I ❤ maths and science:

exploring the views of learners

While external factors such as home and school environment are important in understanding learner performance, attitudes and beliefs towards mathematics and science can also contribute to learners' performance. ***Andrea Juan*** and ***Menzi Mthethwa*** analysed the learner questionnaire in the 2011 Trends in International Mathematics and Science Study and found that motivation to perform as well as approaches to education also played a role in performance.

The questionnaire asked a range of questions relating to attitudes towards mathematics and science, grouped into themes. These included learners' enjoyment of, appreciation for the value of, and self-confidence towards the subjects concerned. In addition to these insights, we were also able to examine how learner attitudes had changed over time.

General attitudes to mathematics and science

The 2011 overall attitudes towards mathematics and science were grouped into high, medium and low levels of each attitudinal theme. All three attitudinal themes (enjoyment, appreciating the value of and self-confidence) revealed similar patterns for both mathematics and science (Figure 1).

Although the majority of learners exhibited high levels of appreciating the value of both subject areas, learners seem to value mathematics (72%) more than science (58%). This may indicate that learners are able to better relate mathematics to their everyday lives or career aspirations than science.

The responses to the question on whether learners enjoyed mathematics and science were almost identical. What was alarming, however, was that confidence in mathematics and science received the lowest scores among the three themes. These findings suggested that learners felt they lacked the capacity to convert the enjoyment and value of mathematics and science into confidence in these learning areas. They also suggested that learners were conscious of what they were capable of, what they knew, and what they did not know.

Changes from 2002 to 2011

To draw comparisons and measure changes in attitudes over time, results from the 2002 TIMSS were compared with those of the 2011 TIMSS. Figure 2 shows that the percentage of learners reporting a high value of mathematics remained relatively high over the period, dropping only slightly from 77% in 2002 to 72% 2011.

While the value attributed to mathematics remained constant, learners' high level of enjoyment of the subject dropped. This was met with a corresponding growth in those scoring at the medium level of enjoyment, from 24% in 2002 to 44% in 2011.

The changes in the levels of valuing science were similar to those exhibited for mathematics (Figure 3); there was a marked decrease in the percentage of learners exhibiting high levels of appreciating the value of science. There was a substantial increase in the low levels of value ascribed to this subject from 5% in 2002 to 16% in 2011. This is of great concern, as a disregard for the value of science may affect a learner's relationship with science post-school.

There was a substantial drop of 31% in those learners who had a high level of self-confidence in learning science. This was similar to the findings for self-confidence in mathematics. The greater increase was found at the low level, which changed from 10% in 2002 to 24% in 2011.

Implications

Fostering positive attitudes in learners towards mathematics is still highly valued, by both policy makers and academics. It is considered a crucial component in developing learners' mathematics and science ability. These findings may be the stepping stone towards a better understanding of how the development of positive attitudes toward science and mathematics can motivate learner interest in science education and science-related careers. ■

Authors: Andrea Juan, Researcher, and Menzi Mthethwa, Junior Researcher, Education and Skills Development (ESD) research programme, HSRC.

Figure 1: Enjoyment, value and confidence in mathematics and science

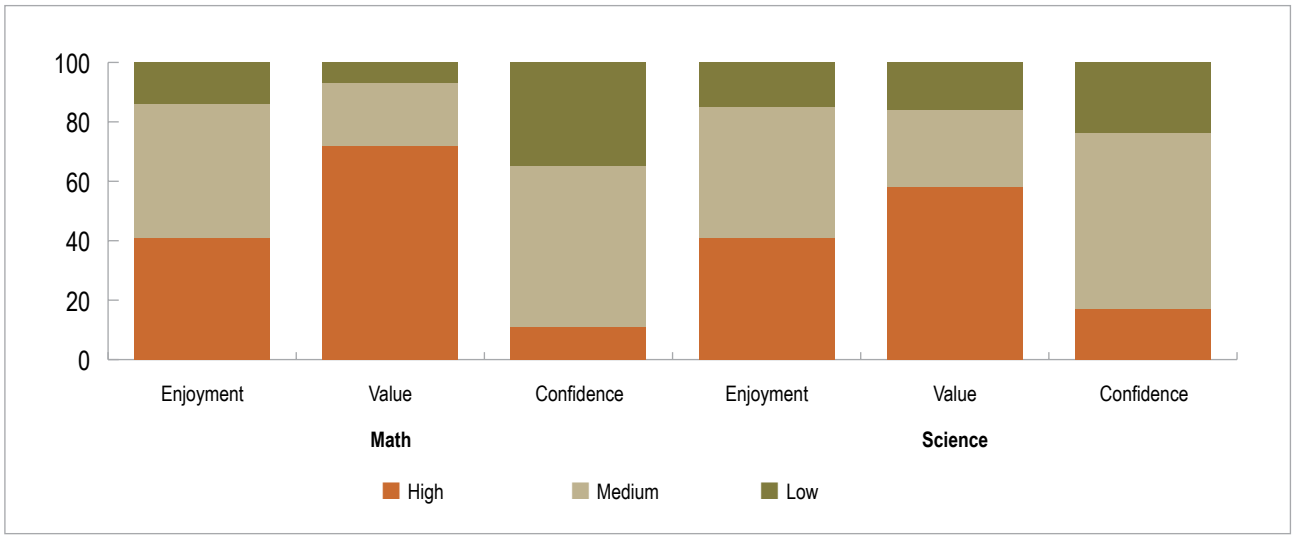


Figure 2: Changes in enjoyment, value and confidence in mathematics in 2002 and 2011

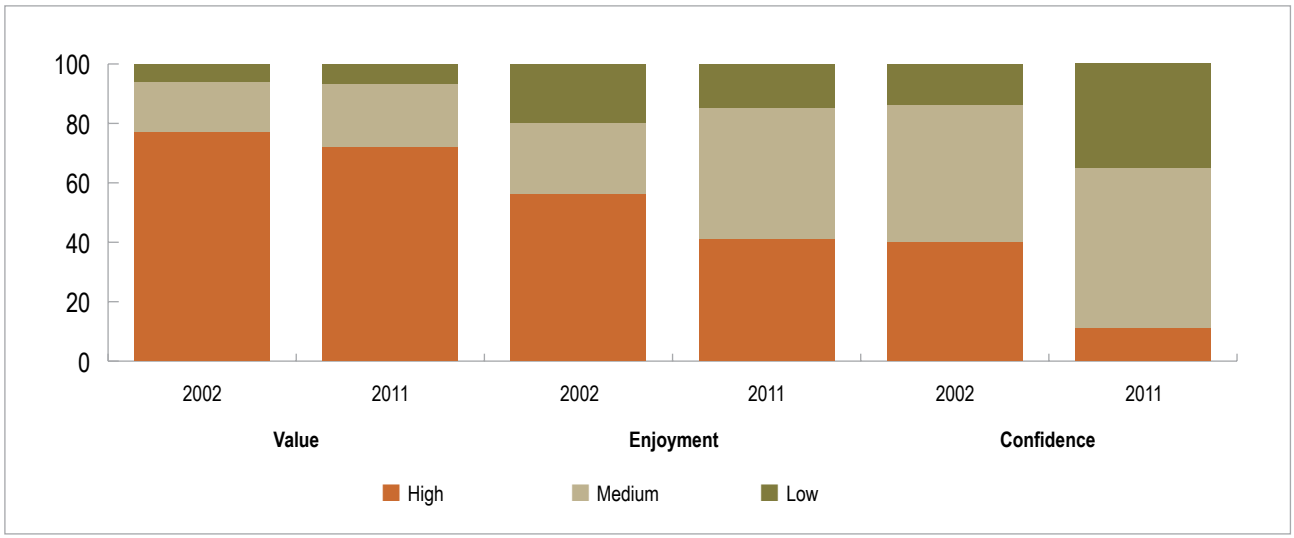
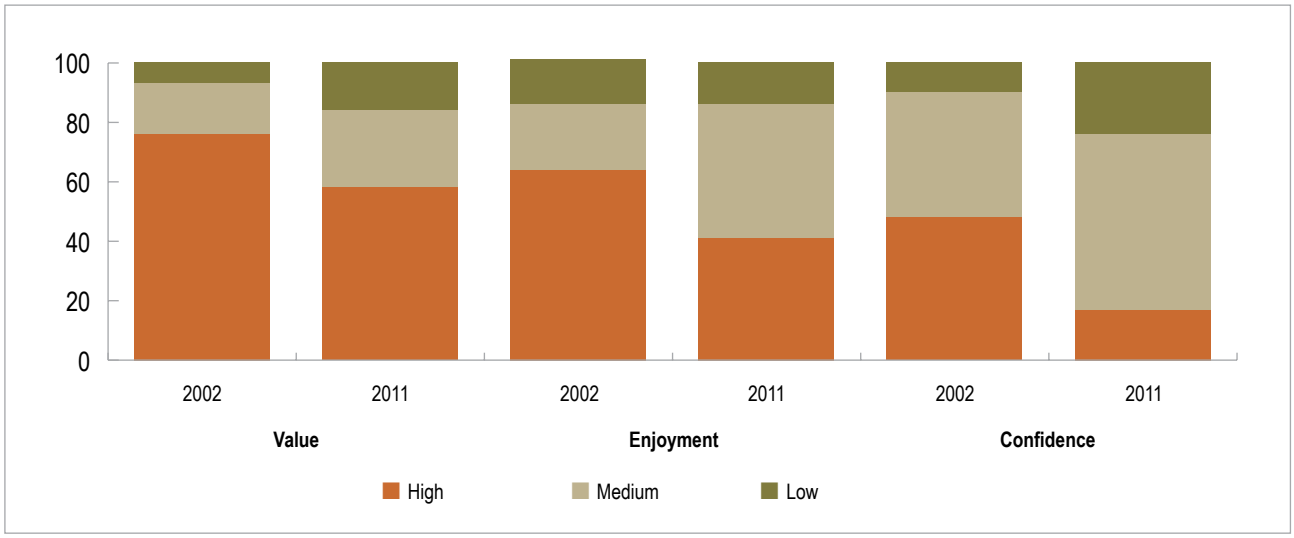


Figure 3: Changes in enjoyment, value and confidence in Science in 2002 and 2011



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