

## Digital Exploration, Investigation and Game Environments

This model encompasses platforms that use contemporary graphics, visualisation tools, mini-games or play-based interactions to develop proficiency with maths concepts, both simple and complex.



### Which challenges does the model address?

- **Teacher capability** – Gamification platforms are used by both specialist maths teachers and out of field maths teachers to develop students' understanding of specific tasks in maths. It is likely gamified tools are more beneficial to out of field teachers who may otherwise struggle to come up with their own contextualised tasks for teaching.
- **Differentiation** – Gamification employs simple language and engaging graphics to convey concepts. Questions and explanations are short, sharp and clear and often pitched at a low reading level. Stakeholders describe platforms such as [Desmos](#) as 'low floor, high ceiling', 'rich resources', meaning they pitch learning low to be accessible but allow for advanced manipulation and learning at the higher end. Real time feedback mechanisms in the platform enable teachers to see progress and data from the back end of the platform and use this to inform personalised learning approaches for their class. For example, for a given task, the teacher can see where a student has finished early and is ready for discussion, or where a student is struggling to complete a task and where precisely they are getting held up with their working.



### Target Groups

A wide range of students at different year levels can benefit from visual and gamified ways of engaging with maths concepts.



### How the model works

Digital exploration, investigation and game environments provide students with alternative ways of learning maths concepts and the opportunity to interact with maths concepts:

- Teachers can use these tools in their classrooms to help students understand maths concepts and improve their understanding of maths concepts.
- Cross-disciplinary projects can be managed on investigation platforms that include significant maths projects.
- Students use individual devices to access online platforms such as [Desmos](#) or [Prodigy](#).
- Students can login with a provided codes or credentials.
- Students work through specific examples or modules within the platform.

Gamification can be applied in digital learning environments to increase students' interest in studying and help them better understand learning material. In a virtual setting, gamification can help influence behaviour and help build a sense of community in the classroom. In Australia, some commonly used gamified platforms for maths teaching and learning include [Desmos](#) and [Prodigy](#). There are also more general play-based platforms that encourage the use of maths concepts, such as [Roblox](#) and [Minecraft](#).



### Success factors

- Device access
- Broadband access, though many games allow for offline play once downloaded
- Alignment to curriculum
- Context is relevant to learners – particularly in relation to examples and data sets
- Confident teachers.



### Caution factors

- eSafety needs to be carefully assessed and managed with online, multi-player platforms. These can include:
  - Anonymous communication
  - Cyber bullying
  - Sexually explicit content.
- Aggressive advertising content in freemium apps.
- Too much focus on 'games', rather than the maths. In particular, there are concerns that games can skim over concepts to focus on process or getting the right answer, rather than ensuring an underlying understanding of concepts. Alternatively, however, some of these interactive and visual platforms are uniquely placed to enable students to dive into rich detail and play with, e.g. numerators, volumes, variables, graphs, etc.
- Parent pre-conception or perception that engaging or gamified platforms are used as 'babysitting' approaches for students, instead of to enrich in-class teaching.



### Cost

Access to gamified platforms ranges from free (in the case of some Roblox games) to subscription costs.