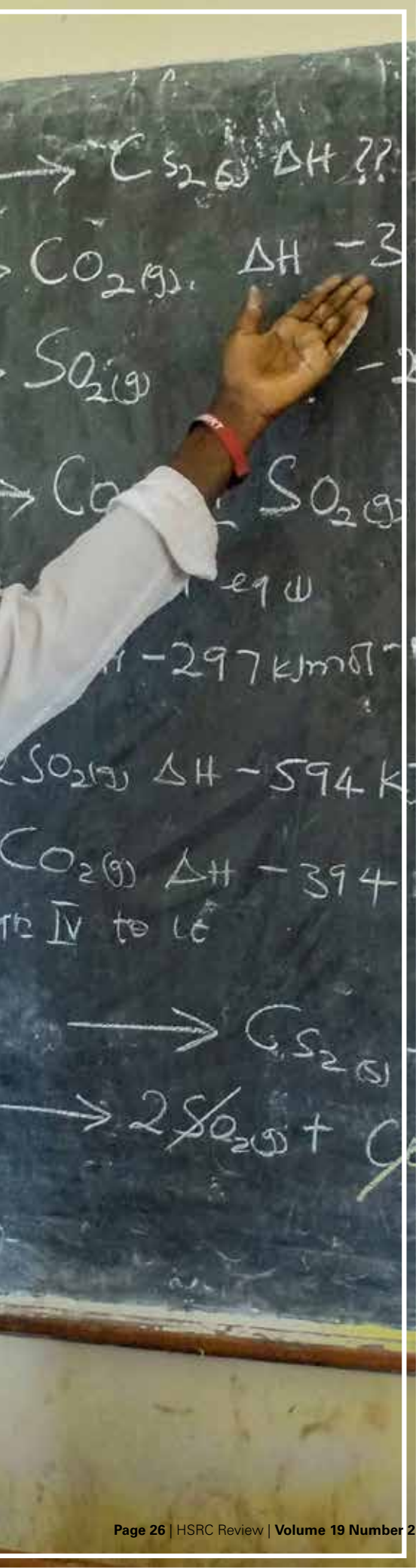
Who are our *educators* and what do they do in class?

Photo: *reteach92, Pixabay*

Most of us have memories of that one, stand-out educator who sparked our love for a particular subject. The role that such educators play in providing quality education cannot be overemphasised. How educators interact with learners is critical to learners' conceptual understanding and to their overall performance in mathematics. *Fabian Arends* discusses educator instructional quality and practices, looking at data related to grade 9 mathematics educators from the Trends in International Mathematics and Science Study (TIMSS) 2019.



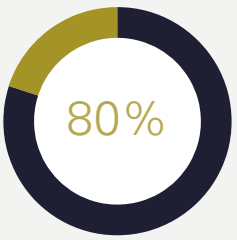
Several South African studies have shown evidence of a relationship between educators' knowledge and learners' academic performance.

Policymakers and researchers measure educator quality based on teachers' academic credentials and educational practices in the classroom. In the next section, we explore grade 9 educators' credentials and preparation, as well as classroom practices and how these relate to learners' mathematics achievement.

Educator qualification and preparation

Figure 1 shows the qualifications of grade 9 mathematics educators based on TIMSS 2019. The sample is not representative of all educators but represents the number of learners taught by educators.

Figure 1: Grade 9 educator preparation



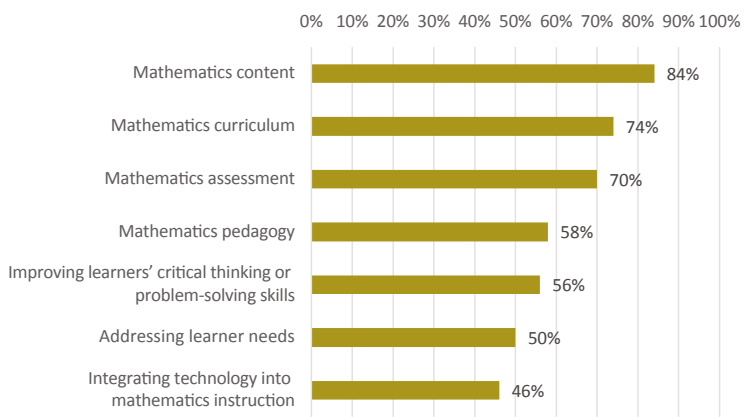
of learners were taught by mathematics educators with at least a bachelor's degree.

Four of five learners were taught by educators with a mathematics specialisation.

Eighty per cent of learners were taught by mathematics educators with at least a bachelor's degree, and 83% of learners were taught by teachers with a mathematics specialisation in their qualification. Qualifications were similar in fee-paying and no-fee schools. It is important to acknowledge that the TIMSS grade 9 mathematics educators had the subject knowledge qualifications that should equip them to contribute to higher mathematics achievements.

Figure 2 shows the professional development activities attended by these educators. The most common recent professional development activities for mathematics educators related to content, curriculum, and assessment. The lowest levels were reported for professional development activities focusing on integrating technology into instruction, addressing individual learners' needs, and improving learners' critical thinking or problem-solving skills.

Figure 2: Grade 9 educators' professional development participation



However, despite educators' qualifications, learners performed poorly. More than half of the mathematics learners (59%) scored below 400 points, implying that they had not acquired basic mathematics knowledge. More focus is therefore needed on raising achievement levels, for example by integrating technology into instruction, addressing individual learners' needs, and improving learners' critical thinking and problem-solving skills.

Instructional practices

To improve learner performance, it is important to understand how educators use classroom instruction to engage learners, how they adapt their teaching and interaction strategies, whether they apply classroom discussion as a learning tool, and how effective their feedback strategies are in enriching the learning environment.

Our focus considers two dimensions of instructional quality, namely cognitive activation and supportive climate. Cognitive activation refers to the educators' ability to challenge learners cognitively and includes instructional activities in which learners must evaluate, integrate, and apply knowledge to solve problems. Educators can create a supportive climate by providing positive feedback, listening, responding to learners' questions, and being empathetic to learners' needs, and by providing extra help when needed.

The TIMSS grade 9 educators responded to questions regarding how frequently they applied instructional practices, with responses ranging from 'every or almost every lesson' to 'never'. Table 1 shows the responses of educators where these practices were applied in every or almost every lesson.

Knowledge acquisition is important in mathematics, but learners must also be able to apply knowledge and conceptual understanding in different contexts and to analyse and reason to solve problems. Table 1 shows that, in terms of the cognitive activation instructional practices, educators did not create sufficient classroom conditions for learners to be cognitively challenged and activated.

In terms of a supportive climate, it seems that educators were engaging with learners – for example by connecting new and old topics and encouraging learners to express their ideas in class – but were not encouraging classroom discussion. However, there is a disconnect between what educators reported with regard to connecting new and old topics (77%), and what grade 9 mathematics learners reported (46%) (see article on instructional clarity on page 33). Further investigation is required to understand this disconnect between educator and learner perception in terms of educators implementing this instructional practice in class.

Table 1: Educators report on applying instructional practices during every or almost every lesson

Cognitive activation	
Ask learners to explain their answers	51%
Relate the lesson to learners' daily lives	38%
Ask learners to decide their own problem-solving procedures	29%
Ask learners to complete challenging exercises	25%
Bring interesting materials to class	18%
Supportive climate	
Link new content to learners' prior knowledge	77%
Encourage learners to express their ideas in class	58%
Encourage classroom discussion	39%

Of the eight cognitive activation and supportive climate variables included in the models, 'Link new content to learners' prior knowledge' was significantly associated with mathematics achievement. Learners taught by educators who applied this practice for half the lessons or more scored on average 17.6 TIMSS points more than learners taught by educators who did not.

Prior knowledge is considered the most important factor influencing learning and learner achievement. Research has shown that trying to learn something without having adequate prior knowledge or while having misconceptions may result in rote memorisation or surface learning. The amount and quality of prior knowledge positively influence knowledge acquisition and the capacity of the learner to apply higher-order cognitive problem-solving skills. Therefore, a good foundation-phase education is of paramount importance.

What can educators do?

The items as they appear in the TIMSS educator questionnaires (Table 1) are good examples of educator behaviour that can assist learners in making sense of information. At the district and school level, education stakeholders should ensure that more time is spent on improving instructional practices that lead to higher learner engagement and subsequent higher levels of achievement. Our findings also show that more instructional time must be dedicated to assist learners in developing higher-order cognitive skills to apply knowledge and conceptual understanding in different contexts, and to analyse and reason to solve problems.

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