

# VALUING MATHEMATICS IN SOCIETY: A DISCUSSION PAPER

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## OVERVIEW

The Mathematical Association of Victoria (MAV), has been a leading contributor to mathematics education in Victoria for over 100 years. In recent decades its key concern has been to support teachers of mathematics in their practice, through the provision of high-quality professional learning opportunities, student activities, teaching and learning resources, conferences and other valued programs and services.

## VALUING MATHEMATICS IN SOCIETY

MAV is a membership-driven association that provides a voice, leadership and professional support for mathematics education.

MAV works within an evolving context, and at a crucial time in education:

- Education is changing, and MAV must lead the way in supporting mathematics educators to have the best impact possible.
- The mathematics curriculum needs to respond to these changes: from VCE and VCAL to the early years of school, and early childhood education.
- Teachers require professional support and resources to develop in students the mathematical capabilities needed in their personal, professional and civic lives.
- It is critical that students are prepared for life after school, progression to further study and for career pathways in a world that is data and information rich and technologically advanced.

## ADVANCING MATHEMATICS EDUCATION

The following pages outline areas for discussion and action within four broad categories:

- Society and government
- School leaders
- Teachers as individuals and team members
- Students and families.

These focus areas are sourced from member feedback, Board discussions and other contributors in mathematics education.

This paper will elaborate on the selected areas as a discussion starter, identifying areas where together we can advance mathematics education in Victoria for the decades ahead.

This will allow stakeholders, at all levels to engage in considered debate and develop ideas and strategies for action where required. MAV seeks collaborators in the areas identified that can help progress change.

## WE VALUE YOUR FEEDBACK

MAV would like to hear your thoughts about the content of this paper and the areas identified for focus. Please send any feedback, questions or further ideas to [office@mav.vic.edu.au](mailto:office@mav.vic.edu.au).

## SOCIETY AND GOVERNMENT

Mathematics is integral to the prosperity of society, including the current STEM agenda. Informed citizens are required to be mathematically literate, including strong numeracy skills in order to contribute positively to society.

Positive perceptions of and engagement with mathematics must be a priority for government and the community. MAV is working to deliver on its vision of 'Valuing mathematics in society', which is always front of mind in our work. This includes addressing disadvantage in education and providing opportunities for all to achieve their potential.

Policy decisions need to be informed by a proper understanding of what is happening 'on the ground' in schools. MAV maintains positive working relationships with the Victorian Department of Education, the Victorian Curriculum and Assessment Authority, the Australian Associations of Mathematics Teachers (AAMT) and other parties both state and national. MAV must continue to use these relationships to share and advance the views of its members and educators, in order to facilitate positive advances in mathematics education.

MAV works with government authorities to develop appropriate and high-quality resources and programs for mathematics, including numeracy, to support school leadership, teaching and learning.

MAV upholds the profession and looks for ways to enhance its standing. Teaching is a professional career, requiring a host of attributes for success. We must ensure society values teaching as a career and strive to enhance teacher status. We must find ways to recruit, retain and develop the best teachers.



### Areas for action

- Developing positive perceptions of mathematics and awareness of its capacity to enhance societal well-being, including personal and economic prosperity and to solve ethical, social and environmental challenges
- Creating opportunities for all students, teachers and members of society to experience mathematics positively
- Building mathematical skills that support STEM and career opportunities and readiness to ensure a supply of highly qualified graduates into careers including teaching that support future innovation and economic prosperity
- Building mathematical literacy and numeracy required for daily life, including algorithmic thinking, problem solving, financial skills
- Improve equity and access to provide opportunity for all students to achieve success in mathematics
- Ensuring effective attitudes to and regulation of university prerequisites, ATAR, and recommended mathematics subjects
- Developing appropriate perceptions and use of PISA/TIMSS, NAPLAN and other system level and comparative testing data
- Developing new curriculum, assessment, pedagogy and resources to support change and policy
- Enhancing teacher status and recognition of the teaching profession
- Recruiting, retaining and developing the best teachers, including recognising and rewarding excellence and growth.

## SCHOOL LEADERS

Mathematics should be valued by school leaders, as what is valued is prioritised. School improvement requires school leadership to continually review and assess their practices. It also requires an understanding and application of evidence-based practices that enhance learning outcomes in mathematics.

There are many exemplars showing best practice, innovation and achievements. MAV facilitates professional learning opportunities for schools to share best practice, respond to challenges and create change through targeted professional learning such as conferences and events.

Such opportunities allow schools and leaders to share their successes and challenges, and strengthen their understanding of what works well in different contexts. In turn, this facilitates the building of networks, the development of mathematics leaders, and communities of practice.

MAV provides formal whole school development programs, involving school leaders and utilising evidence-based approaches. MAV consulting gives schools direct access to leadership expertise, and objective professional advice to support school improvement plans.



### Areas for action

- Providing the tools to lead whole school change, measure success, and create collaborative professional learning communities
- Ensuring that secondary mathematics leaders, careers counsellors, and mathematics teachers consider mathematics subject selection in relationship to vocational outcomes, and the ATAR, ensuring students are prepared well for mathematics success in tertiary courses and careers
- Ensuring that primary mathematics leaders develop the teacher capacity of all teachers, their confidence and capability, and mastery of the big ideas that will ensure continued success in mathematical learning
- Building collegiality: faculties working together to identify areas of need, ensure shared goals and success
- Reducing variation within and between schools by providing equitable support and opportunity for all learners
- Supporting the implementation of new curriculum, assessment and pedagogical changes
- Providing a variety of opportunities that support professional learning, networking and sharing of best practice leadership
- Supporting school leaders to ensure numeracy across the curriculum is in focus
- Ensuring excellence in the capabilities to enhance learning in mathematics, including collaboration, problem solving, resilience, critical and creative thinking
- Ensuring school leaders understand the time allocation required for successful mathematics, and expanding upon the minimum required hours to raise the profile of the subject
- Providing appropriate support structures and resources for graduate teachers to increase early career success and retention.

## TEACHERS AS INDIVIDUALS AND TEAM MEMBERS

We must focus on the development of teacher capability, provide the best possible tools and access to opportunities for growth. Working together and sharing ideas is essential to developing teacher practice that meet the needs of all learners. When teachers are given the time and the trust to collaborate, they grow professionally and personally, leading to better outcomes for their students.

We must ensure that teachers of mathematics have a deep understanding not only of the curriculum, but also of the process of designing learning programs and the pedagogical approaches that will best communicate the ideas behind the curriculum.<sup>2</sup> This has become more important during periods of remote learning, with teaching practices evolving to use various technologies to deliver effective and engaging learning. Such innovative and emerging practices if harnessed and developed can help our educators' practice evolve positively for the longer-term future.

MAV has led the way during periods of remote learning, pivoting to flexible and virtual delivery of services to support teachers and ensure they have the resources and opportunities to continue to grow personally, and deliver meaningful learning experiences. The TEMAG<sup>3</sup> report *Action Now, Classroom ready teachers*, indicates that primary teachers were challenged in confidently teaching certain areas of the curriculum including mathematics. 'Out-of-field' teaching is far too common in our schools as indicated in the 2018 AMSI<sup>4</sup> paper, and seems to involve a disproportionate number of early career and regional teachers. Support is required to ensure students learn from appropriately qualified mathematics teachers.

Teachers must assume ownership of their own professional learning journey. They must have the opportunity to select professional learning relevant to their needs at each point in time in their career. MAV delivers successful and evolving models for both in and out of school professional learning responding to the needs of teachers and schools. MAV also provides conferences and events for networking, showcasing innovation and sharing best practice.

There are a myriad of new programs, requirements, publications, resources and websites that offer advantage in the mathematics education space. It is challenging for teachers to keep up with all of these developments. MAV evaluates selected resources and programs, providing guidance to members through its resources, website and newsletters.

*'That is the role of the teacher: to make the subject not just compulsory, but compelling.'*

- Dr Alan Finkel, Former Chief Scientist<sup>5</sup>

### Areas for action

- Helping educators create and maintain effective collaborative professional learning communities within and across schools
- Providing a variety of opportunities that support diverse professional learning opportunities, networking and sharing of best practice
- Developing teachers as reflective practitioners: using evidence-based improvement and data to make decisions
- Allowing teachers agency of their professional learning journey based on their developmental needs
- Equipping teachers with the tools to support best-practice delivery of curriculum including mathematical content and proficiencies, personalised learning, student agency, and other new opportunities
- Supporting the needs of out-of-field and early career teachers
- Supporting effective pedagogy including differentiation and individualisation
- Developing teachers' ability to move beyond traditional assessment, implementing effective formative assessment and feedback approaches based on recognition of student progression
- Supporting use of digital technologies to enhance students' learning as teachers are now becoming creators and users of media to engage and support learners
- Allowing teachers to innovate during and beyond remote learning to enhance student outcomes using technology
- Supporting the specific needs of regional, rural and remote teachers to reduce impediments to their success
- Supporting the development of numeracy across the school curriculum in all disciplines where numeracy is required for success.



### STUDENTS AND FAMILIES

At the heart of education are students and their families. When students feel good about themselves as learners, they are more likely to choose suitable pathways and take hold of opportunities in their mathematics education. This includes the selection of mathematics courses at Years 11 and 12 that open up rewarding opportunities in their future.

Parents and students need to develop positive attitudes towards mathematics from the early years onwards. MAV has a strong vocational focus, including industry and workplace links in order to prepare students for future careers that include STEM, and to help teachers apply real life contexts to engage students.

MAV provides information, events and revision programs that contribute to student success and engagement. MAV's program should include engaging with students of high potential, and students of disadvantage, including Indigenous students, those with learning related issues and special needs.

MAV's *Maths Active Accredited Schools* engage with the community, and demonstrate best practice approaches to teaching and learning. They are showcase schools that encourage improvement, and recognise excellence.



#### Areas for action

- Engaging with the public, including advocacy for parents, to develop positive attitudes towards mathematics
- Providing the right approaches at Early Years, a critical time for educators and parents to ensure students get a good start
- Maintaining engagement at transitions: from early childhood to primary, secondary, VCE/VCAL/VET, tertiary, the workplace and through other pathways
- Supporting parents and students with appropriate and accurate information for course and career decisions
- Better communication for parents about what is expected as students progress through the curriculum, including strategies used and how parents can support their children
- Challenging and supporting all students and providing opportunities for engagement and success through appropriate pedagogies, and real-world, vocational applications
- Developing appropriate support and programs for disadvantaged and high potential students
- Ensuring parents understand and students develop the mathematics and numeracy required for success in their personal, professional and civic life.

#### REFERENCES

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## MAV: SUPPORTING THE PROFESSION

There are many different dimensions to the relationship between a professional association and its members. The Australian Professional Standards for Teachers set out the expectations of the profession as shown in the table below<sup>1</sup>.

MAV provides programs that support all aspects of these standards.

Domains of teaching	Standards	Annual conference and Primary and Early Childhood conference	Professional Learning events, regional network days	VCE Professional Learning program	Professional advice	Professional and classroom resources	In-school consulting	Maths leadership development programs	Maths Active schools	Maths Talent Quest	Maths Games Days	VCE Revision program	Girls in STEM, industry based maths Camps
Professional knowledge	1. Know students and how they learn	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
	2. Know the content and how to teach it	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Professional practice	3. Plan for and implement effective teaching and learning	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
	4. Create and maintain supportive and safe learning environments	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓
	5. Assess, provide feedback and report on student learning	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
Professional engagement	6. Engage in professional learning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	7. Engage professionally with colleagues, parents/carers and the community	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓