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Australian Academy of Science Submission to Department of Education, Skills and  
Employment Quality Initial Teacher Education Review

The Australian Academy of Science (the Academy) welcomes the opportunity to comment on the Department of Education, Skills and Employment Quality Initial Teacher Education Review discussion paper.

The Academy maintains that Australia needs a school system that ensures students in all Australian primary and secondary schools will be taught by teachers some of whom will have a science or mathematics specialisation. Accordingly:

1. Teachers of science, technology, engineering and mathematics (STEM) must be adequately prepared for the subjects they need to teach, both in terms of content knowledge and pedagogical skills; and
2. Teachers must have access to fit-for-purpose professional learning and development across the course of their careers.

As our society develops, Australia requires a mathematically and scientifically literate community to engage in discussions about issues that determine our future, particularly those which require science and technology-based responses. For most people, their understanding of science and mathematics will be formed through school education, so when they leave they should have a capacity to participate in informed decision-making.

Teachers play a significant role in determining students' attitudes, beliefs and confidence in STEM. Teachers themselves must also have confidence in their own capacities and knowledge. It is well understood that enhancing teachers' capability is vital to raising the overall quality of Australia's school system and lifting student outcomes.<sup>1</sup> Both initial teacher education (ITE) and professional development opportunities throughout their careers are important to the ways teachers go on to influence their students.

Australia needs to raise the professional and social status of teaching to attract and retain quality candidates into ITE. Teachers should be highly respected, effectively supported and resourced, and recognised as highly-skilled professionals.

## Attracting STEM-literate candidates to initial teacher education programs

The delivery of high-quality STEM education in Australian schools would be well-served by ensuring that a proportion of teachers are well educated in science or mathematics at a tertiary level, as well as in pedagogy.

The Academy suggests that an agreed proportion of incoming ITE students should have completed science or mathematics subjects at a Year 12 level. This proportion will vary by state and territory, but will mean that an acceptable number of students entering ITE for primary and secondary teaching qualifications will have followed science and mathematics in their own schooling.

The education and science faculties of ITE providers should work closely to ensure that students with an appropriate background develop further their science and mathematics to become effective, competent teachers in these areas.

## Supporting teachers throughout their careers

The discussion paper highlights that teachers are the most significant in-school influencers of student learning. The Academy maintains that developing a STEM literate and professional workforce must occur along the continuum of a teacher's career. A focus on ITE alone is not enough.

It is necessary to support ITE students and existing teachers in maximising their professional effectiveness through appropriate resourcing and professional development. Providing this support for teachers is critical to capitalise on ITE investments. There must be whole-of-system support for both pedagogical skills and content knowledge.<sup>1</sup>

Increasing teacher agency is effective at facilitating change in education and is achieved through professional learning that is centered on increasing student learning (rather than a deficit in teachers' knowledge) and contextualized to address the specific needs of the school community.<sup>2</sup>

Early career teachers should be supported through their transition from ITE to in-service teachers with formal mentoring, with additional support for teachers in positions and locations identified as having a high turnover.

Quality, sustained teacher professional learning and support throughout a teacher's career lifespan needs to be a feature of school STEM teaching. Teachers should be provided with effective support for how continuing development will be enacted in the real world of the school and the classroom.

## Teacher shortages and teaching out-of-field are critical challenges to quality STEM education in Australia

Increasing teacher shortages<sup>3</sup> and the growing proportion of out-of-field teachers<sup>4</sup> affect students' experience and their access to quality STEM education. This is a particular issue for regional and remote and disadvantaged schools.<sup>5,6</sup>

Initiatives to upskill teachers in science and mathematics are one response to this issue, such as the [Secondary Science and Mathematics Initiative](#) and the [Graduate Certificate in Education \(Middle Years Mathematics\)](#).

Useful and effective support and professional development for teachers currently working out-of-field are essential, and an enhanced commitment to the recruitment and retention of qualified staff to address teacher shortages is needed for the longer term.

### The Academy's role in science and mathematics education

The Academy supports and plays a leading role in science and mathematics education, engaging directly and closely with teachers for more than 30 years. The Academy's current educational programs, *Primary Connections*, *Science by Doing* and *reSolve: Maths by Inquiry*, include professional development opportunities for teachers and are used in in-service and ITE settings.

One of the greatest strengths of these education programs is the delivery of practical support to in-service teachers and ITE students,<sup>7</sup> which is essential to building educators' STEM capability to underpin improved student engagement and learning outcomes. This is regarded as the area of greatest need and a clear opportunity for the Australian Government to maximise its impact.<sup>7</sup>

If you would like to discuss any aspect of this submission, please contact Christopher Anderson, Director Science Policy ([chris.anderson@science.org.au](mailto:chris.anderson@science.org.au)).

### References

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