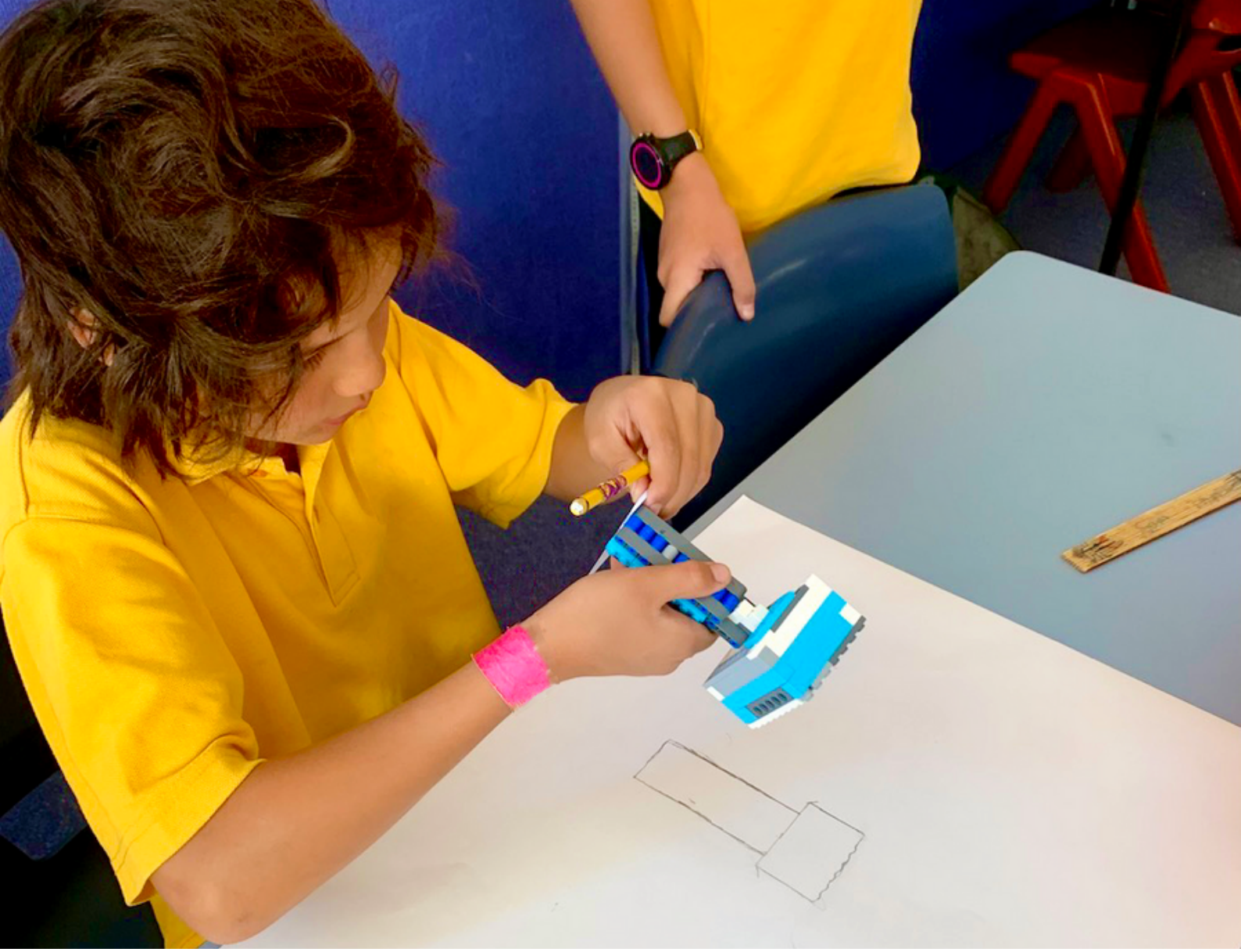


MathsBURST Prospectus

Building Understanding Through Reasoning and Spatial Thinking

Spatial reasoning is a series of cognitive skills associated with the ability to retain, retrieve and transform visual images in the mind. These skills can be developed rapidly with effective training and practise.

Spatial skills are important for mathematics and numeracy development—especially when encountering novel or complex problem solving. Highly developed spatial skills are a strong predictor of a person working in a STEM profession.

MathsBURST is an intervention program for all students—the skill-based program develops cognitive skills that help students access curriculum content with more flexibility and fluency.

about.mathsburst.com

tracy@mathsburst.com

About MathsBURST

MathsBURST is a learning and instructional program that focuses on the development of student's (Years 3–6) spatial thinking skills.

MathsBURST has been conceptualised over a 20-year period, through extensive classroom-based action research projects and is backed by empirical research.

The program's empirical evidence base has demonstrated strong growth in student's mathematics understandings, with transfer from spatial skill proficiency to numeracy knowledge.

The program promotes spatial thinking in three ways:

1. bringing spatial thinking into the learning environment through intentional teaching embedded in the curriculum;
2. practicing spatial skills through scaffolded digital challenges; and
3. building a spatial habit-of-mind through new ways of thinking spatially about the STEM-rich world.

tracy@mathsburst.com

The Learning Program

Teachers are provided with a comprehensive and detailed set of spatial lessons that target a specific spatial skill over two terms of the school year.

Lesson outcomes are aligned to the Australian Curriculum: Mathematics and relevant state syllabi.

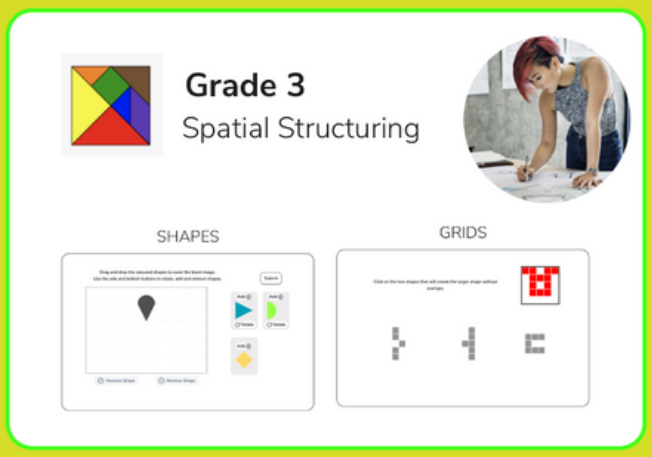
Lessons are matched with digital challenges that facilitate the development of the spatial skill through scaffolded learning progressions and practise.

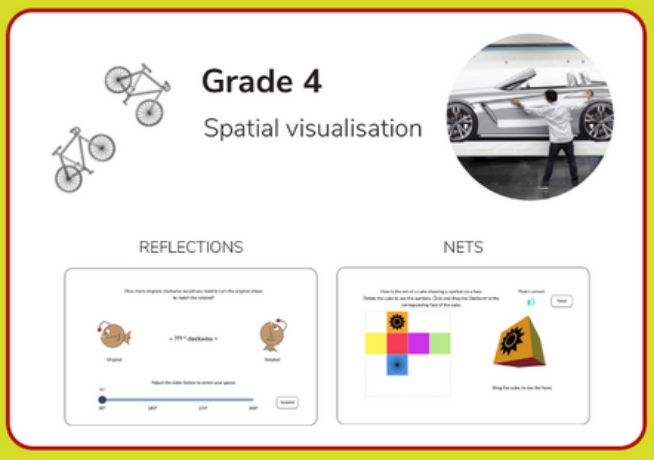
Students are then exposed to a STEM unit that applies the skills development to rich and authentic STEM Practices.

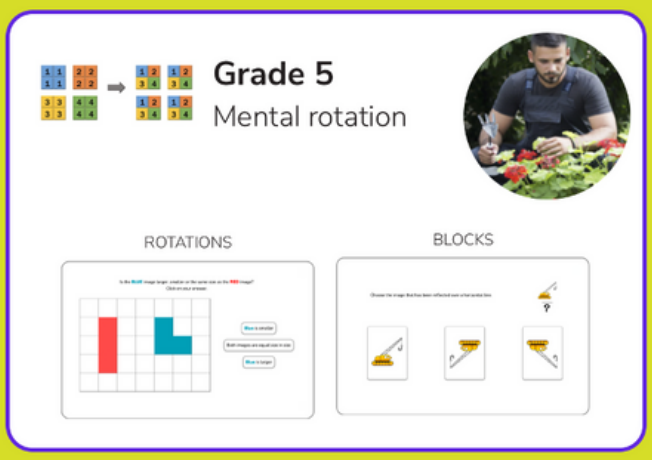
The STEM unit is aligned to the outcomes of the Science, Technologies and Mathematics Curriculum.

The units within each grade level include:

- detailed spatial reasoning enrichment program
- a bespoke learning framework
- integrated spatial thinking challenges
- a learning module that engages students in STEM thinking
- a digital assessment dashboard for teachers to monitor student learning
- professional learning opportunities for teachers







The Impact: Evidence base for Program

2019 Intervention

4200 Students

20-hour intervention

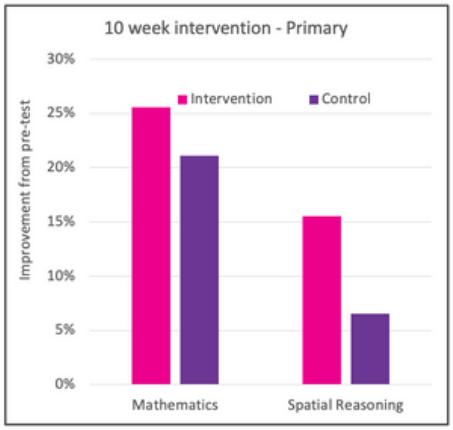
Student numeracy performance increased by a mean of 28%

Numeracy instrument = NAPLAN items

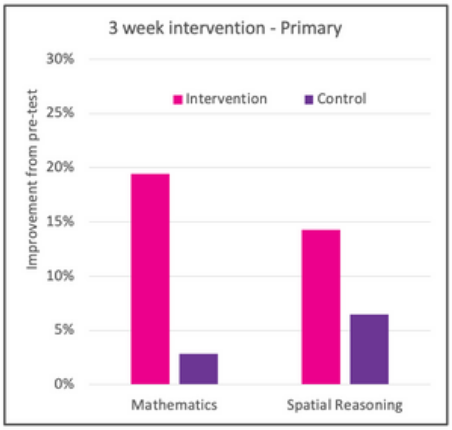
Students' spatial skills improved by a mean of 40%

Math effect size increases by grade [between 0.58 and 0.89]

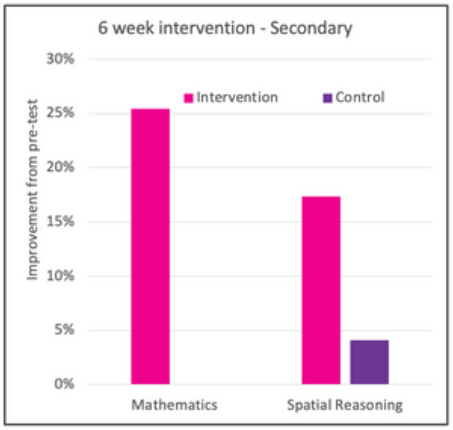
Spatial effect size increases by grade [between 0.62 and 0.82]



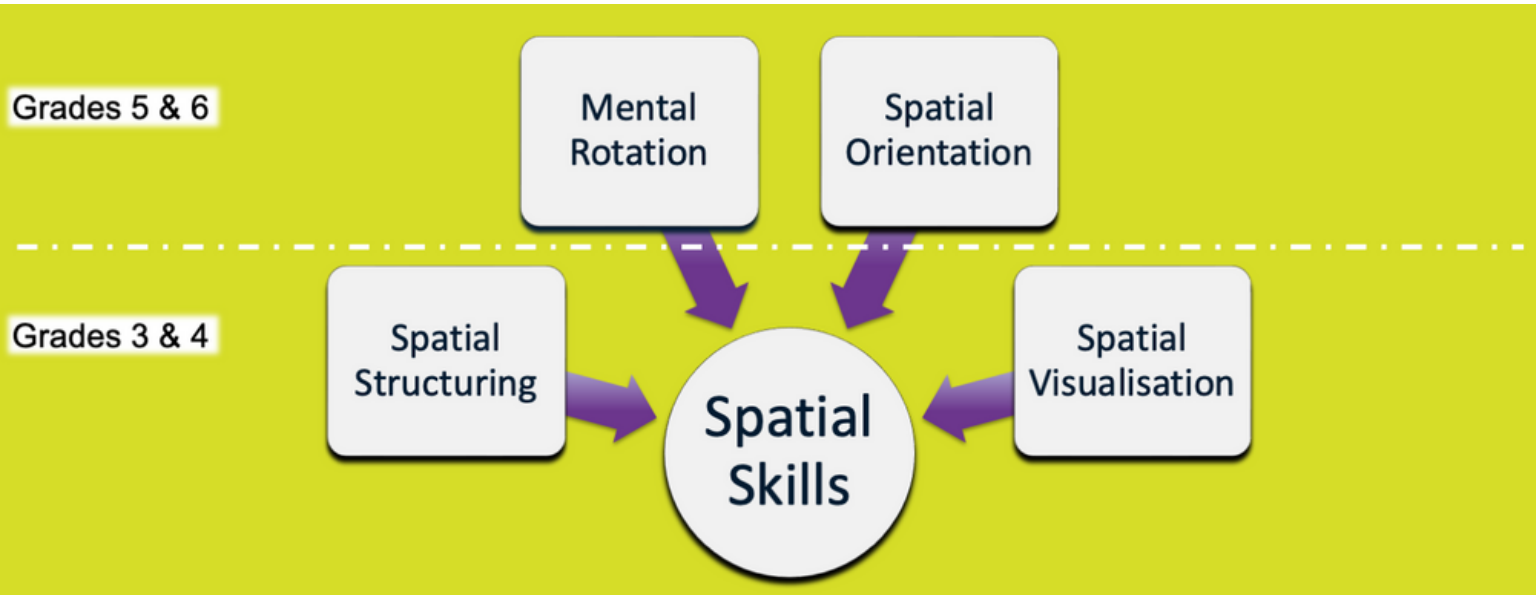
Lowrie, T., Logan, T., & Ramful, A. (2017). Visuospatial training improves elementary Students' mathematics performance.



Lowrie, T., Logan, T., & Hegarty, M. (2019). The influence of spatial visualization training on students' spatial reasoning and mathematics performance.



Lowrie, T., Harris, D., Logan, T., & Hegarty, M. (2020). The impact of a spatial intervention program on students' spatial reasoning and mathematics performance.



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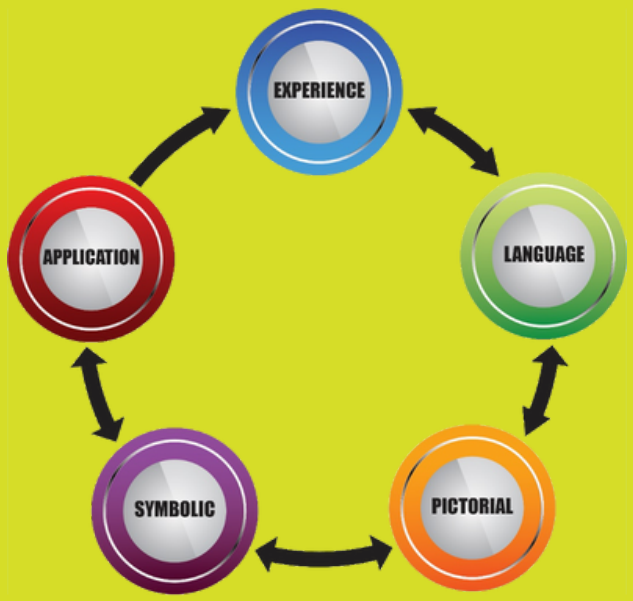
tracy@mathsburst.com

The Pedagogy

ELPSA: Our Pedagogical Framework

E	• Evoke out-of-school experience to build on understanding. • Reinforcing existing understandings to new concepts. • For new concepts, provide physical experiences if possible.
L	• Reinforce mathematics terminology throughout the lesson. • Foster conversations that link experiences with language. Build bridges between E & L. • Encourage student's own language while modelling precise terminology.
P	• Includes concrete manipulatives, external representations and students' encoded understandings. • Ensure multiple representations are provided including non-prototypical representations. • Progressively model effective pictorial heuristics.
S	• Introduce symbolic expressions alongside pictorial representations. • Encourage multiple appropriate symbolic representations. • Model fluency and flexibility with efficient symbolic representations.
A	• Apply symbolic reasoning to real-life situations. • Apply symbolic reasoning to related mathematics concepts. • Consider the application of the mathematics concepts outside of the classroom.

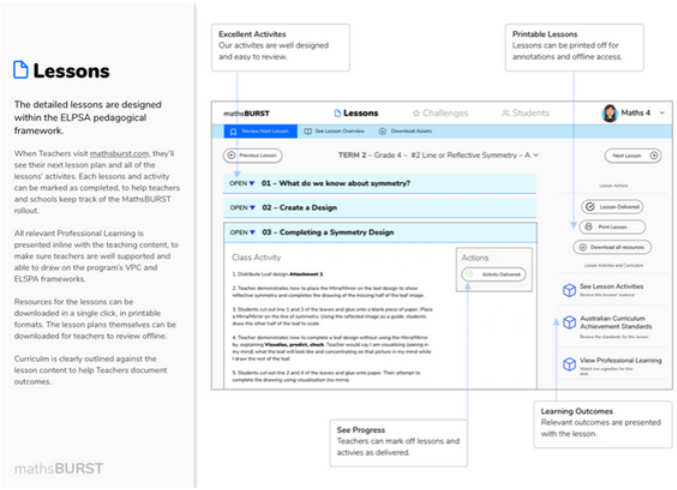


Lowrie, T., Logan, T., & Patahuddin, S. M. (2018). A learning design for developing mathematics understanding: The ELPSA framework. Australian Mathematics Teacher, 74(4), 26-31.

All learning materials are designed and written within a pedagogical cycle that mirrors concept development. The five-stage model [E-L-P-S-A] replicates constructivist views of learning—but in a focused manner.

At each stage of the model, explicit intentional teaching processes are enacted to ensure learning is purposeful and deliberate in nature.

Further, lessons are designed to introduce explicitly pictorial and symbolic representations on concepts to help build student's problem-solving flexibility and fluency.



tracy@mathsburst.com


Dr. Tracy Logan


Professor Tom Lowrie


Robyn Lowrie

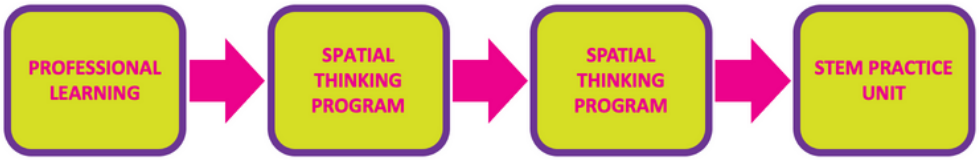
Teacher Professional Learning

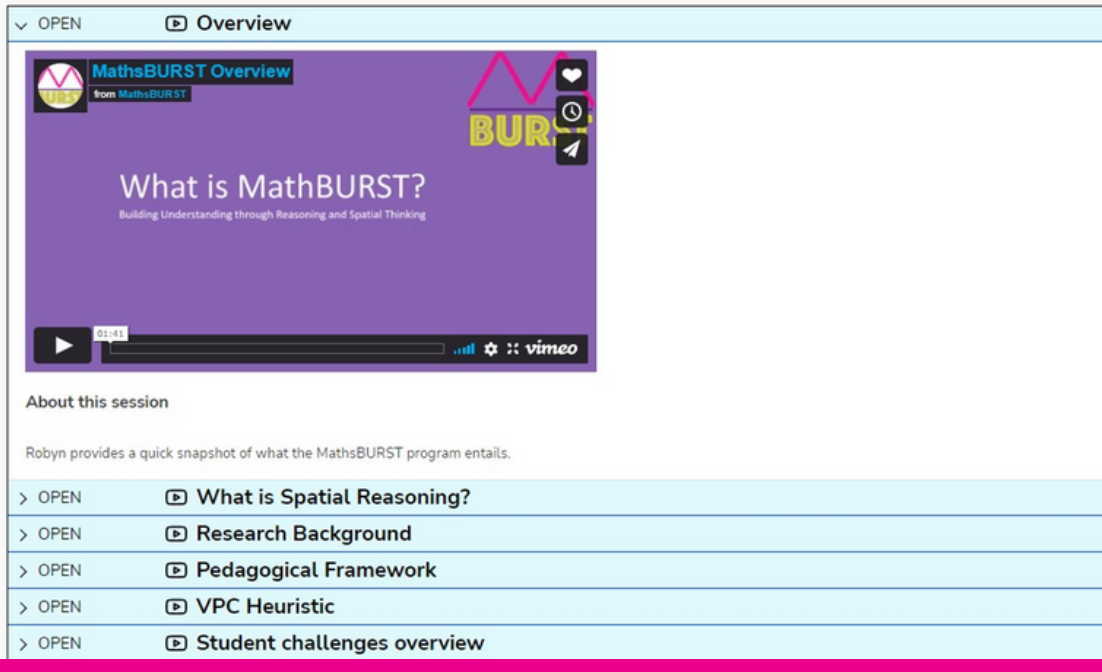
Teacher Professional Learning (PL) is a cornerstone of the MathsBURST Program, which is provided asynchronously online via our learning portal. Our PL resources have been created by our expert team, pictured left: Professor Tom Lowrie, Dr. Tracy Logan, and Robyn Lowrie.

Teachers can work through the PL at their own pace at a time that suits them.

Our PL also supports educators in using the innovative technologies that are part of the program.

We work with jurisdictions to tailor the PL to other learning initiatives–offering synchronous-online and face-to-face PL where appropriate.





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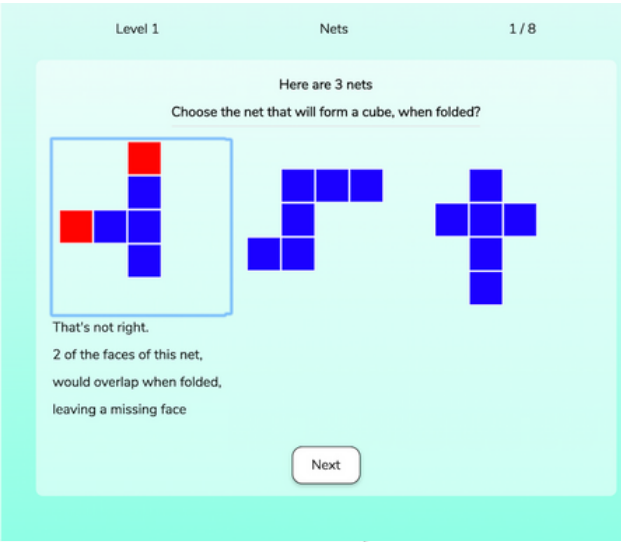
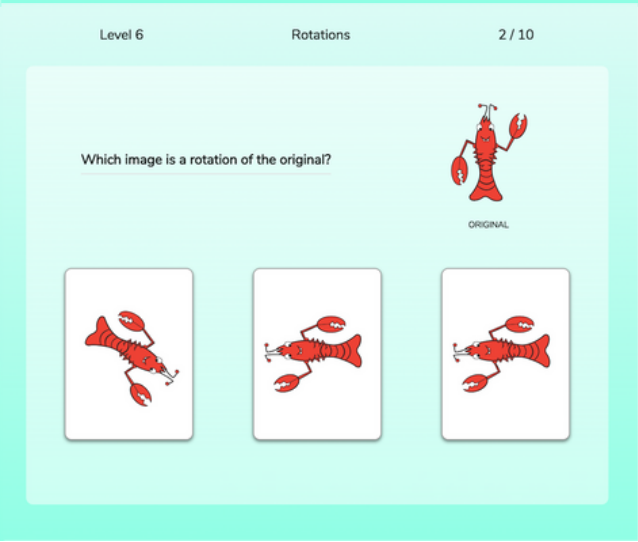
Formative Assessment

The digital challenges provide opportunities for scaffolded mastery of spatial skills.

The respective spatial skills are mapped to student learning programs—with individual student performed mapped on assessment dashboards in real time.





Assessment

The online assessment tools have been psychometrically validated.

When your school commences the MathsBURST program we're able to baseline your student's numeracy and visual spatial ability through an online standardised test.

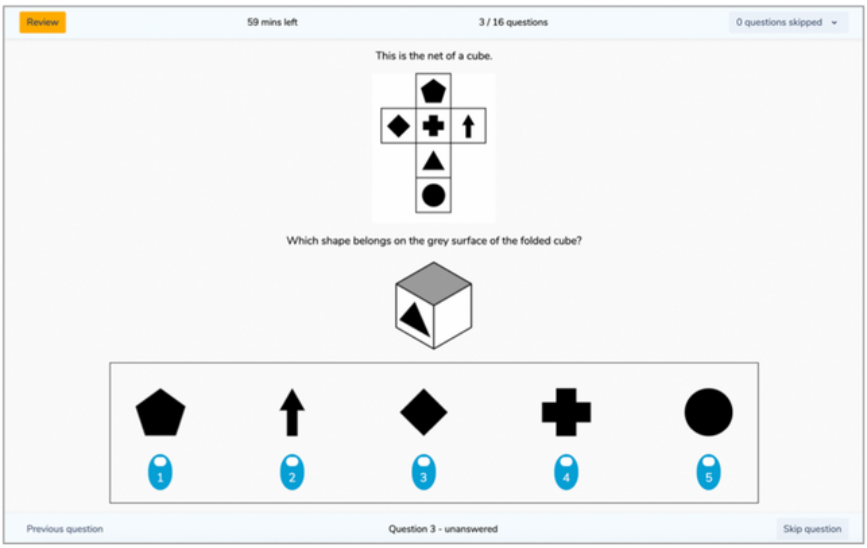
Towards the end of the program Students are again invited to complete the test. These test results, and previous controlled studies provide you with the context you need to evaluate student's improvement.

Our tool saves students answers in realtime and offers a robust experience, as even when students exit the test, they can resume progress when they next login.

Support

Teachers can contact our support team via phone, email or web chat. We also have video walk throughs for key features, and provided training for the website during our professional development sessions.

Timed Test
Students have a time limit for each section and will be locked out when it has elapsed.



The Investment

The MathsBURST Program is now available at the discounted rate of $25 per child (including GST).

Professional Learning is currently free to participating teachers. This is normally valued at $200 per person.

PROGRAM item	Cost $
1x Child Access (Includes program, digital challenges, teacher dashboard, asynchronous classroom teacher PL.)	**$25** Yearly costs including GST.
Face-to-face Teacher Professional Learning	**FREE** When jurisdictions use the program at scale.

Sign Up To MathsBURST now! Scan the QR code to the right, fill out the form and we will be in touch.