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The Planning and Implementation of AI-Generated Rich Tasks in Primary Mathematics Classrooms

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Generative AI (GenAI) can expand teachers' planning possibilities, yet its mathematics outputs may be generic, inaccurate or developmentally inappropriate. This matters when designing rich tasks, whose cognitive demand is realised through classroom enactment. This study examined how primary teachers used GenAI to design rich mathematical tasks and the implications for teachers and students.

Three cases were selected from a larger Australian multiple case study involving 34 teacher-class cases across nine schools. The early-, mid- and late-career teachers taught Kindergarten to Grade 6. Data included pre- and post-interviews, facilitated GenAI planning sessions, AI chat logs and artefacts, three observed lessons per teacher, and student focus groups. Analysis used the Technology Acceptance Model (Davis, 1989), the TPACK Development Model (Niess et al., 2009), and Mathematical Knowledge for Teaching (MKT) (Ball et al., 2008).

All three teachers valued GenAI's capacity to generate and contextualise ideas, but task quality was determined by pedagogical rather than technological factors. During planning, teachers drew on knowledge of curriculum, students, content and teaching to reject, refine or extend AI suggestions. During enactment, task richness depended on noticing and responding to student thinking. Teachers with deeper MKT used questioning, discussion, explicit instruction and in-the-moment adaptations to strengthen conceptual connections. When teachers did not recognise or respond to opportunities for extending the mathematics, practical aspects of the activity could overshadow the intended mathematical learning. Students enjoyed the contextualised tasks but requested greater challenge or differentiation. The findings position prompt crafting as a contemporary enactment of MKT. Knowing what to ask requires clarity about mathematical purposes, curriculum and likely student responses. GenAI cannot anticipate classroom dynamics or ensure that mathematical potential is realised. Professional learning should therefore develop teachers' capacity to evaluate, differentiate and enact AI-generated tasks. GenAI does not diminish teacher expertise; rather, it repositions MKT as the decisive factor in determining whether AI-supported task design enhances or constrains meaningful mathematical learning.

References

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For more information, please refer to the following paper presented at the 48th Annual Conference of MERGA in July 2026.

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