



# **Education and Employment Committee Inquiry into the Operation of TAFE**

## **AAMT Submission**

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**Submitted by**

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## Introduction

The Australian Association of Mathematics Teachers (AAMT) is the peak national body of teachers of mathematics, representing their professional interests and supporting their work. It has branches in each state and territory and extensive and active networks within the profession (see Appendix 1 for more detail).

This submission focuses on the mathematics/numeracy domain of TAFE. Although AAMT's main sphere of activity is the schooling sector, the Association believes that schooling should not be seen in isolation – AAMT has, over a number of years, formed productive links with Early Childhood education, and the university sector. The association believes that this Inquiry provides a timely opportunity to argue a case for AAMT to connect better with, and, potentially, take a more forward role in support of, the mathematics/numeracy teaching within the TAFE sector.

The importance of mathematical/numeracy skills in our society is well recognised. Shortages of skilled workers have been an issue in a range of industries for several years. Employers highlight particular concerns about quantitative skills, both at the entry level and on the job, in increasingly demanding technological workplaces. This issue has been identified, for example, in the report *Lifting our Science, Technology, Engineering and Maths (STEM) Skills* (Australian Industry Group, March 2013). These findings make clear the extent of the problem from employers' perspectives.

Moreover, not only are mathematical/numeracy skills also essential in daily life outside of work, the nature of those skills is understood and articulated. For example, the COAG *National Numeracy Review Report* of 2008 concluded:

Our review of national and international research and practice informs us that the mathematical knowledge, skill and understanding people need today, if they are to be truly numerate, involves considerably more than the acquisition of mathematical routines and algorithms, no matter how well they are learned. Students need to learn mathematics in ways that enable them to recognise when mathematics might help to interpret information or solve practical problems, apply their knowledge appropriately in contexts where they will have to use mathematical reasoning processes, choose mathematics that makes sense in the circumstances, make assumptions, resolve ambiguity and judge what is reasonable.

This view of the sorts of skills required needs to be central to efforts to improve mathematics/numeracy in TAFE – there needs to be a greater focus on engendering higher order thinking in training and mathematics/numeracy situations at work.

## The Terms of Reference

The AAMT Submission addresses the first two of the Inquiry's Terms of Reference:

- The development of skills in the Australian economy
- The provision of pathways for Australians to access employment

in the context of mathematics/numeracy. Whilst this could be seen as a narrow, sectional focus, the AAMT believes that genuine support for TAFE provision to match the needs and aspirations of Australian society can only be achieved if issues in mathematics/numeracy in TAFE are thoroughly and intelligently addressed and programs developed and implemented in a targeted range of ways.

## Situation Analysis

Whilst the Committee's inquiry is much broader than the focus of this Submission, the mathematics/numeracy area stands out as among the two or three top areas in which improvement is urgently needed.

*There are sustained issues with 'outcomes'.*

Australia's performance in the recent international study of adult numeracy and literacy – Programme for the International Assessment of Adult Competencies (PIAAC) – found that in 2011-12 around a third of Australian adults were in the lowest two bands of performance in

numeracy. In other words, many Australians 'do not possess the literacy and numeracy skills necessary to participate fully in modern life and work' (ACER, 2013). Within schooling, the Program for International Student Assessment (PISA) that measures 15 year olds' mathematical literacy has recently returned some concerning results, although these would not appear to be as negative as the PIAAC results for adults. School systems and teachers are currently responding, with policies and programs that are attempting to address the apparent slide in school students' rankings in PISA. Similarly, TAFE and the VET sector generally has a responsibility to respond to the PIAAC results.

As indicated above, employers often criticise the mathematical skills of young workers as being less than what are needed for today's increasingly demanding workplaces. Whilst schooling should accept and work to improve school leavers' mathematical capabilities, once these people are in work, the TAFE system needs to take increasing responsibility for the mathematics/numeracy skills – or lack thereof – of their students in training programs.

These outcomes point to a range of education and training issues within TAFE mathematics/numeracy including curriculum, assessment and pedagogy. For example, the use of training packages that do not appear to support TAFE teachers to diagnose underpinning gaps in students' skills bases and then deal with these would seem to fall well short of effective teaching and learning.

### *There is a continuing – and very likely increasing – workforce quality issue*

The report *Seeking the N in LLN* (NCVER, 2013) is the most recent indication of the serious skills shortage of mathematics/numeracy background and skills in the VET sector workforce, at least as it applies to language, literacy and numeracy support and related programs, that seek to address general literacy and numeracy skill development. There is evidence of practitioner fear and lack of confidence in the face of students' numeracy needs.

In a manner similar to the well publicised shortages of qualified mathematics teachers in schools, many TAFE teachers of subjects and courses which include substantial mathematics/numeracy are apparently not trained at all in the teaching of mathematics/numeracy. Further, it is AAMT's understanding that the needs of teachers in TAFE in relation to the teaching of the mathematics/numeracy in the courses they teach has historically received extremely limited attention. Indeed, there appears to be a lack of sufficient minimum benchmarks for practitioner qualifications and training standards for practitioners across all VET sectors, including TAFE.

In its submission to the 2010 Education and training Workforce Study by the Productivity Commission, the Mathematical Association of Victoria (AAMT's Affiliate in that state) said:

We argue that all VET teachers should be able to identify student's skills in numeracy and mathematics, and have the pedagogical knowledge and methodology to develop these skills. In many courses maths skills will be a fundamental and underpinning component of the course being taught. There is the need to support all VET teachers to learn numeracy and mathematics content and pedagogy knowledge. This could vary from basic level maths skills related to, for example, numbers, measurement and location and direction applicable to a wide range of courses such as hospitality, retail, construction etc through to much higher level maths skills in trade and technical courses in areas such as electro-technology. In this latter case students need access to qualified teachers and trainers with an understanding of the underpinning maths skills and empathy for explaining and demonstrating the real-world applications of mathematics.

MAV, 2010

The AAMT's conclusion is that 'we' need to do much better with mathematic/numeracy in TAFE – and the VET sector generally. This is true in both broad areas – direct vocational training in which courses contain mathematics/numeracy content, demands and expectations of graduates/workers; and the more generic language, literacy and numeracy programs.

## **Solutions**

The AAMT believes that an essential part of a sustainable overall approach is to develop the quality and professionalisation of the TAFE mathematics/numeracy teaching workforce. Connections between and collaboration among key stakeholders will be a key strategy in achieving the level of quality and professionalisation required.

## *Dialogue*

The 'we' in the paragraph above needs definition. It is AAMT's view that sustainable solutions rely on schools and schooling, TAFE and the VET sector generally, government and employers, both directly and through umbrella organisations such as AIGroup, Business Council and ACCI, all playing their parts as partners. The separations between these stakeholders that AAMT has observed in the mathematics/numeracy area over many years must be replaced by open and purposeful dialogue that results in real change.

This dialogue needs to lead to greater mutual understanding of the contexts, constraints and opportunities as seen by the different stakeholders. A key outcome should be a much greater level of sophistication in the shared understanding and expression of the mathematics/numeracy requirements in workplaces and for training. This is particularly needed on the context that mathematics/numeracy is often so integrated with other workplace tasks that it is not acknowledged and the mathematics/numeracy becomes 'invisible'.

This dialogue needs to inform a research agenda relevant to the mathematics/numeracy provision in TAFE. A solid research base is needed to inform policy directions on curriculum, teaching and training in the sector.

## *Schools' responses*

AAMT and its Affiliates can bring to the table the capacity to help diminish the gap between the mathematics/numeracy skills of school leavers and the needs and reasonable expectations of training and work from the school end through improved curriculum and teaching practice. As independent professional bodies, AAMT and its Affiliates will do this from within the profession, rather than looking for top down approaches from education systems. However, AAMT can 'bring the systems along' with its initiatives, having done this to some degree with areas that often sit outside of the mainstream of school systems' activities and/or might prove problematic (and we would argue that aligning the mathematical skills of school leavers to the needs of work and further training may well fit either or both of these categories in practice).

Through the *Quantitative Skills in 21st Century Workplaces* project funded by the Office of the Chief Scientist, AAMT has commenced some exploration of this territory. The project, due to report in the middle of 2014, is using a process in which mathematics teachers work-shadow young workers to better understand the demands of contemporary (i.e. increasingly technological) workplaces. Their observations will provide data for a report that provides advice and practical examples that assist mathematics teaching in secondary schools to reduce the gap between the skills of school leavers and the requirements of the workplace and associated training.

This research is one example of the sort of work that can inform the connections between school education, training and employers that AAMT sees as vital to establish and maintain.

## *Professional TAFE mathematics/numeracy teachers*

AAMT and its Affiliates constitute an existing professional community that TAFE practitioners with teaching responsibilities in the mathematics/numeracy area can join and benefit from. This is true for those with specific vocational teaching role. The reality is that to be a good (i.e. properly trained) plumber/hairdresser/chef/electro-technologist etc. you have to be good at the mathematics/numeracy of that work. The AAMT networks and connections could also be useful and used by those practitioners in TAFE with more generic numeracy teaching roles.

However, the first step in becoming engaged professionally with their colleagues – largely secondary mathematics teachers – from the schooling sector is for TAFE practitioners to recognise that they are teachers of mathematics/numeracy, at least in part. Currently a negligible number to AAMT members identify as working in the TAFE (or VET) sector and therefore avail themselves of the opportunity to engage with and inform and be informed by their secondary colleagues. Over time, a vibrant community of practice in mathematics related to the workplace needs to be developed and sustained.

TAFE mathematics/numeracy teachers' professional commitment to their teaching through involvement in professional development and other activities of AAMT and its Affiliates would need to be recognised and the outcomes valued within the TAFE system. This leads to another element of 'professionalism' within teaching – the setting and monitoring of professional teaching standards. AAMT believes that, just as in the schooling sector, TAFE mathematics/numeracy

teachers would benefit from defining their specialist knowledge and skills. AAMT has well-recognised expertise in this area and would be a natural 'fit' for a process that defines good mathematics/numeracy teaching in the TAFE sector through professional standards, and establishes means for using those to improve teaching and acknowledge highly accomplished practitioners.

## Appendix 1 – About AAMT

The Australian Association of Mathematics Teachers Inc. was founded in 1966 as a ‘federation’ of mathematics teacher professional associations in the states and territories. The AAMT is the nation’s pre-eminent professional association in school mathematics and numeracy education. It exists to:

- support and enhance the work of teachers;
- promote the learning of mathematics; and
- promote progress in mathematics and numeracy education.

The nature of the organisation has enabled the AAMT to play a significant role of national leadership in mathematics and numeracy education over many years.

The Association’s members come from all states and territories and all levels of government and non-government schools. They form an extensive network of committed and enthusiastic mathematics and numeracy education professionals including teachers, academics, policy leaders and administrators. Currently the Association has approximately 4,500 members — 2,400 of these are individual teachers. The rest are Institutional members (schools), thus giving the AAMT direct contact with more than 25,000 teachers and others.

AAMT is a not-for-profit organisation with tax exempt status from the ATO as a scientific organisation. The Association is funded through membership fees and its other activities. There is no annual funding from any government. Average annual turnover is more than \$2 million.

Through the work of its many volunteer members and highly skilled staff, the AAMT provides a range of services for teachers and schools that includes:

- Three refereed journals (primary, middle years and senior secondary);
- Annual Activities that promote the learning of mathematics by students and teachers, including the National Mathematics Day, National Mathematics Talent Quest and numeracy activities as part of National Literacy and Numeracy Week;
- An extensive catalogue of teaching materials for sale by ‘mail order’;
- Professional Development activities including electronic networking of teachers and Biennial National Conferences; and
- Projects to undertake research, and curriculum and professional development.