



2nd HCT Maths Conference
19th April 2005 @ Abu Dhabi Women's College
Assessment 360°


Exploring an Alternative Assessment Model

J.V. Marc Corbeil
faculty AAW HCT
former subject area manager IBCA, math & science

International Baccalaureate Organization

- www.ibo.org
- HL course 2 year // 240 hrs // 10 hrs IA
- 20% of grade – three standard exams make up other 80% (short answer, long answer, and extended question on option material).
- English, French, Spanish in 119 countries.



Some objectives from IBO and HCT mathematics

- **Know and use appropriate notation and terminology (IBO)**
- **Use ideas from one subject to another subject (HCT)**
- **Demonstrate an understanding of both the significance and the reasonableness of results. (IBO)**
- **Recognize and demonstrate an understanding of the practical applications of mathematics. (IBO)**
- **Find possible solutions for a problem. (HCT)**
- **Show a positive attitude and good work habits in the workplace. (HCT)**



Weaknesses of standardized tests

- Puts a restraint on classroom teaching
- “Teaching to the test” syndrome
- Standardized tests do not emerge from classrooms
- Are very limited in what they measure – “do not show the teacher all they want to know about a student” // narrow scope of evaluation
- Cannot show the development of the student over time ... only snap shot of performance
- Only measure certain types of thinking or certain level of skills.

4

Fitness of the assessment tool.



Which picture best describes the fitness of your assessment tool in terms of the objectives of your curriculum?





Learning styles

- Visual
- Auditory
- Kinesthetic & Tactile

Sensory Modality Inventory and the Keirsey Temperament Sorter

6



Howard Gardner's theory of Multiple Intelligences

- **Linguistic intelligence** ("word smart")
- **Logical-mathematical intelligence** ("number/reasoning smart")
- **Spatial intelligence** ("picture smart")
- **Bodily-kinesthetic intelligence** ("body smart")
- **Musical intelligence** ("music smart")
- **Interpersonal intelligence** ("people smart")
- **Intrapersonal intelligence** ("self smart")
- **Naturalist intelligence** ("nature smart")

7

Cultural Intelligence

The HCT students are likely to relate to a certain learning style and/or will demonstrate characteristics of a particular cultural intelligence.

Are we tapping into this?

Are we ignoring this?

Are we aware of this?

8



Value-added: purpose of an alternative assessment

- Develop students' personal insight into the nature of mathematics
- Provide opportunities for students to complete extended pieces of mathematical work
- Enable students to develop the qualities of patience and persistence, and to reflect on the results they obtain

9



Important points

- Level of sophistication of work should be similar to that contained in the regular syllabus.
- Should be completed at intervals throughout the course, not left at end of course or for only a specific time of course.
- Integrated into the course of study so that it enhances student learning.
- Independent work, but teacher guided through the work progress

10



Ex. Mathematical Modeling Skills

- Translating real-world problem into mathematics
- Constructing a model
- Solving the problem
- Interpreting the solution in the real-world situation
- Identifying the range of validity of the model
- Identifying the possible limits of technology

11



Problem: Predict work force for next ten years

year	%
1940	24.3
1950	29.6
1960	33.4
1970	38.1
1980	42.5

12



- Translating : dependant versus independent variables
- Model: $y = mx + b$
- Solving : the linear equation
- Interpreting : giving values 2004-2014
- range of validity : before 1900 or after 50 years
- limits of technology : years 1940, 50, 60

13



IBO Assessment Criteria

- Criterion A: Use of notation and terminology
- Criterion B: Communication
- Criterion C: Mathematical processes
- Criterion D: Results – generalization/interpretation
- Criterion E: Use of technology
- Criterion F: Quality of work

14



Ex. Awarding achievement levels

Criterion C: Mathematical modeling: developing a model

0	The student does not define variables, parameters or constraints of the task.
1	The student defines some variables, parameters or constraints of the task.
3	The student defines variables, parameters or constraints of the task and attempts to create a mathematical model.
4	The student correctly analyzes variables, parameters and constraints of the task to enable the formulation of a mathematical model that is relevant to the task and consistent with the level of the course.
5	The student applies the model to other situations.

15



Important details

- Framework of criteria
- Extensive training of teachers
- Production of support material including
 - i) exemplary examples of work
 - ii) exemplary examples of evaluation
- IBO makes use of external examiners to moderate internal assessment

16



Translating to HCT

- Student projects ?
- Larger proportion of total assessment ?
- Multiple alternate assessments ?
- Moderation of project work ?

17



Potential problems

The IA has been, and remains, the most contentious and complaint heavy part of the entire IB package.

- Moderation is required for all IB assessment, but is complex and expensive.
- Issues of academic honesty are magnified.
- Problems with second language speakers.
- Teacher workload.

18



References and further reading

- Diane Coates, "Alternative Assessments to Reflect a Changing Mathematics Curriculum", <http://www.frontiernet.net/~dcoates/altass.htm>, 12/95 [accessed 7 April 2005]
- Merrilyn Goos, "Learning Mathematics in a Classroom Community of Inquiry" *Journal For Research in Mathematics Education*, July 2004, Volume 35, Issue 4, Pages 258 - 291
- David Fantegrossi, An Analysis of Alternative Assessment Methods With and Eye towards their Alignment with the NCTM *Principles and Standards for School Mathematics* and Achieve Inc.'s *Foundations for Success Middle Grades Expectations*, 2001, <http://www.math.umd.edu/~dac/fantegrosspaper.html> [accessed 7 April 2005]
- Gardner, Howard, *Frames of Mind: The Theory of Multiple Intelligences*. New York: Basic, 1983
- Gardner, Howard, *Multiple Intelligences: The Theory in Practice*. New York: Basic, 1993.
- Curriculum Guide (2006) Mathematics Higher Level, IBO, 2004
- HCT Guide and Syllabi to Math 1100/1200
- <http://www.engr.ncsu.edu/learningstyles/ilsweb.html>
