

In the graph of Spaul in “B” being Figure 1 on p 636, four separate groups of South African Grade 6 learners are represented.

The Grade 6 learners who wrote the test have been partitioned on the basis of the inferred wealth index of the community in which their school is located. The authority for the inferred wealth index is the corresponding Statistics SA census. All learners in a community are defined as members of the same quartile to which their community belongs.

The SACMEQ test consists of items for which marks are allocated and added. These total marks are then transformed to fit a scale stretching from 0 to 1000, with 500 as a notional midvalue for the grade 6 learners for the combined set of candidates from all 16 countries writing the test.

The scale operates in such a way that any student with a higher test score than any other specified learner, will always be allocated a higher reading score on the transformed scale. The motivation for the scale change is that the final score will admit interpretations of which items the learner is more likely to answer correctly and which more likely to find too difficult to manage a correct answer.

For each quartile of learners a graph is drawn. For each graph the total area under the curve and above the horizontal axis is by construction 1 or 100%. For any interval on the horizontal axis, vertical slice lines could be drawn on the graph. The areas between these lines are less than the total area 1. These areas may be interpreted as the proportion and hence percentage of learners within the quartile whose score was at or between the slice lines.

The density on the vertical axis can be interpreted as follows: each member of the quartile is given an equal size chip slice with width 1 score unit on the horizontal axis. The total of the heights of all the chips is one length unit, so that if there are 15000 learners in the group, each slice has height  $1/15000$ . Each learner places their own chip at their own score. The profile of these building blocks is given by the graph. The height above each possible score is the density of that score in the data set.

A density of 0.006 at a score 375 for a quartile group of size 15000 implies some  $15000 \times 0.006 = 90$  learners with score exactly 375.

The four graphs indicate strong similarities between the first three quartile, but with progressively higher frequencies of scores in the range for roughly 480 to 720. In contrast the wealthiest quartile is characterised by very high frequencies of scores in the uppermost regions.

The message of these SACMEQ 2007 graphs is further demonstrated in Table 1 on page 639 of “B”. The average score is presented for the four groups and the relative fractions of the national average by which the four groups differ from that standard, are presented in rows one and two.

The rows three and four address the consequentiality of the score within the quartiles and exhibit the levels of disadvantage the scores reveal.