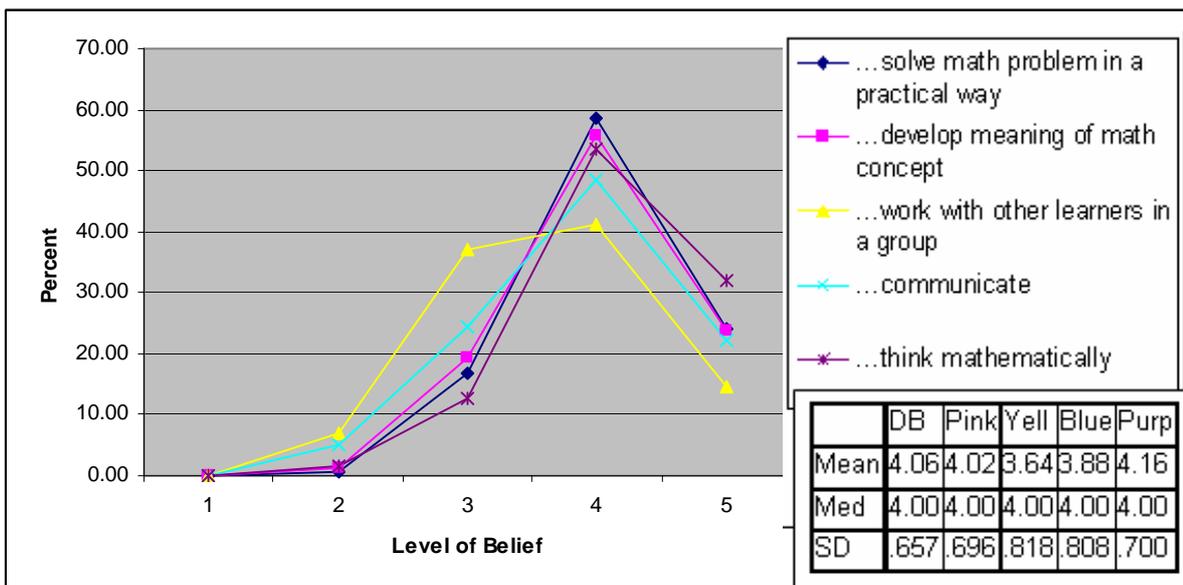


Figure 4: Responses to what teachers’ belief assessment should focus on

The graphs to the statement ‘Effective tool for the assessment of learner performance in mathematics classroom’, show two peaks (Figure 5). Teachers tend to believe that written tests, class work and in class questioning as more effective than journal writing, portfolio and projects. They believe to a more moderate extend that observation and investigation is effective.

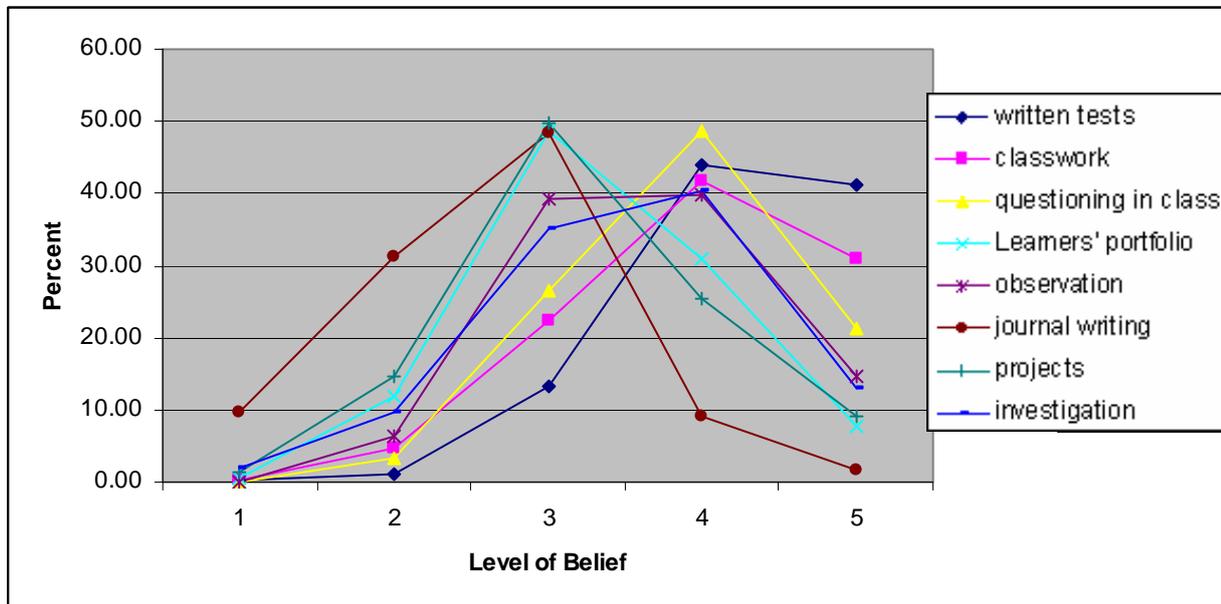


Figure 5: Teachers responses on what they belief as effective assessment tool.

From classroom observations of about two months accomplished at the same time as the survey was taken, it was found that assessment was mainly through written tests and class exercises.

CONCLUSION

There are many challenges when a new curriculum is being introduced. The desired changes will take some time to come about and that depends whether changes in assessment are implemented steadfastly. The changes in teaching approach will come eventually once the assessment system is in place. However, to reach this level, all parties involved have to work together in making it a reality. Some suggestions as to what can help to make things happen at school level are as fpllows:

1. ensure that teacher evaluation program is designed to collect relevant info on teaching.
2. provide analysis
3. use them to alter instruction to achieve program goal.
4. regular evaluation cycle
5. Stress increased teacher role in teaching evaluation and teacher improvement that focus on attainment of objectives dealing with a solid context 4 learning

6. Less emphasis on high stake testing. Focus on developing tests that are in line with current reform, develop guidelines for judging the quality of assessment, ensure public understanding of assessment
7. School teacher and administrator should become informed of alternatives in assessment. Arrange for development program, avenue for public discussion of changes in curriculum and evaluation

Assessment for learning, especially performance-based assessment is still new to some people. Teachers need assistance in evaluating students' responses to higher –order problem solving problems, grading written communication and observing individual and small group contribution. The Ministry of Education is responding to this by offering various continuous professional developments with the help of experts from overseas and locally.

References

- Baroudi, Z. M. (2007). Formative assessment: Definition, elements and role in instructional practice. *Postgraduate Journal of Education Research*, Vol. 8(1), August 2007, pp. 37-48
- CDD, (2006a). *Mathematics syllabus for lower primary school*. Curriculum Department, Ministry of Education: Brunei Darussalam.
- CDD (2008a). *Mathematics assessment guidelines for years 1 - 3*. Curriculum Department, Ministry of Education: Brunei Darussalam.
- CDD (2008b). *Mathematics assessment guidelines for years 4 -6*. Curriculum Department, Ministry of Education: Brunei Darussalam.
- De Lange, J. (1999). Framework for classroom assessment in mathematics. Freudenthal Institute & National Center for Improving Student Learning and Achievement in Mathematics and Science. September 1999.
- Dossey, J. A. (1990). Selected procedures for improving the mathematics curriculum: assessment. *ERIC Clearinghouse for mathematics, Science and Environmental Education*, No. 2, EDO-SE-90-29.
- IAR, (2007). Instructional Assessment Resources, The University of Texas at Austin. Retrieved February, 10, 2010, from <http://www.utexas.edu/academic/diia/assessment/iar/students/plan/why.php>
- Khalid, M. (2007). Mathematical thinking in Brunei curriculum: Implementation issues and challenges. 2nd APEC-Tsukuba International Conference on Innovation in teaching Mathematics. http://www.criced.tsukuba.ac.jp/math/apec/apec2007/progress_report/specialists_session/Madiyah_Khalid.pdf