PGT212E MATHEMATICS TEACHING METHODS I

Assessment in Mathematics

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WHAT IS ASSESSMENT?

A key component of the T&L process is that these assessments play a role in **strengthening student learning**, **enhancing teacher teaching effectiveness** and **being able to provide valid information about what has been accomplished or achieved in a T&L process.**

CONCEPTS, FEATURES, METHODS AND TYPES OF ASSESSMENT

- Teachers need to make judgments or decisions in relation to students in their classroom regarding teaching and learning. Whether they have achieved the set goals or need repeat actions and so on.

- In the world of education, a systematic assessment, taking into account all the factors that may influence the information or findings obtained will assist teachers in making the right decisions.

ASSESSMENT CONCEPTS

- the concept of assessment is a step towards determining the extent to which a person has a certain quality of ability, status and value.
- assessment is the integration of the process of collecting information, interpreting information or valuing it and making decisions based on interpretations made. Assessment = Evaluation + Measurement (David Payne,2003)
- Popham (2000) argues that the terms of measurement, testing and assessment are used interchangeably and are considered synonyms.

- In the context of Malaysian education, assessment is also considered as a learning process that includes the activities of decomposing, collecting, recording, scoring and translating information about a student's learning for a specific purpose (Malaysian Examination Board, 2000).

  Measurement, evaluation and testing are part of the teaching and learning process. These three concepts, although having different interpretations in terms of meaning, purpose and characteristics, are closely related to the implementation process. In fact, these three factors contribute to the achievement of common goals in the educational process which is **assessment**.

DEFINITION OF ASSESSMENT

- assessment is a process of collecting, analyzing and interpreting information to determine the extent to which students achieve their teaching objectives.

OR

- The systematic gathering and analyzing of information to improve student learning.

DEFINITION OF MEASUREMENT

- Measurement carries a definition as a process of obtaining numerical explanations or through numbers about how much an individual or student has a feature that is measured using an instrument. Or in other words steps determine the degree to which an individual has certain characteristics.

- We usually assign a numerical index to an individual's performance so that the individual's status is more accurate and can represent a particular trait.

DEFINITION OF TESTING

- Testing can be thought of as a standard set of questions that need to be answered, or a set of instruments or a systematic procedure for measuring individual or student behavior or change.
- The testing process usually begins with the preparation stage, followed by the implementation (administration of the test) and ends with the examination of the answer script. It is through this testing process that a teacher can determine if his or her students have mastered the skills they have learned.
- In summary, testing is one or the systematic procedure for measuring a single set of behaviors. It answers the question of how well an individual performs in comparison to another individual's performance, or rather than a given task.

General Purpose of Assessment

o The process of getting a sense of one's performance in learning
o Evaluate activities carried out during teaching and learning
o Getting continuous information on teaching and learning to improves teaching.
o Plan teaching and learning activities that are organized and systematic to the level of student ability.
o Effectively involve all or most of the students in the class.
o Plan and implement effective follow-up activities.
o Improve teaching and learning

Specific Purpose (the important of Assessment)

I) *Monitoring students' progress* toward learning goals.

- After setting high expectations, evidence should be collected to provide each student and the teacher with feedback about progress toward those goals.
- The feedback is used in an ongoing effort to promote each student's growth in mathematical power.
- Monitoring is seen as a continuous process.
- Sometimes the collection of evidence is informal and spontaneous, and sometimes it is formal.
- Hence, the results are provisional, yet they provide the rich diagnostic feedback important to each student.
- The basic question to be answered about students' progress is, *How is each student progressing in relation to the goals we have set and agreed on?*

2) *Making instructional decisions.*

- Teachers use evidence of students' mathematical understanding, along with other evidence from the instructional process, to modify instruction so that it will better facilitate learning.
- The teacher is the primary assessor of the mathematics that students know and can do.
- The basic question teachers consider when using assessments undertaken for this purpose is, *How can I use evidence about my students' progress to make instructional decisions?*

3) *Evaluating students' achievement* at a particular time.

- At regular intervals, evidence from multiple sources is formally summarized for each student and reported to interested parties.
- The sources of selected evidence are deliberate, and the reporting is done in a formal manner to acknowledge student achievement publicly and to certify that certain milestones have been reached.
- The basic question to be answered is, *How does each student's understanding at this time compare with the goals he or she was expected to have achieved?*

4) *Evaluating programs*

- Evidence of students' performance, as well as other data, is used to make decisions about instructional programs so that all students are encouraged to meet high expectations in mathematics.
- The question being addressed is, *How well is the mathematics program working in relation to goals and expectations for the students?*

How to Assess?

- *plan the assessment*,
- *gather evidence*,
- *interpret the evidence*, and
- *use the results*

FEATURES

- Good assessment has the following characteristics;
- i) Objective - The accuracy of an examiner examining the answer script.
- ii) Efficiency and follow-up work carried out on a central or school-based basis.
- iii) Interpretation of information about a candidate based on a score, disqualifying a candidate, meeting the purpose of conducting a test and assessment.
- iv) Comprehension - contains questions that represent all important objectives.

ASSESSMENT METHODS

The assessment can be done using several methods such as;

i) Observation

Created when difficult to detect by oral or by written students. Usually assessments are made through the attitude, behavior, process or work of art, painting, handicrafts and so on.

ii) Oral

Instantly detect students' knowledge, understanding, concepts, skills, practice behaviors and attitudes. Usually this kind of assessment is carried out through activities such as questions, discussions, quizzes, others, stories and so on.

iii) Writing

Involves activities for reviewing and examining student work results such as written test worksheets, project reports, essays, graphs, maps, tables or charts. Each evaluation and assessment should be conducted by the teacher to continuously evaluate his or her students based on the specified learning outcomes.

TYPES OF ASSESSMENT

TWO TYPES OF ASSESSMENT:

- Assessment of learning (SUMMATIVE)
- Assessment for learning (FORMATIVE)

Assessment of learning (SUMATIVE)

Summative assessment explained..

- Summative assessment aims to **evaluate student learning and academic achievement** at the end of a term, year or semester by comparing it against a universal standard or school benchmark.
- Summative assessments often have a high point value, take place under controlled conditions, and therefore have more visibility.

Summative assessment examples:

- End-of-term or midterm exams
- Cumulative work over an extended period such as a final project or creative portfolio
- End-of-unit or chapter tests
- Standardised tests that demonstrate school accountability are used for pupil admissions; UPSR, PT3 and SPM/STPM

Why is summative assessment important for learning?

In the current education system, standard-driven instruction plays a significant role.

- Summative assessment, therefore, provides an essential benchmark to check the progress of students, institutions and the educational program of the country as a whole.
- Summative assessment contributes largely towards improving the curriculum and overall curriculum planning. When summative assessment data indicates gaps across the board between student knowledge and learning targets, schools may turn to improved curriculum planning and new learning criteria to assess and improve their school attainment levels.

Assessment for learning (FORMATIVE)

Formative assessment explained

- Formative assessment is more diagnostic than evaluative. It is used to monitor pupil learning style and ability, to provide ongoing feedback and allow educators to improve and adjust their teaching methods and for students to improve their learning. style and ability, to provide ongoing feedback and allow educators to improve and adjust their teaching methods and for students to improve their learning.
- Most formative assessment strategies are quick to use and fit seamlessly into the instruction process. The information gathered is rarely marked or graded. Descriptive feedback may accompany formative assessment to let students know whether they have mastered an outcome or whether they require more practice.

Examples of formative assessments

Formative assessments can be classroom polls, early feedback, and so on. But you can make them more fun too. Take a look at these three examples.

- In response to a question or topic inquiry, students write down 3 different summaries. 10-15 words long, 30-50 words long and 75-100 words long.
- The 3-2-1 countdown exercise: Give your students cards to write on, or they can respond orally. Students have to respond to three separate statements: 3 things you didn’t know before, 2 things that surprised you about this topic and 1 thing you want to start doing with what you’ve learned.
- One minute papers are usually done at the end of the lesson. Students answer a brief question in writing. The question typically centres around the main point of the course, most surprising concept, most confusing area of the topic and what question from the topic might appear on the next test.

Why is formative assessment important for learning?

- Formative assessment is a flexible and informal way of assessing a pupil's progress and their understanding of a certain subject matter. It may be recorded in a variety of ways, or may not be recorded at all, except perhaps in lesson planning to address the next steps.
- Formative assessment helps students identify their strengths and weaknesses and target areas that need work. It also helps educators recognize where students are struggling and address problems immediately.
- At a school level, school teachers use Impromptu quizzes or anonymous voting Short comparative assessments to see how pupils are performing against their peers. One-minute papers on a specific subject matter Lesson exit tickets to summarize what pupils have learnt. Ask students to create a visualization or mind mapping of what they learnt.

Comparison Chart

BASIS FOR COMPARISON	FORMATIVE ASSESSMENT	SUMMATIVE ASSESSMENT
Meaning	Formative Assessment refers to a variety of assessment procedures that provides the required information, to adjust teaching, during the learning process.	Summative Assessment is defined as a standard for evaluating learning of students.
Nature	Diagnostic	Evaluative
What is it?	It is an assessment for learning.	It is an assessment of learning.
Frequency	Monthly or quarterly	Term end
Aims at	Enhancing learning	Measuring student's competency.
Goal	Monitor student learning.	Evaluate student learning.
Weight of grades	Low	High

Differences between formative and summative assessments

Difference 1
The first big difference is *when* the assessment takes place in a student's learning process.
As the definition already gave away, formative assessment is an ongoing activity. **The evaluation takes place during the learning process**. Not just one time, but several times.
A summative evaluation takes place at a complete other time. **Not during the process, but after it**. The evaluation takes place after a course or unit's completion.

Difference 2
There's also a big difference between the assessment strategies in getting the right information of the student's learning.
With formative assessments you try to figure out whether a student's doing well or needs help by **monitoring the learning process**.
When you use summative assessments, you **assign grades**. The grades tell you whether the student achieved the learning goal or not.

Difference 3
The purposes of both assessments lie miles apart. For formative assessment, the purpose is to **improve student's learning**. In order to do this you need to be able to give meaningful feedback.
For summative assessment, the purpose is to **evaluate student's achievements**.
So do you want your students to be the best at something, or do you want your students to transcend themselves each time over and over again?

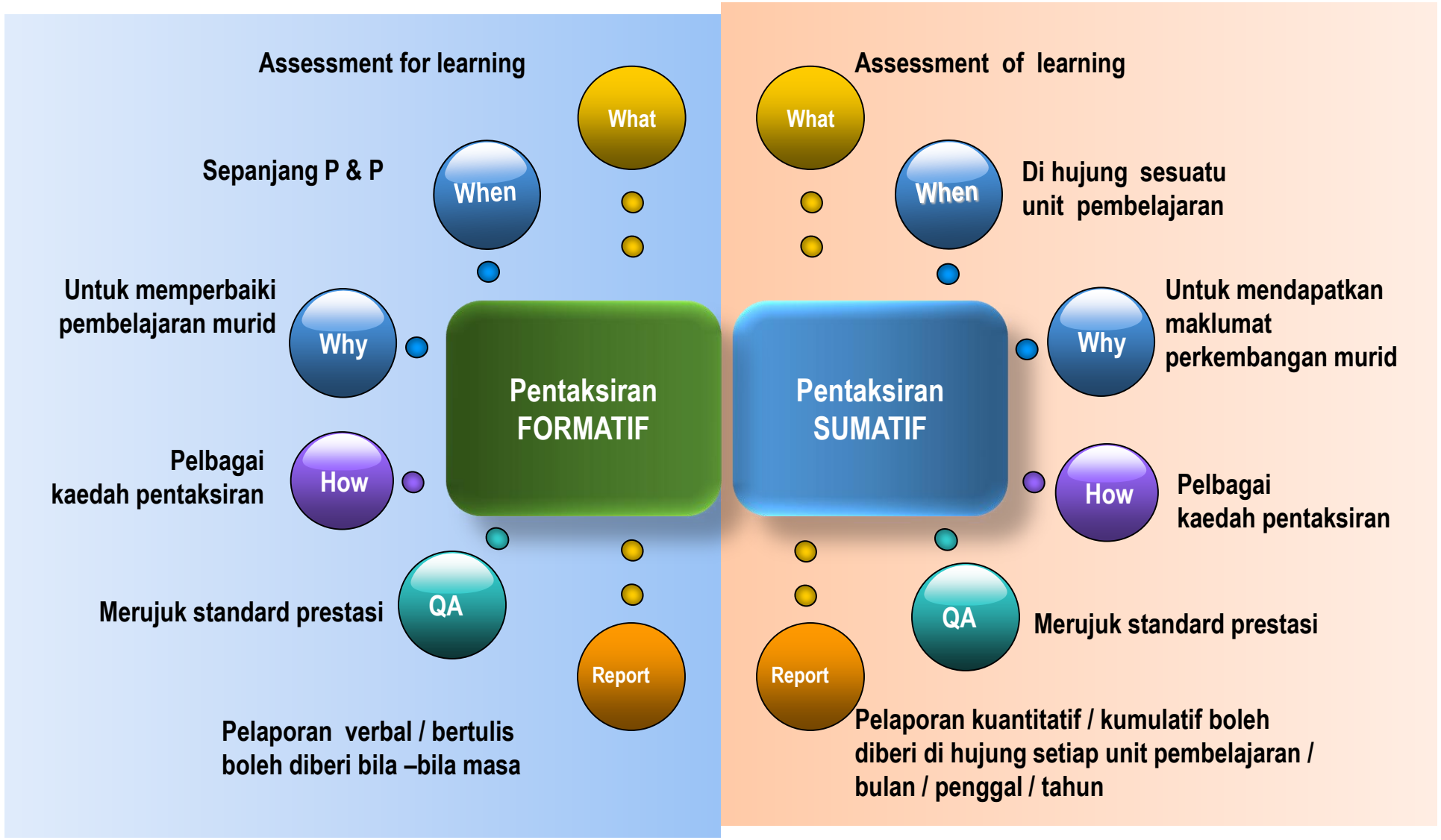
Differences between formative and summative assessments

Difference 4
Remember that with formative assessment the evaluation takes place several times during the learning process end with summative assessment at the end of a chapter or course? This explains also the size of the evaluation packages.
Formative assessment includes **little content areas**. For example: 3 formative evaluations of 1 chapter.
Summative assessment includes **complete chapters or content areas**. For example: just 1 evaluation at the end of a chapter. The lesson material package is much larger now.

Difference 5
The last difference you may already have guessed. Formative assessment considers **evaluation as a process**. This way, the teacher can see a student grow and steer the student in an upwards direction. With summative assessment it's harder for you to steer the student in the right direction. The evaluation is already done. That's why summative assessments or evaluations are considered to be more of a "**product**".

Proses Pembentukan

Proses Merumuskan



Alternative Assessment

Hancock (1994) defines alternative assessment as "an ongoing process involving the student and teacher in making judgments about the students' progress using non conventional strategies" (p. 1).

Forms of alternative assessment

- Performance assessment.
- Portfolio assessment.
- Project-based assessment.
- Observational assessment.
- Mastery Learning.
- Interviews.
- Open ended questions.
- Student self-assessment.

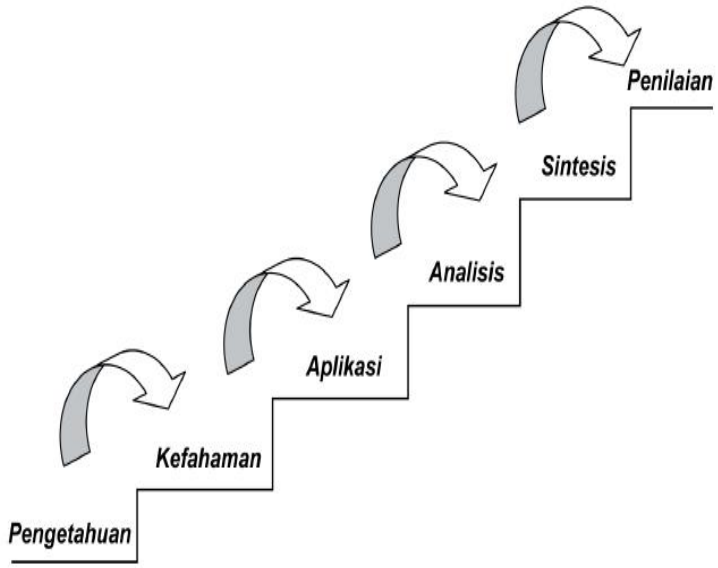
TEST SPECIFICATION TABLE (TST)

Purpose?
How to create?

- A TOS is a chart that shows the topics that will be covered on a test.

- The purpose of a Table of Specifications is to identify the achievement domains being measured and to ensure that a fair and representative sample of questions appear on the test.
- Teachers cannot measure every topic or objective and cannot ask every question they might wish to ask.
- A Table of Specifications allows the teacher to construct a test which focuses on the key areas and weights those different areas based on their importance.
- A Table of Specifications provides the teacher with evidence that a test has content validity, that it covers what should be covered.

TAKSONOMI BLOOM



Rajah 2.3: Taksonomi objektif Domain kognitif Bloom

- **Knowledge**– remembering facts, terms, definitions, and concepts.
- **Comprehension**– understanding the meaning of material. Explain interpret, summarize, give examples, predict, translate
- **Application**– selecting a concept or skill and urging it to solve a problem. Compute, solve, apply, modify, construct
- **Analysis**– breaking material down into its parts and explaining the hierarchical relations.
- **Synthesis**– producing something original after having broken the material down into its component parts.
- **Evaluation**– making a judgment based upon a pre–established set of criteria.

Example

MATHEMATICS PAPER 2

No	TOPIC		CONSRUCT				SUB MARKS	TOTAL MARKS
			Knowledge	Understand	Application	Analysis		
1	Sets	a	L				1	3
		b		M			2	
2	Quadratic Equations			M			4	4
3	Simultaneous Equations			M			4	4
4	Line and Planes in 3-dimensions			M			4	4
5	Mathematical Reasoning	a	L				1	5
		b	L				1	
		c		M			3	
6	Solid Geometry			M			4	4
7	The Straight Line	a	L				2	5
		b		M			3	
8	Matrices	a			L		2	6
		b			M		4	
9	Perimeter and Area of A Circle	a			M		3	6
		b			M		3	
10	Gradient and Area Under A Graph	a		M			2	5
		c				M	5	
11	Probability	a	L				1	6
		b			M		3	
		c			M		2	
12	Graphs of Functions (Reciprocal)	a					2	12
		b					4	
		c					2	
		d					4	
13	Transformations	a i	M				1	12
		ii		M			2	
		b i				M	6	
		ii			M		3	
14	Statistics (Frequency Polygon)	a	M				3	12
		b		M			4	
		c			M		5	
15	Plan and Elevation	a			M		4	12
		b i			M		4	
		ii			M		4	
16	Earth as A Sphere	a	L				2	12
		b	L				2	
		c			M		3	
		d			M		5	

No	Topics (Form 4)	Paper 1			Paper 2								
		Level 1	Level 2	Level 3	Section A			Section B			Section C		
					L 1	L. 2	L. 3	L 1	L. 2	L. 3	L 1	L. 2	L 3
1.	Functions	1(a), (b) 3(a),	2(a), (b) 3(b)										
2.	Quadratic Equations		4			2(ai),2(b)							
3.	Quadratic Functions	5(a). (b)		6		2(aii)							
4.	Simultaneous Equations					1							
5.	Indices & Logarithms		7	8									
6.	Coordinate Geometry		15						9(a), (b), (c)				
7.	Statistics		24(a), (b)										
8.	Circular Measures	12(a)		12(b)					10(a)	10(b), (c)			
9.	Differentiation		19(a), 20				3(a)						
10.	Solution of Triangles											12(a), (b), (d)	12(c)
11.	Index Number										13(a)	13(b), (c), (d)	

Jadual 1: JADUAL SPESIFIKASI UJIAN (JSU) UJIAN KECIL TOPIK PANJANG TAHUN 4

Kandungan	Aras																		Jumlah, %
	Mengingati			Memahami			Mengaplikasi			Menganalisis			Menilai			Mencipta			
	M	Sd	S	M	Sd	S	M	Sd	S	M	Sd	S	M	Sd	S	M	Sd	S	
12.1 Unit Panjang.	1	2																	2 (0.08%)
12.2 Mengukur dan menganggar panjang.					3														1 (0.04%)
12.3 Penambahan panjang.	4			5	8														3 (0.12%)
12.4 Penolakan panjang.						9													1 (0.04%)
12.5 Pendaraban panjang.		6																	1 (0.04%)
12.6 Pembahagian panjang.						7													1 (0.04%)
12.7 Penyelesaian masalah melibatkan panjang. (Penambahan panjang)							10	3(K2)			12, 15				20				5 (0.2%)
12.7 Penyelesaian masalah melibatkan panjang. (Penolakan panjang)							13				16, 4(K2)				18	5(K2)			5 (0.2%)
12.7 Penyelesaian masalah melibatkan panjang. (Pendaraban panjang)								1(K2)		17		2(K2)							3 (0.12%)
12.7 Penyelesaian masalah melibatkan panjang. (Pembahagian panjang)								19	11		14								3 (0.12%)
Jumlah, %	2	2	0	1	2	2	2	3	1	1	5	1	0	0	2	1	0	0	25
	4			5			6			7			2			1			

M – Mudah Sd – Sederhana S – Sukar

Nombor 1 – 20 = Nombor soalan kertas 1

Nombor 1(K2) – 5(K2) = Nombor soalan kertas 2

THANK YOU