AMESA Office
P.O Box 54
2050 WITS

Tel: 011 484 8917
Fax: 086 553 5042
Cell: 082 4513648
Email:
president@amesa.org.za
vice-president@
amesa.org.za

NPO registration no: 134-443 NPO
PBO registration no: 930 008 391

To: Ms A Motshekga, MP, Minister of Basic Education

Dr HW Mweli, Director General. Department of Basic Education

Prof Ingrid Sapire, Chairperson of Ministerial Task Team (Mathematics)

28 September 2018

Dear Ms Motshekga , Dr Mweli, and Prof Sapire

AMESA Position on the Mathematics Teaching and Learning Framework for South Africa

The Association for Mathematics Education of South Africa (AMESA) was formed in 1993 and has been witness to the various changes to the Mathematics Curricula in South Africa and have been part of forums where decisions regarding curriculum change or revisions have been discussed. Continuing in the same spirit and responsibilities, AMESA provides a response to the Mathematics Teaching and Learning Framework for South Africa that has been put out for public comment. In this respect, the views of AMESA members on the framework are assimilated in terms of 3 positions for your consideration and action.

POSITION 1

The first, and larger grouping in the feedback suggests that the contents of the Framework are substantively problematic, and therefore likely to be disruptive, rather than supportive, of development of mathematics teaching on the ground, and that given this, the best thing would be to abort the Framework as it currently stands. Comments relating to this position point to aspects such as a frequent and problematic slippage in the Framework between procedures, strategies and reasoning with the latter two particularly muddied. The exemplifications and explanations of conceptual understanding often seems to be about procedures. There was concern that the examples of approaches presented as illustrative of strands across phases frequently did not illustrate what the descriptions of the strands suggested, nor the ways in which the strands could and should be integrated.

The absence of attention to trajectories and transitions of ideas was also noted as a significant gap, as was a sense of limited useful attention and exemplification of the role of 'overlapping' of key, and carefully selected representations for supporting the development of mathematical proficiency.

A key suggestion within this position was that it might be more coherent to work directly from Kilpatrick et al's (2000) strands of mathematical proficiency, as the basis for thinking about what an integrated, effective and flexible mathematical working should look like, rather than trying to reinvent this wheel.

POSITION 2

The alternative position, with a smaller set of comments, suggest that edits to the current formulation are likely to be needed to make constructive progress possible. In these comments, there are suggestions for adaptations to the strands and to the exemplifications of them in the document, if they are to illustrate the aims of the Framework to support: 'the implementation of the current curriculum through introducing a model to help teachers to change the way in which they teach.'

In this grouping of comments, there are suggestions to tighten up wording. For example, rather than 'procedures', an approach that emphasizes integrated working across strands might attend, instead, as Kilpatrick et al suggest, to 'procedural fluencies'. This is because the current exemplifications in the document miss out attention to the underlying fluencies required for enacting the approaches that are suggested, and this therefore feeds into presenting the approaches illustrated as separate exemplifications of strands, rather than illustrating how the strands can be integrated, and this is highly problematic in a terrain where early performance in mathematics is already so lagging on the curriculum specifications.

In these comments, the suggestion was that it would be possible to devise better illustrative examples based on alternative formulations of the strands. Taking one example from the Framework – which was discussed extensively at the NSTF forum and in earlier correspondence - the suggestion was that a more connected exemplification of the strands for 2-digit addition and subtraction might look something like:

Conceptual understanding: Key to place value is being able to work flexibly with composite units – treating 10 as either 'one unit of ten' or 'ten units of one'

Procedural fluencies: Adding or subtracting 10 to any 2-digit number (without counting in ones), adding a single digit to any two digit number

Possible Strategies:

A. Using jumps of 10s and units: 63 – 49. "Start at sixty-three, jump back forty, that gives twenty-three. To jump back nine, jump back three to get to the ten before, which is twenty and then jump back the remaining six to land at 14"
B. Using compensation: 63 – 49. "Sixty-three minus fifty is twenty-three. That's subtracting one more than I need to, so I have to add one back. The answer is 14"
C. Using place value blocks: Make sixty three as '6 tens and 3 units'. We don't have enough units here to take away the nine units in 49, so exchange one of the ten strips for ten units, leaving us with 5 tens and 13 units. We can now subtract 4 tens and 9 units, leaving 1 ten and 4 units = 14"
Reasoning: Given that 63 – 50 = 13 learners can reason that 63 – 49 must be 14 and explain that 'if you subtract 49 from 63, that is taking away one less than 50 so the answer must be one more. There are various elements of reasoning across the strategies described above.

More work would be needed to look at parallels to this more integrated approach to other content areas across phases. There was also comment that while learner strategies are undoubtedly critical, this strand is of a somewhat different nature to the other strands, which are about the nature of mathematical working.

At the level of detail, there were some differences of opinion on some aspects:

- The balance across the four strands and whether they should be evenly attended to or have conceptual understanding prioritised
- The grade placements of particular examples

A key area of consensus in the feedback was on concern with the processes, scale and timelines of broader consultation processes. The lack of broad access to the actual Framework document was highlighted, and the lack of formal feedback from key stakeholder groups such as mathematics teacher bodies like AMESA, and mathematics teacher educators was seen as highly problematic, particularly given the intention that the Framework should impact on the work of curriculum planning, materials development, and teacher education.

Taken together, the balance of feedback points to the need to think much more collectively across stakeholder communities on – not just a document, but a broader and more integrated approach to thinking about how to support the improvement of mathematics teaching on the ground, and the mathematical and pedagogical principles that can support this enterprise.

The feedback suggests widespread concern that the current Framework has too many flaws to support this goal in its current format, and that an extensive rollout may disrupt initiatives currently underway. However, there was also noting of a willingness across initiatives such as

the PrimTEd project, the HRDC project and the DBE Framework project to come together collectively to think about how key principles for supporting the development of mathematics teaching in South Africa, and support for more conversation and collaboration across these initiatives.

Position 3

Firstly, this grouping asserts that the process followed during the development of the framework was rushed, and did not necessarily allow for broad enough consultation, with an unsuitable response period after the draft framework had been released for comment. Secondly, the framework itself, taking into consideration its intent, does not seem possess the coherence to realise what it is designed to achieve.

Furthermore, there are concerns that this framework will inform further texts which may be designed to support the framework itself. In its present state, will not be able to inform said texts effectively.

The model for the framework has been seemingly adapted from Kilpatrick's strands. The group felt that if Kilpatrick's strands were being so heavily leaned upon, the working group could have just used the strands as they exist.

An alternate view however, begs the question as to whether a model, such as Kilpatrick's is ideal for the South African context. In this light (this is one opinion not necessarily shared by the entire group, but a valid point none-the-less), Kilpatrick's strands may be problematic as they do not necessary identify *conceptual understanding* as a driver for *mathematical procedures*, *reasoning*, and *learners' own strategies* (child-methods) and regards all four as of equal importance.

This document could have identified and promoted the "big ideas" and mathematics, and could have made clear the possible progressions (trajectories) towards understanding concepts and applying mathematical knowledge. It may be suggested that once a deep understanding of these fundamental ideas in school mathematics is developed, teachers – and then learners – could build on this knowledge to access more complex aspects in mathematics.

The utilisation of examples used to illustrate the kind of "thinking" which the document attempts to encourage may defeat the intended purpose. The danger exists that these examples may be translated into procedures. The examples themselves are inconsistent across the draft document in terms of the referenced content (for example, there are no geometry examples among the lower grade sections). With its focus on separate, unrelated examples, the document, in a sense, seems to "*reduce mathematics to procedures and understanding to understanding of procedures".*

The inclusion of learner's own strategies is commendable, to an extent, although it may enjoy too much of a privileged in the model as proposed, and may represent a short-sighted perspective of school mathematics in that, as quoted: "*The usefulness/effectiveness of "child-methods" diminishes towards the higher grades at school. This is a major reason why the draft Framework may be naive in making "child-methods" one of the four blocks of the scheme."*

As one of the commentators puts it: *"The current draft framework presents "child-methods" as alternatives to "conventional methods", and in the Rainbow (DBE) books "child methods" are actually* ***taught****. This is deeply questionable. "Child methods" should rather be viewed as stepping stones towards conventional methods, and should only appear as things that learners produce when engaging with novel situations before they know conventional methods."*

The group expanded on their understanding of "child-methods" as *"children's strategic and adaptive reasoning enacted. They are devised according to conceptual understanding and procedural fluency at a given point in time. And they develop and get abstracted, streamlined, more and more strategically effective as the conceptual understanding, procedural fluency develops."*

Hence, we must realise that *learners' own strategies* (child-methods) cannot be taught, but should rather be elicited.

In summary, this group requests that the process be put on hold, with enough time afforded to include recommendations as made by a broader consultation with stakeholders.

Position 4

Far too much emphasis on the low level topics, like completing squares and patterns. This document should not be used to display/market researchers' work on primary school mathematics. The completion of the square for example is probably a portion of one lesson in grade 9 or 10, yet so much space is allocated to it and related concepts. Same can be said for the article on patterns.

Too much philosophy and talk. More emphasis and thought must be given to strategies that could be used teach a variety of topics, especially, graphs, trig, geometry, probability.

Post 1994, much thought was spent in trying to explain things in a concrete manner. Mathematics is much more than asking learners to believe what they are told. A few examples, a few constructions do not constitute proof and understanding.

The envisaged approach may be time consuming and there needs to be reconfiguring of topics in the various phases (combining and leaving some out). Something has to be done to thin out/share the Grades 10 and 11 curricula. There is far too much in Grade 10 and there is not time at all to develop understanding. This is a huge problem. Reduce Grade10 syllabus by as much as 25% and do the topics thoroughly.

Conclusion and Recommendation

AMESA is one of the key voices of Mathematics Education in South Africa and its stance has been to work very closely with the DBE and our provinces in ensuring that children in South Africa are given the best possible Mathematics Education. Introducing the Mathematics Teaching and Learning Framework for South Africa in its current form is bound impact

negatively on South African children. As AMESA has a very important role in engaging with the DBE to find long-term sustainable solutions to the crises in Mathematics teaching and learning in South African schools, the DBE is urged to place the roll out of the Framework on hold until our raised concerns are adequately addressed, and a broader extensive consultation with stakeholders is pursued.

Yours in Mathematics Education

Thank you

Rajendran Govender
AMESA Vice President
On behalf of AMESA