

Teaching Maths with Digital Tools

The Department of Education commissioned the Melbourne Graduate School of Education and dandolopartners to conduct an academic literature review regarding the evidence on effective teaching of maths using digital technology. 79 studies from Australian and international researchers were examined. The following are the key principles arising from our review of the academic research.

Principle 1:

Minimise cognitive load for your students through coherent learning resources

Practice examples:

- ✓ Explicitly teach students how to navigate online resources and outline how different learning materials can be used to support their learning.
- ✓ Clearly outline the weekly tasks required to be undertaken.
- ✓ Use frameworks for learning such as the 'Gradual Release of Responsibility' to inform the logic of learning resource design.

Principle 2:

Establish an engaging online presence through clear, regular communications

Practice examples:

- ✓ Have an 'announcements' process where you can regularly broadcast messages to all students about expectations.
- ✓ Use brief asynchronous instructional videos that students can view to clarify expectations.
- ✓ Build person-to-person interaction into your learning design with the intention to clarify lesson and weekly expectations.

Principle 3:

Use peer support to build an online community among your students

Practice examples:

- ✓ Provide opportunities for students to collaborate with different peers by using breakout rooms. Include clear expectations for academic conversations.
- ✓ Use digital tools that allow collaboration such as [Padlet](#) and [Desmos](#) to allow students to share their ideas with their peers and receive feedback.
- ✓ Utilise online forums such as [Discord](#) to enable communication and sharing of documents among students.
- ✓ Provide opportunities for collaborative problem solving so students can observe peers' learning strategies.

Principle 4:

Develop students' conceptual understanding through multiple representations of mathematical concepts

Practice examples:

- ✓ Solve equations using virtual manipulatives.
- ✓ Solve problems using more than one representation register.
- ✓ Utilise open-ended questions and encourage students to describe answers using complementary representations.

Principle 5:

Use worked examples to scaffold student learning

Practice examples:

- ✓ Model fully worked examples in synchronous sessions using a video conferencing tool such as [Zoom](#) and [Teams](#) with screen sharing.
- ✓ Provide short asynchronous video recordings of key aspects of solution or analytical process using a tool such as [Screencastify](#) and [Loom](#).
- ✓ Use partially worked examples to scaffold student learning and to check if students' understanding is comprehensive.