



YuMiDeadly
Growing community
through education

YUMI DEADLY MATHS

Mathematicians in Training Initiative (MITI)

Working with your school to improve mathematics teaching and learning

The **YuMi Deadly Centre (YDC)** at QUT is a research centre dedicated to enhancing the learning of all students to improve their opportunities for further education, training and employment, and to equip them for lifelong learning. YDC has developed three mathematics projects for secondary schools, based on the YuMi Deadly Maths (YDM) pedagogy: general teacher development training (YDM TDT), remedial pedagogy Accelerated Inclusive Mathematics (YDM AIM), and MITI as described below.

The **Mathematicians in Training Initiative (MITI)** is an extension of YDM that aims to enrich and extend the mathematics ability of students through the development of mathematics pedagogy and materials designed to go beyond the Australian Curriculum and prepare students for higher level mathematics. The MITI pedagogy is designed to enable deep learning of powerful mathematics. Its purpose is to develop confidence, motivation and knowledge with respect to maths to increase participation in higher level courses in senior years (e.g. Maths B and C), improve university entrance, and raise quality of all school maths.

The first stage of MITI for Years 7–9 has been piloted in secondary schools since 2014. The focus for the pilots was on developing a pedagogy that assists teachers to use normal classroom situations to enrich and extend the learning of mathematics, and to prepare open-ended motivating investigations (tasks) to add to the curriculum. In the pilot, many teachers used the materials successfully with lower performing students to provide enrichment as well as with special high performing classes. Since then we have increased the emphasis on pedagogy, increased the number of tasks and developed a three-stage sequence for Years 7–12.

The full three-stage MITI project is as follows.

- **Stage 1 – Years 7 to 9 (Investigations and problem solving):** Enrichment and extension pedagogy that uses problems and investigations to enhance understanding and develop motivation to undertake high-level maths subjects. *Resources:* overview and problem-solving booklets, online community, and collection of tasks (investigations) covering Years 7–9.
- **Stage 2 – Years 7 to 10 (Building curriculum for future learning):** Vertical pedagogy that enables Years 7–10 maths to be taught in ways that facilitate easy sequence/transition to Years 11–12. Ideas for using digital technologies to attract students into Maths B and C. *Resources:* big ideas and technology booklets, online community, and collection of transitional teaching ideas.
- **Stage 3 – Years 7 to 12 (Deep learning in futures contexts):** Deep learning pedagogy that develops future-oriented applications to encourage thinking and technology use that leads to identification of powerful mathematics, sequenced to Maths B and C, and linked to other maths and STEM subjects. *Resources:* pedagogy book, online community, and collection of future-oriented applications.

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MITI framework and implementation

MITI will be provided to schools through a train-the-trainer process. Each stage of MITI provides 4 days face-to-face and 2 days of online professional development (PD) for up to four teachers from each school. Participants will become key teachers within each school's mathematics faculty, sharing the activities and pedagogical strategies with other faculty members and providing significant input to the redevelopment of programs of work. The PD aims to encourage the development and delivery of high quality mathematics programs for all students.

PD activities will be conducted at QUT Kelvin Grove Campus with clusters of schools participating in each session. The interaction and sharing that takes place among teachers from different schools is a significant aspect of the program. Ongoing discussion between teachers and YDC staff occurs between sessions by enrolling all participants in an online community designed for the program. Participants will have continuing access to the online resource for an extra year following the end of the PD program.

The aim is to: (a) enrich and extend the mathematics ability of students; (b) develop pedagogy and materials preparing students for higher level mathematics; (c) encourage pedagogy designed to enable deep learning of powerful mathematics; (d) develop confidence, motivation and knowledge with respect to mathematics; and (e) increase participation in higher level courses in senior years.

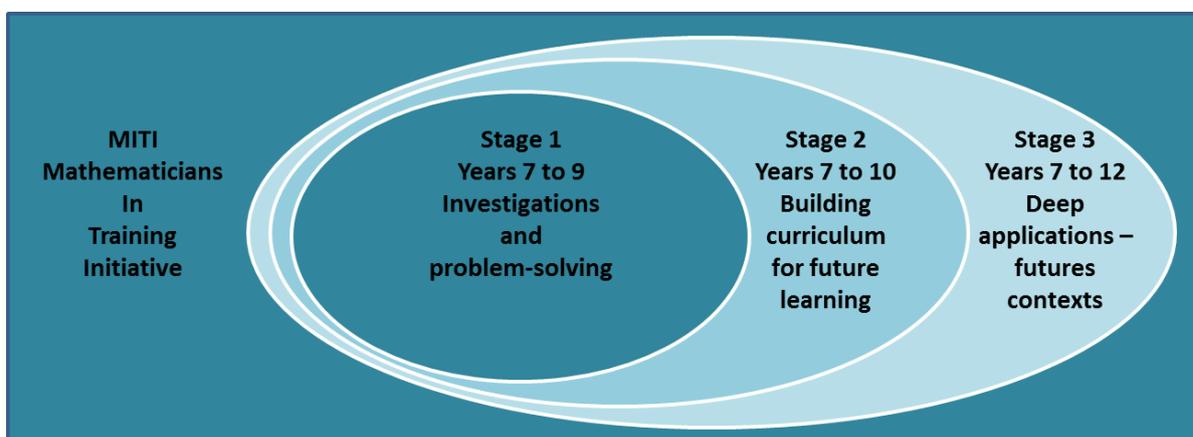
MITI is designed to build the capacity of teachers to adopt a lead role in the delivery and development of mathematics programs to provide all students with a high quality mathematics curriculum. This includes the skilling of other teachers and the preparation of resources.

Participants in MITI: (a) gain knowledge of mathematical structures and sequences that will enhance student learning now and in future years; (b) develop the skills necessary to create and modify rich learning tasks designed to engage students and enhance mathematical learning; (c) embed problem-solving and reasoning in all lessons; and (d) structure extension activities that provide pathways to more advanced topics.

MITI aligns closely with the Australian Professional Standards for Teachers providing participants with the opportunity to demonstrate the Lead Standard in many areas. The complete MITI project provides a mechanism to revitalise a high school maths program from Year 7 to Year 12.

Programs developed using the resources and concepts provided by MITI are characterised by: (a) high levels of student engagement; (b) focused development of student problem-solving, thinking and reasoning skills; (c) big ideas and rich schema designed to promote deep and powerful mathematics learning; (d) boosted performance of students at all levels; and (e) student interest in the study of mathematics at a high level in the senior years and beyond.

THREE STAGES OF MITI



***We can work with you to tailor a program to meet your school's needs.
A new cycle of training begins in Term 1 2016***