# ENHANCING STUDENT ENGAGEMENT IN MATHEMATICS STUDIES WITH LOW-BARRIER INTERACTIVE TOOLS

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Many mathematical applets are freely available online, especially on platforms such as Desmos and WolframAlpha, but their notation and conceptual breadth might diverge from the needs of a particular course. These mismatches can impose unnecessary cognitive load when students must translate unfamiliar symbols or when they encounter concepts and notation not covered in their syllabus.

Guided by accessibility goals and a focus on minimising cognitive load, the Learning Hub (Mathematics) at the University of Sydney is introducing a 200-line micro-template—plain HTML / CSS / vanilla JavaScript with small MathJax, Math.js and Plotly libraries—that educators with some HTML/CSS/JavaScript experience can open in a simple text editor, tweak in minutes, and embed in Canvas with one <iframe>. Based on this template, the Learning Hub (Mathematics) is also building a repository of lightweight, single-purpose applets to enhance the interactivity of teaching and learning mathematics. Furthermore, the JavaScript applets come with features such as WCAG-compliant semantic markup and dual-mode input, to ensure that they are accessible for a diverse range of users. They run in any browser without extra software, and enable real-time exploration through intuitive sliders, draggable elements (e.g., vectors), and simple buttons. Development of discipline-specific, customisable JavaScript applets is also underway. One example is an applet which allows chemistry students to see how symmetry matrices rotate an atom, and they can drag a slider and watch the atoms' position vectors transform in three dimensions, while the applet instantly shows the matrix multiplication corresponding to this linear transformation.

Attendees will leave this session with practical strategies for creating or sourcing low-barrier, course-aligned applets that enhance student engagement and conceptual understanding in STEM education. We will share our design principles, development workflow, and examples, empowering participants to implement or adapt similar interactive tools in their own teaching contexts.

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