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Re: Response to National Mathematics Framing Paper

## INTRODUCTION

The timely publication of the Cambridge Primary Review as The Australasian Association for Progressive and Alternative Education (AAPAE) is finalizing the submissions to the National Curriculum Framing Papers addresses many of the issues which are important to the learners, parents and teachers in alternative, progressive and democratic schools. We urge the Board and the writers of the Curriculum to consider the findings carefully.

“Several submissions warned that the government’s preoccupation with numeracy risked a similar kind of reductionism in mathematics as has happened to English. (p27) Overall the general impression of the Maths Framing paper is that genuine attempts to avoid this are being canvassed and AAPAE supports this direction.

(Alexander, R.J. and Flutter, J. (2009) Towards a New Primary

Curriculum: a report from the Cambridge Primary Review. Part 1: Past and Present.

Cambridge: University of Cambridge Faculty of Education.

<http://www.primaryreview.org.uk/Publications/CambridgePrimaryReviewrep.html>)

AAPAE has a general concern that by embarking on a national curriculum to which all schools and individuals must adhere, the very pluralistic, changing, dynamic, diverse experience and society which we say we value may be countermanded.

AAPAE broadly supports the recognition that society will become more complex and future workers need to learn, adapt, create communicate interpret and use information critically. We also want to see Mathematics enjoyed at every stage in life understanding it as a way of interpreting the world, not just as a means to future employment and participation in any workforce, global or otherwise.

## AIMS

(M17-20) AAPAE strongly supports the recognition of the goal of educating learners to be active, thinking citizens, interpreting the world mathematically, and appreciating the role mathematics has in doing this; the 'value and beauty, the elegance and power of mathematical thinking' and opportunities to really enjoy the mathematical experience.

Recommendation 1: That Mathematics be valued and experienced as a way of thinking not just a utilitarian tool.

Recommendation 2: That the logical process of teaching maths be valued and not diminished in the name of making mathematics "more relevant to the real world"

Recommendation 3: That the curriculum be as flexible as possible so that all students have the opportunity to study a course which relates to their interests and abilities and in which they can genuinely enjoy and achieve

## **CONSIDERATIONS**

### **Equity and opportunity (M30)**

#### **The need to engage more students (M31,32)**

#### **Ensuring inclusion of all groups (M33-35)**

#### **The challenge of creating opportunity (M 36-38)**

(M30) Any maths syllabus needs to be inclusive. Maths is a subject where work that is too challenging or not challenging enough can result in the student not learning much. If the work is too challenging many students will fall behind, become disengaged and give up. If the work is not challenging enough students can be bored and become disengaged. Another issue with not challenging brighter students in the stages 1-3, is that they may coast till they hit more difficult working stage 4 and then struggle, as they are not used to having to put effort into their study of mathematics.

Recommendation 4: An inclusive syllabus needs to be flexible so that all students can be engaged in mathematics and different rates of progress recognized and accommodated.

(M31-32) The articulation of the issue of disengagement and disillusionment with mathematics sometimes from very early in the schooling experience, is a challenge to all to ensure that the curriculum honestly addresses this as well as the real effect of each student's socio-economic level. As well as the reasons

articulated AAPAE would ask the writers to consider that the effects of high stakes and standardized testing regimes which have been in place for many years. They have narrowed the curriculum focus and opportunities for long term in depth study, placed stress on learners and teachers contributed to a sense of failure and disengagement.

(M33-35) AAPAE recognizes the value of the suggestion that algebra and geometry if developed in meaningful and interesting ways can contribute to greater mathematical understanding especially when related in the primary stages to patterns as in the NSW syllabus *Patterns and Algebra*

Recommendation 5: Make sure that the 'unsuccessful study of algebra' does not continue to be the norm and the continuation of 'alienation from mathematics.'

(M 36) + (M 65)

The transition from a single common compulsory syllabus for all students to a number of syllabi that are non-compulsory is an issue that needs to be considered carefully. Mathematics being a subject where there is a great range of abilities this transition needs to give students the opportunity to study.

(M40) In our submission to the English Framing paper we spoke of the need to ensure that general capabilities have a more central role rather than an accommodating role.

(M45) We value the recognition that the relationship between teacher and learner or co-learners as we like to think of them in AAPAE is a 'key determinant of effective learning' and that feedback is part of this relationship

Recommendation 6: That feedback grow out of the relationship between teacher and learner and parents and relate to the specific individual's study rather than an external standardized test.

(M46) AAPAE strongly supports the intention to find ways to 'thin' out the crowded curriculum and allow space for more in depth study. Recognition of the differences between learners is very welcome.

Recommendation 7: That the goals and the expectations of the curriculum be as broad and flexible as possible to allow different rates of progress in different sequences and pathways.

(M 50) Digital technologies play an important part in modern society and are important tools in learning mathematics. We need to be careful we do not implement technology in a way that the course became purely about how to use the technology to get the answer. Example, a student could be taught how to enter a set of data into a calculator and get the calculator to tell he/her what the Mean and Standard Deviation of the data is, but not understand what Mean and Standard Deviation measure. In this example the student has learnt how to use a

calculator not how to use Mean and Standard Deviation to understand and draw conclusion from the data.

Recommendation 8: that technology be implemented as an aid in learning and understanding mathematics

## STRUCTURE and STAGES

(M52-74) "A joint Royal Society and Joint Mathematical Council reported in July 2000 that the teaching of mathematics was increasingly being reduced to nothing but numbers, and that the death of geometry and the study of shape and space in mathematics teaching could only be to the detriment of visual and spatial intelligence. It takes little to see in this entirely quantitative approach a verification of René Guénon's vision of 'The Reign of Quantity.'

AAPAE is positive about the proposal to reduce the number of strands from 6 to 4. The more maths can be seen as integrated rather than a catalogue of small pieces the better.

### Stage 1

(M63) AAPAE welcomes the emphasis on the opportunity to have access to 'powerful mathematical ideas' that are 'relevant to their current lives',

Recommendation 9: Concentrate on the quality of the relationship between teacher and learner and PLAY with mathematical ideas and experiences.

### Stage 2

(M64) AAPAE welcomes emphasis on the importance of students studying coherent, meaningful and purposeful mathematics that is relevant to their lives and the notion that learners 'still require active experiences'

Recommendation 10: Continue the PLAY and build in and integrate the construction of key mathematical ideas,

### Stage 3

(M65-67) AAPAE supports the intention that the curriculum will list fewer detailed topics and encourage the development of important ideas in more depth.

Recommendation 11: Reconsider whether Maths needs to be compulsory for the whole of this very fraught stage in the continuum of Maths appreciation.

**Stage 4 and Question 13: How many mathematics courses for the senior years of schooling should be included in the national mathematics curriculum?**

(M68-74)

AAPAE was happy to see the inclusion of "[Participation in Year 12 Mathematics across Australia 1994-2004](#)" (Barrington 2006)

We would be disappointed if a national curriculum denied students in NSW the opportunity to study a course of equal academic and intellectual rigor of the current (or soon to be implemented revised) HSC Mathematics Extension 2 course. A concern with Extension 2 is that many students do not get the opportunity to do it unless they are at a large academic school and have relevant class size and teachers who want to teach it. So it can be an equity issue.

Recommendation 12: We would hope that any national curriculum would consider the case of NSW where the two non-calculus course were replaced a single course, General Mathematics, that many students found over challenging and is proposed to be replaced with two course: Mathematics General 1 and Mathematics General 2.

#### PEDAGOGY and ASSESSMENT

(M75-78) AAPAE would like to see pedagogy which encourages the interests and enjoyment of the learner and is pleased to see that the writers prefer that students have the opportunity "to study fewer aspects in more depth rather than studying more aspects superficially."

Again we refer to the Cambridge Primary Review (p51.52)

A more measured challenge came from Professor Guy Claxton: "Beyond the obvious usefulness of basic arithmetic, mathematics has the status it has not because it is intrinsically important, but because it seems to fit the methods and assumptions of Zumbac's school so well. Mathematical knowledge is timeless. It can be easily segmented into topics. It can be clearly explained. Graded exercise can be constructed to guide practice. The steps of reasoning can be set out so errors are easily spotted. There are unambiguously right answers, which make for rigorous and objective assessment.

'Zumbac's school', Caxton explains, perpetuates the classical and mediaeval primacy of logical or quasi-logical systems of thought, and values above all knowledge which is reliable, timeless and readily parcelled up and transmitted, regardless of its relevance. Mathematics, he believes, fits this bill perfectly and thereby escapes challenge on the grounds of relevance to which other subjects must submit. Claxton adds, though, that **'the real way mathematicians actually solve problems and make discoveries is ... a million miles away from this clinical kind of learning.'**

AAPAE believes that assessment is the servant of the learner and direct feedback between those intimately involved in the learning process is the key. Standardised highstakes testing regimes and public reporting have been shown

over and over to narrow curriculum, stress teachers and learners into test focus, labelling and categorization as less than or outright failure, threats of punishment, criticism, strip self esteem and instil a lifelong distaste for anything academic.

“Tests exist for their own sake they measure the ability of the entire school community, learners, parents, teachers administrators to focus all their efforts on producing good results on tests! Nothing more, nothing less!”

Ackoff.R.L & Greenberg.D 2008 Turning gninraeL Right Side Up

Wharton School Publishing, New Jersey p27

Recommendation 13: As mentioned in (M45) that assessment relate specifically to the feedback processes between the individual and their learning and the teacher and be free of high stakes external standardized testing regimes which are then publicly reported and lead to comparisons and build pressure and stresses on the learners and the teachers and thus contribute further to s sense of alienation and disengagement.

Recommendation 14: Self assessment of goals and achievement and diagnosis of new directions within the context of the learning/ teaching relationship work to engage and encourage the learner to further inquiry

Conclusion

9&9-80) AAPAE supports including greater emphasis on finding out what the students know, and building on this and also greater emphasis on ways of adapting activities to enable access for students experiencing difficulty, and to extend students who may benefit from richer activities. Let's bring the fun and excitement of maths back into learners' lives.