Skewed Maths exams favour top learners and handicap the below-average

by Aslam Mukadam

Aslam Mukadam is the co-ordinator of the Concerned Maths Educators (CME), a network of Maths teachers in schools and institutions throughout South Africa committed to improving Maths education and making maths more accessible to all learners.

There are many challenges in Maths education but one of the major challenges of the new curriculum is the structure of the assessment system. The new Maths curriculum as it stands is designed for the modern society and in order to make it more accessible the assessment structure needs major adjustment.

The assessment system is skewed in favour of the above-average and top learner and disadvantages the below-average learner. Moreover, it does not adequately prepare the top learner to cope at University.

According to the departmental Subject Assessment Guidelines the Maths exam paper is to be split into 55% knowledge & routine based questions and the other 45% into higher-level questions and problem- solving.

This 45% is outside the reach of most below-average learners. It is clear that these learners start off the exams with a handicap of about 45% to 50% and are therefore unfairly disadvantaged.

In an exam paper worth 150 marks, a learner needs to score 45 marks in order to achieve a 30% pass. The below-average learner does not have the cognitive ability and skills to confidently attempt half the paper ie. the portion of the paper which is based on higher-level questions and problem- solving. This learner is therefore expected to score 45 marks out of the remaining 75 marks. Hence the below-average learner actually requires to score close to 60% as almost half the paper is inaccessible to that learner.

On the other hand, the top learners are advantaged because half of the paper they can do with their eyes closed and it is only the other half that really provides a challenge.

The A-symbols scored by top learners in the Matric final exams do not accurately reflect their mathematical abilities; they are not necessarily equipped to cope at tertiary level in Maths related courses. Generally universities are complaining about the calibre of these students. Students whose Maths marks in Matric were good enough to enter university are failing first year Maths. The curriculum does not adequately challenge these learners enough to be able to deal with University Maths.

It is practically impossible for this "one-size-fits-all" assessment system to satisfy both the top learner as well as the below-average learner.

To solve this problem our proposal is to divide the exam paper into three sections, namely Section A, B & C each worth 75 marks. Section A & B (lets call it Technical Maths) will cater for learners aiming to attend Techikons and Colleges and Section B & C (lets call it Bachelors Maths) will be directed towards learners wanting to follow careers at Universities.

Section A will test 'Technical Maths' students only and will deal with questions on basic knowledge and routine procedures.

Section B will deal with questions on routine procedures, complex procedures and problem solving and will be geared towards both streams.

Section C will test 'Bachelors Maths' students only and will deal with questions mostly on complex procedures and problem solving.

In this assessment system the below-average learner won't be disadvantage and handicapped by the difficult higher-level questions in Section C. The top learner and above-average learner in turn will be more challenged having to deal with the more difficult questions in Section C and also won't be advantaged by the easier Section A.

In this way learners who score well in 'Technical Maths' and who wish to further their studies at Universities of Technology and Colleges will enter these institutions highly motivated and confident instead of disadvantaged and demoralised as is currently happening. At the same time the curriculum will adequately challenge and prepare the top learner to cope with University Maths. Hence this adjustment in the assessment system will make Maths more accessible to all streams.

The National Senior Certificate will accordingly reflect the Maths assessment as a 'Technical Maths' mark or a 'Bachelors Maths' mark.

Our proposed modification in the assessment system would indeed provide a solution for preparing all our learners adequately for tertiary studies as well as attract more learners into the Maths stream instead of losing them to Maths Literacy.

To provide assistance to our education system we have on our part set up a dedicated, user-friendly website namely www.mathsexcellence.co.za which contains Maths, Maths Literacy and Physical Sciences resources to provide support and assistance to teachers and learners.

The resources made available on this free website are revision video lessons, textbooks, workbooks, question papers with memoranda and tutorials with full answers. The latest Curriculum & Policy Statements (CAPS) from Grade 1 to Grade 12 are also available on this website.

The layout of the revised Maths assessment could look as follows:

PROPOSED FORMAT FOR A DIFFERENTIATED MATHS ASSESSMENT

in Grades 10, 11 & 12 in order to make Maths more accessible to all streams

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Answer only TWO SECTIONS from Sections A, B & C

TECHNICAL MATHS - LEARNERS ANSWER ONLY SECTIONS A & B [Total: 150 marks]

BACHELORS MATHS - LEARNERS ANSWER ONLY SECTIONS B & C [Total: 150 marks]

SECTION A [75 marks = 50%]

(For Technical Maths only)

Questions on basic knowledge - **15%**

Questions on routine procedures - **35 %**

SECTION B [75 Marks = 50%]

(For BOTH Technical Maths & Bachelors Maths learners)

Questions on routine procedures - **30 %**

Questions on complex procedures - **15 %**

Questions on problem solving - **5%**

SECTION C [75 Marks = 50%]

(For Bachelors Maths only)

Questions on routine procedures (for scaffolding) - **10 %**

Questions on complex procedures - **15 %**

Questions on problem solving - **25%**

TOTAL : 150 marks