My impressions: ACARA National Consultation Forum: Senior Mathematics 23/24 June 2010
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I attended both days of these forums though left at lunchtime on the second day. Neville Weber also attended the second day. The forums were attended by well over 100 representatives from across Australia including high school teachers, university academics, professional societies, state boards and assessment authorities. On each day we broke up into tables of 6-8 and some tables focussed on specific courses and others looked at the nexus between courses. I will try to be objective but obviously that's not really possible.

General statements:

- The draft curricula will be **redrafted** later this year based on the current consultation round and a **second** consultation round will take place over Feb-Apr next year with a **final** version mid next year.
- Draft achievement standards will be developed by the end of this year.
- Unlike the junior curricula there will be no **elaborations**
- ACARA acknowledges that this suite of 4 courses is insufficient to cater to the needs of all categories of students, individual states are allowed to develop and offer courses in addition to the national ones
- ACARA said that the draft content is a 'dump' intended to be 'heavy' and for the consultation process to refine more by deletion than by addition
- I got the impression that every topic has at some stage been taught successfully somewhere in Australia
- Statements from ACARA about students being able to move between these courses were viewed with some scepticism by most of those present
- There was reasonable consensus for some course intermediate between A and B; and for another course intermediate between C and D.
- The names of the courses are not carved in stone, but the number might be.
- Some people looked at how the courses fit the needs of the historic/existing partition(s) of target student audiences; others looked at whether the courses suit the needs of new partitions(s) of the students.
- Everyone proudly stated that assessment should never drive content; and then behaved "pragmatically".
- A significant minority (including me) are wondering whether courses B and C may evolve to be of comparable difficult/rigour but based on complementary areas of mathematics.
- The first day (courses A&B) was dominated by school teachers and most of the feedback was optimistic
- The second day (courses C&D) was dominated by non-school teachers who were more cynical/critical
- The degree to which technology could/should be **exploited/excluded** was not evident and this would seriously impact the depth vs. breadth vs. fluency achieved. It was not clear if different states could/should take different stances on this issue.
- The junior curriculum is already being test-driven at about 200 schools and seems to be working.
- On both days I was lucky enough to be at tables that took an optimistic stance

Course A: Essential Mathematics

The table I was at did not concentrate on this course and what I say is based on a summary given at the end of Wednesday.
- There is a well defined target audience for this course
- Most states have had positive experiences with "investigations" (research/project work)
- The same content could be repackaged thematically for this target audience
- This course is not suitable preparation for any university studies in quantitative or semi-quantitative fields
- This course would/shoudl leave students with a positive attitude towards mathematics and its role in society.
- The title of the course contradicts statements elsewhere that Year 10 maths is sufficient to participate as a capable citizen in 21st century society.

Course B: General Mathematics

- This course may suit students intending university studies in fields which use mathematics that is not calculus-based but may rely on various areas of statistics, linear algebra and discrete mathematics as in the health and social sciences, some types of management and business studies, non-technical areas of engineering, and perhaps agriculture.

- An entire topic on 'price index numbers' is inappropriate and should be removed or relegated to a subtopic of 'financial modelling'
- 'Linear modelling' could be moved to Unit 1 and 'graphs and networks' moved to unit 2
- The topic on 'measurement' may not be necessary…especially if some other course is developed between A and B.
- SA strongly felt that there is no point teaching trig if you don't include the sin and cosine rules.
- SA was opposed to logarithms being in this course (they have evolved very intricate ways of doing complicated calculations avoiding the need to introduce this function), all others felt it was essential to understanding growth and decay as well as important transformations of data
- Matrices were viewed positively.
- Those states used to graph theory have positive experiences with practical algorithms that are used in industry (minimum spanning trees, critical path analysis, maximum flow problems) but don't currently include topics such as Euler and Hamiltonian paths or the Hungarian problem (no one at the meeting knew what is was either).
- The amount and type of statistics was reasonable.
- 'Time series analysis' is taught in some states but this could by a topic that is deleted to allow more depth in other topics.
- The 'financial modelling' topic is okay but some content could be deleted such as 'asset valuing'
- Analysing loans, annuities and investments are useful demonstrations but if the curriculum is interpreted as saying that all these examples need to be covered then this would be too much… perhaps providing options (not the financial kind) is one approach.

Course C: Mathematical Methods

- This course may suit students intending university studies in fields which rely on mathematics and statistics, including ALL of the natural sciences and technical engineering disciplines
- There are typographical errors!
- There are topics that are nice and useful but that also have the property that if you delete them, what is left remains coherent – we put these under intense scrutiny
- Although it might look like there was too much statistics, we felt that the tri-partite structure of 'discrete-> continuous-> inference' in that order was the best way to teach the subject in a cohesive way that reached a viable end-point or capstone. One could delete the last topic but then you have taught a lot of content and not brought it together in a satisfying way.
- 'Linear equations' can be taught without introducing 'matrices' if necessary
- Four separate topics on calculus could be regrouped into three by judicious excisions
- With regard to the unit 'Algebra, functions and graphs 2':
    -the horizontal and vertical scaling of trig functions is done within the unit on trigonometry, thus the horizontal and vertical shifting of trig functions could be done in that same unit
    -the horizontal and vertical scaling and shifting of arbitrary functions is done in AF&G 1 a type of transformation.
    - curve fitting in its entirety can be deleted or simplified to transformations of data
    - whatever is left of AF&G2 could be merged into a more coherent AF&G 1
- There is no explicit mention of mathematical proof in this course

Doing both Course B and C

- People from NSW strongly believed no-one would want to do this much maths unless they were the 'top' maths students and of course they would combine C and D
- People from SA, WA and others said that there currently were many students at a moderate level of ability doing this amount of maths and that it was even seen as a good strategic choice to do twice as much maths but not the hardest maths for university entrance

Doing both Course C and D

- Contradictory statements have been made as to whether Course C is required, recommended or desirable to go with course D and whether you can start Course D half-way through.

Course D Specialist Mathematics

- This course appears to be a collection of topics with little regard to coherence and flow
- There are even more typos in this course than in course C.
- The statement in the rationale that this topic has an emphasis on applications seemed wrong
- Everyone was pleased to see mathematical proof appears in various places:
    - a topic of its own in unit 1 emphasising number theory and deductive geometry
    - with regard to conics in 'Parametric equations' Unit 2
    - within 'Graph theory' Unit 2
    - 'Induction' in Unit 3
    - within 'Vectors' Unit 3
    - within Option 3 regarding inequalities
- proofs in different subareas of maths appeal to different students (i.e. someone poor at deductive geometry may excel at number theory or combinatorics or graph theory)
- everyone loves Graph Theory but if you made it an option, the course would not lose any coherence
- the section on proof should not just be number theory or just geometry, but there is too much at the moment, perhaps retain circle geometry and relegate triangle geometry to other units or options.
- the curriculum should not explicitly list which specific theorems need to be proved
- the inclusion of a mandatory specific topic 'Kinematics' gives inappropriate weight to one discipline, this should be absorbed into the option called 'Vectors and dynamics'
- the examples of differential equations should be chosen in a balanced way from many areas and the lists in the curriculum document should not give the impression that only physicists need advanced calculus.
- some people like the idea of options, some do not.
- there construction of the course depends a lot on how seriously you take the idea that some students will start this course half-way through!

Printing the documents on the web has caused problems for many people, I will try to leave printed copies in the tea room.