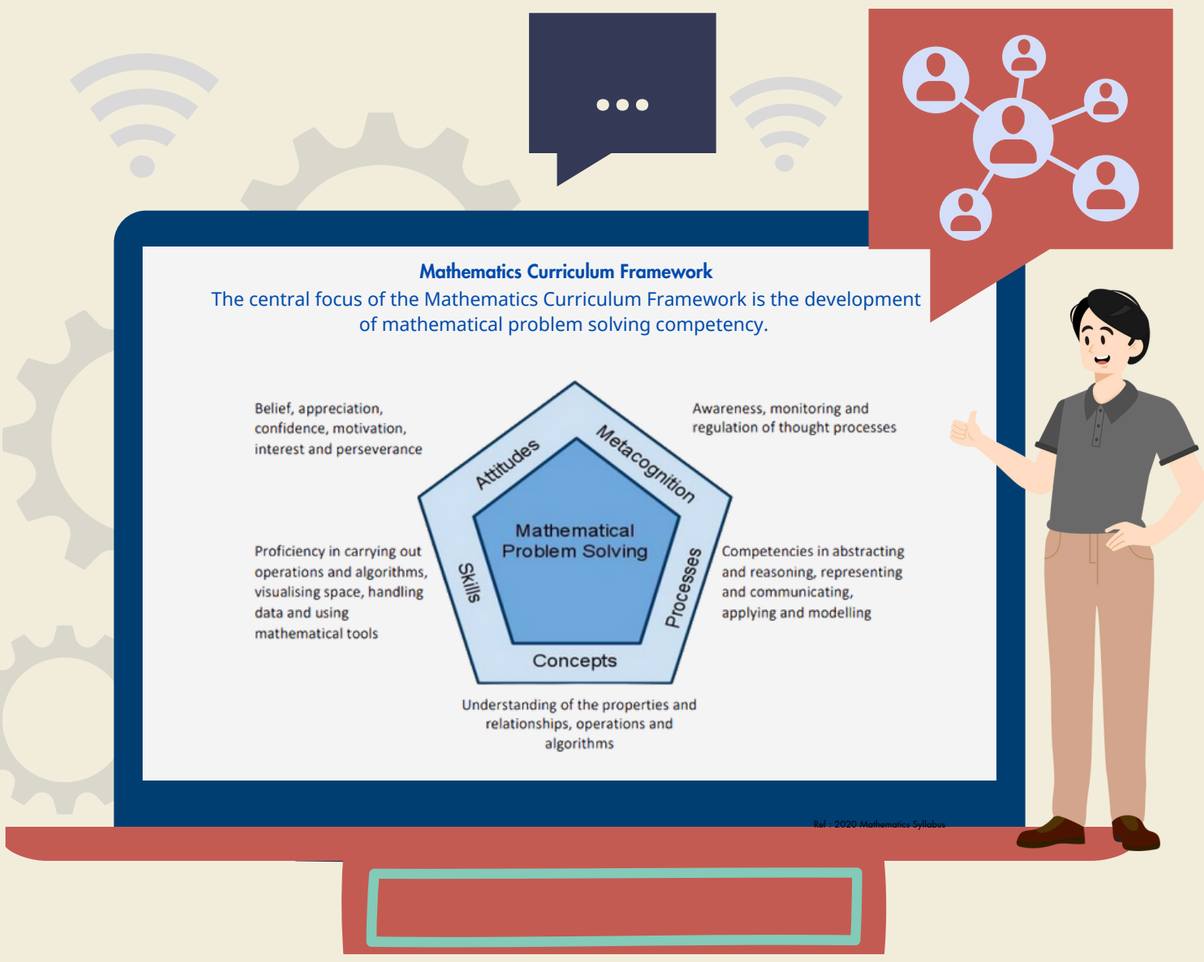
SINGAPORE

Student Learning Space

Educational Technology Division
Ministry of Education

SLS Guide for Mathematics

Leveraging SLS to Enhance Teaching and Learning of Mathematics



Features primary and secondary level learning activities

Updated as of 28 March 2025

SLS Guide for Mathematics
Leveraging SLS to Enhance Teaching and Learning of Mathematics

- The guide is developed by Educational Technology Division (ETD) with input from the Academy of Singapore Teachers (AST) and the Curriculum Planning and Development Division (CPDD).

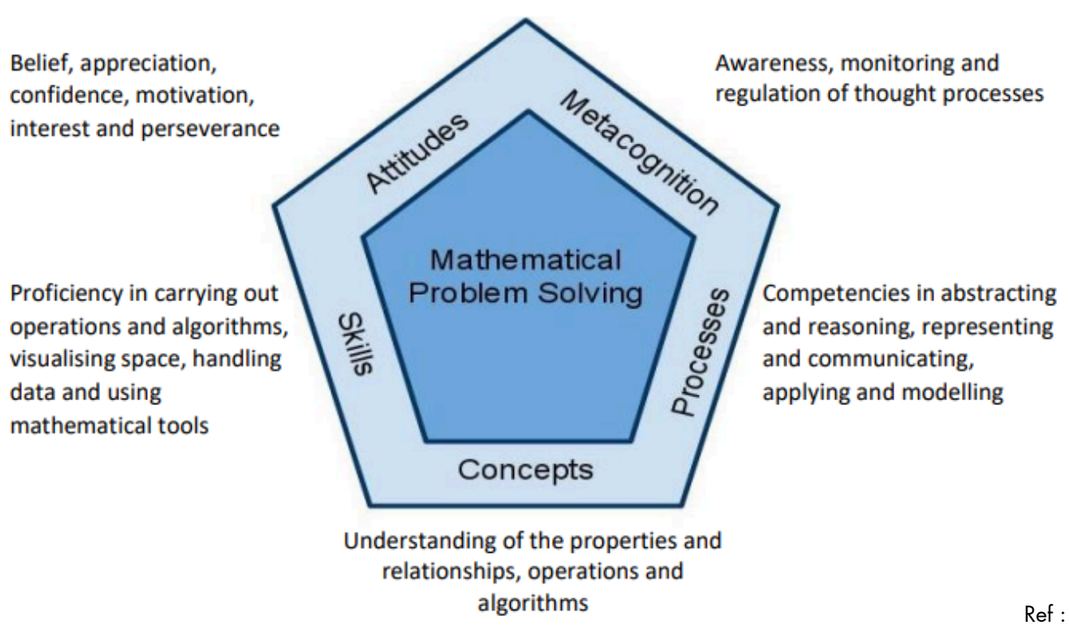
- The examples in the guide incorporate key actions and considerations in the EdTech Pedagogical Scaffold (EdTech PS).

- The guide demonstrates the potential of the Singapore Student Learning Space (SLS) to enhance the teaching and learning of Mathematics, featuring learning activities utilising SLS that are derived from different mathematics lesson examples. These activities actively foster and support the process of mathematics problem-solving.

- The guide encourages teachers to explore SLS features that can help them to overcome the challenges that mathematics teachers commonly face when teaching the process of mathematics problem-solving to students. Teachers can also leverage available resources on Community Gallery and MOE Library to complement lessons and reinforce key or challenging concepts.

Mathematics Curriculum Framework

The central focus of the Mathematics Curriculum Framework is the development of mathematical problem solving competency.



Ref : 2020 Mathematics Syllabus

Navigation Tips:

- Each segment addresses key challenges that teachers commonly encounter while teaching mathematics problem-solving. It highlights:

  how teachers can harness the affordances of SLS to enhance their teaching approach,

  the interactions among students, teacher and students, and/or students and content that foster engagement and learning, and

  the pedagogical affordances of SLS features.

- Please note that the SLS features mentioned in the guide serve as suggestions to inspire teachers to explore possibilities and they are not exhaustive.
- For detailed technical information on each SLS feature, simply click on its embedded link. You will be directed to the relevant page within the SLS User Guide.

Content outline

Click on the page number to access the page

Mathematical Problem Solving

- **How can I help my students in visualising and observing patterns so as to enhance their understanding of abstract concepts?** — **Pg 4**
- **How can I support my students in developing metacognition whilst reason and communicate using the mathematical language?** — **Pg 7**
- **How can I build my students' confidence and increase their chances of success when solving problems?** — **Pg 10**



Mathematical Problem Solving
(e.g., metacognition, concepts)



How can I help my students in visualising and observing patterns so as to enhance their **understanding of abstract concepts**?

Teachers can Insert Media Objects (e.g., videos and images) (Fig. 1.1) to **spark curiosity** and help students **visualise and observe patterns for abstract mathematical relationships**. Videos and images can help students connect prior knowledge to new content to activate learning. Media such as PowerPoint, video, audio or YouTube video can be split across different pages within an activity using the Split-page Media (Fig. 1.2) to further organise content into shorter segments of focus accompanied by guiding questions to draw students' attention to specific concepts. This provides cognitive support and helps to **scaffold the students' learning**. In addition, teachers can include a Poll (Fig. 1.3) to quickly check students' readiness to learn a new concept or assess their understanding before moving on.

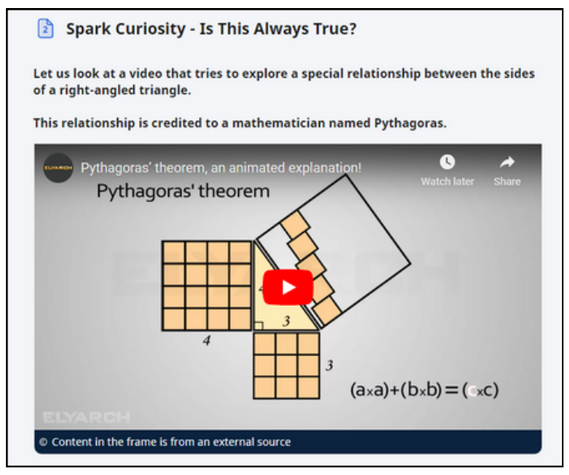


Fig. 1.1

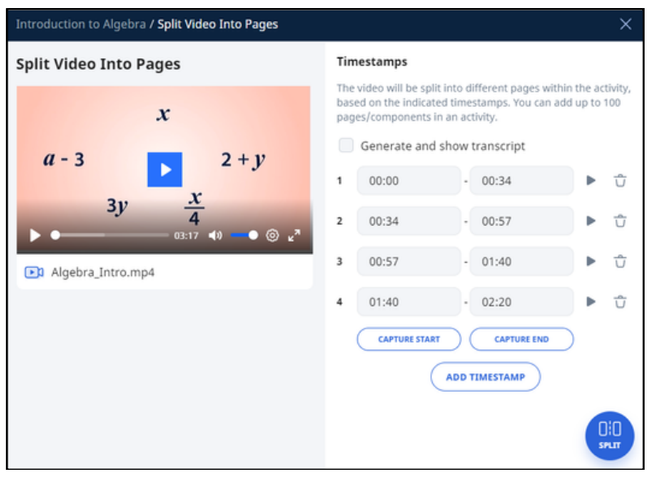


Fig. 1.2

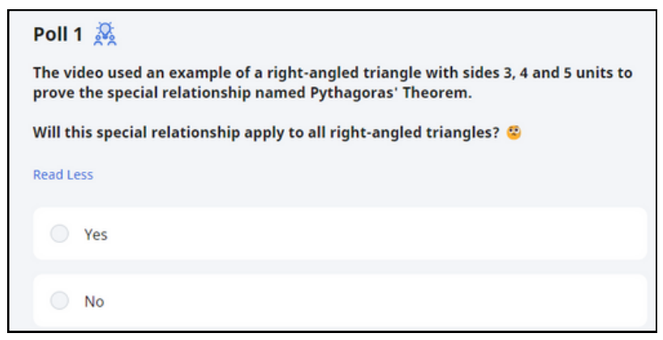


Fig. 1.3

Click on the picture for a larger view.

If you are interested in this activity, it is available here.

Students can interact with the media object and **generalise by making a claim** based on what they have just viewed. Within the activities, students are able to Annotate Text (Fig. 1.4), as well as Add Notes to Audio or Video (Fig. 1.5) to create their own notes for review and revision, which can be viewed and commented on by teachers.

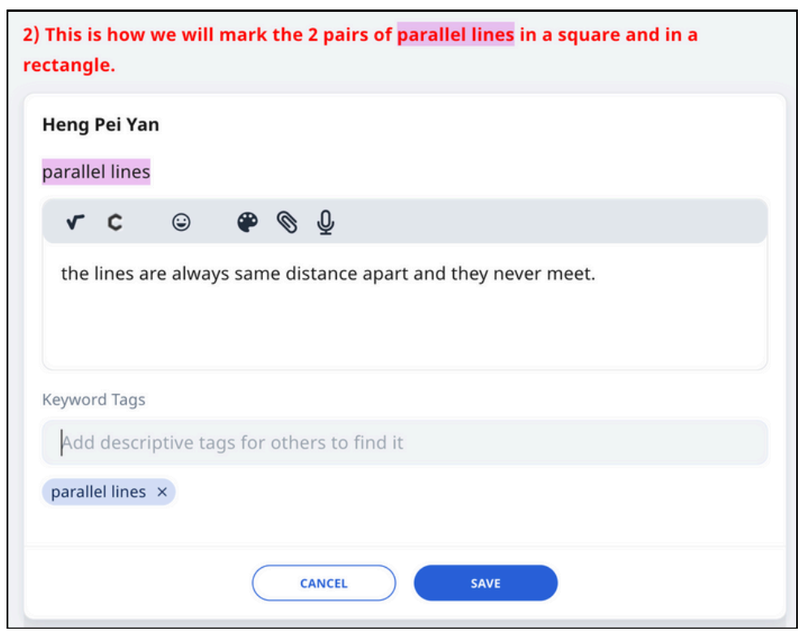


Fig. 1.4

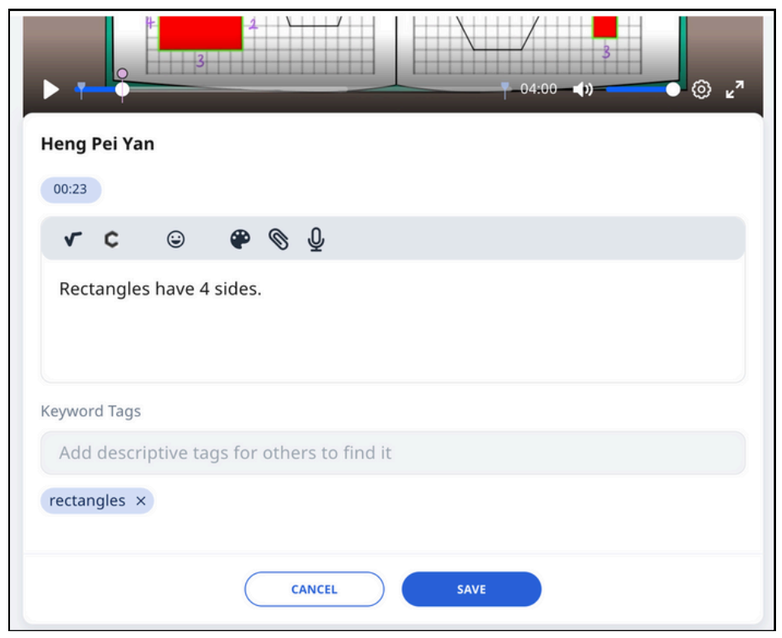


Fig. 1.5

Click on the picture for a larger view.

Mathematical Problem Solving
(e.g., metacognition, concepts)

Teachers can use digital manipulatives for students to **investigate and analyse the results, so as to justify their claims**. These manipulatives can be embedded in SLS (Fig. 1.6). They support students in making conjectures and testing them for different cases before forming generalisations about what they have observed.

Students can interact with the digital manipulatives, collaborate with their peers, and **record observations** in a pre-populated table provided in Interactive Thinking Tool (ITT) (Fig. 1.7). Students can then **reflect and articulate their understanding** of the relationship(s) between the different variables in a Free-Response Question (FRQ) (Fig. 1.8). Conceptual change is fostered when students express their initial thinking and understanding, then revise them after reflection.

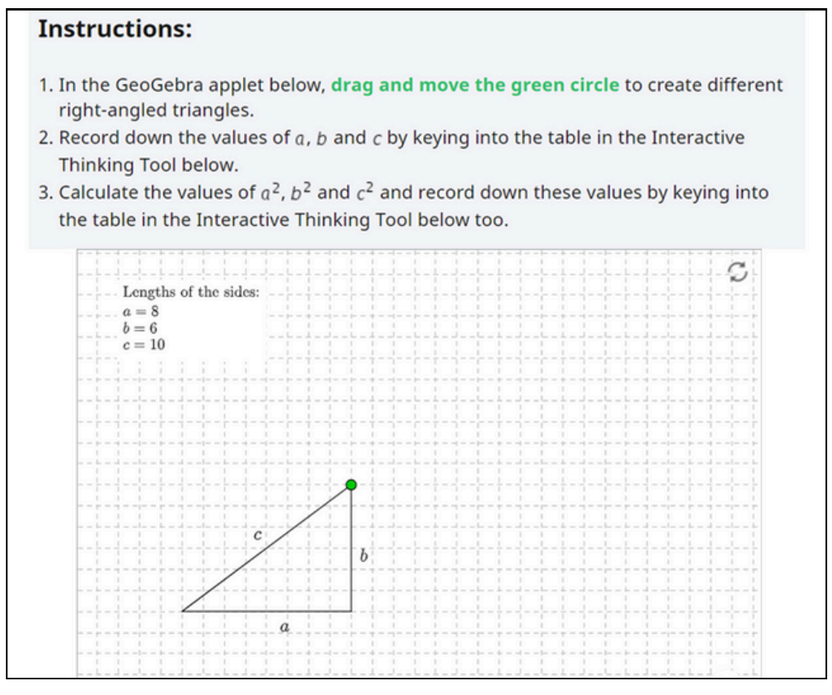


Fig. 1.6

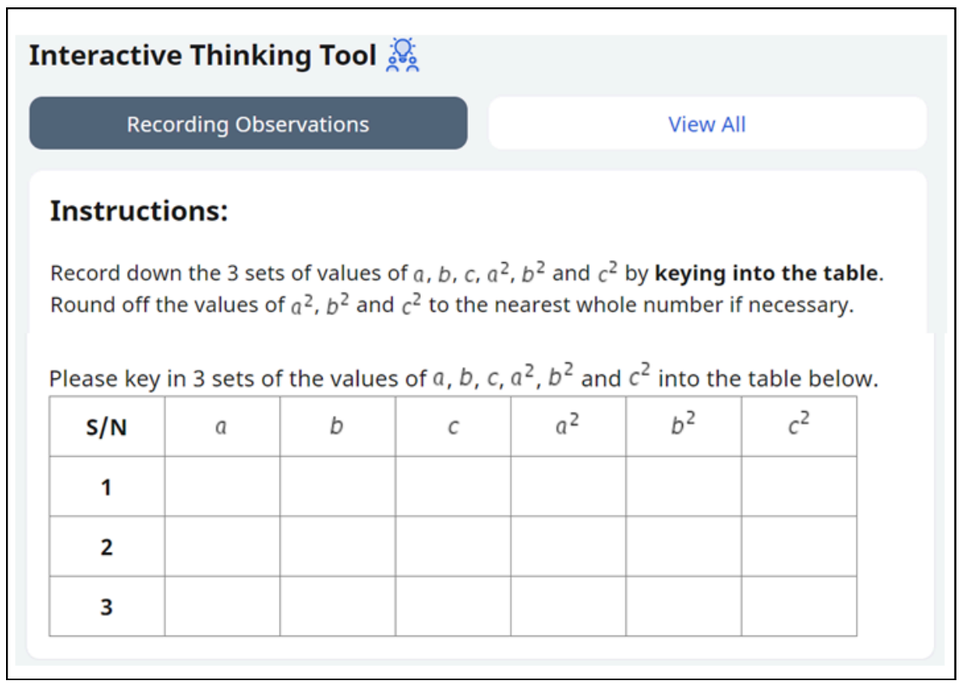


Fig. 1.7

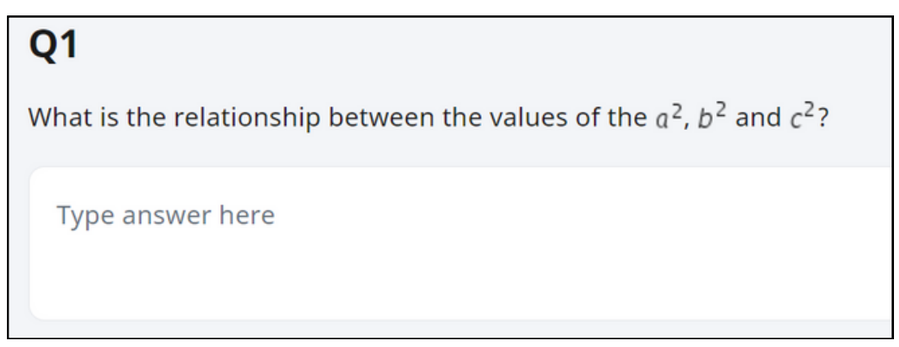


Fig. 1.8

Click on the pictures for a larger view.

If you are interested in this activity, it is available here.

Mathematical Problem Solving
(e.g., metacognition, concepts)

Teachers can use Column Display (Fig. 1.9) to include media objects (such as video or image) in the left hand column and include questions in the right hand column to help students **make connections** and **assess understanding**. Teachers can also embed digital scaffolds by adding components (e.g., Text/Media, Multiple Choice Question (MCQ)) in the right hand columns to provide additional resources or questions. These additional scaffolds can be hidden using the Accordion Display to reduce students' reading and cognitive load.

Students can **seamlessly move** between the media object and question.

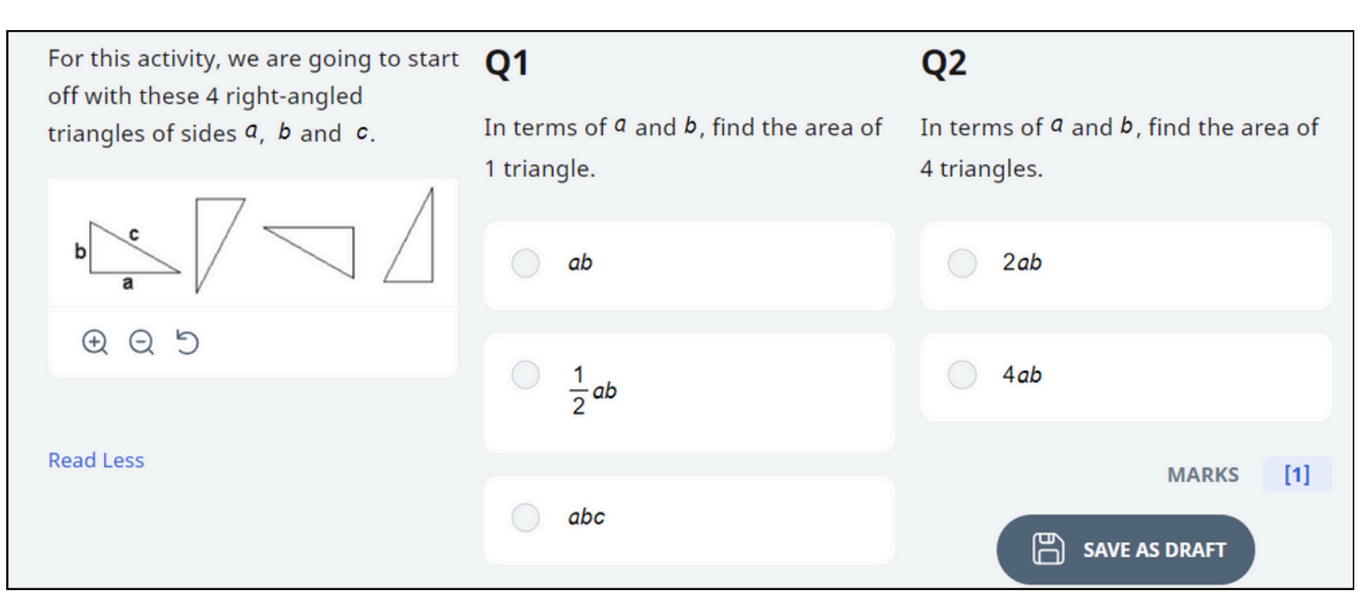


Fig. 1.9

Click on the picture for a larger view.

If you are interested in this activity, it is available here.

PEDAGOGICAL AFFORDANCES:

- The use of different representations allows students to see similarities and differences to discern patterns. Getting students to make a claim helps the teacher support students in **externalising their initial conceptual understanding** of the topic.
- Using digital manipulatives supports activity-based learning to guide students to **explore the concepts, manipulate variables and make observations** which can lead them to form relationships between the ideas and concepts.
- Presenting pictorial and abstract representations together allows students to seamlessly move between the two and thus, **compare and make connections easily**.

Mathematical Problem Solving
(e.g., skills, metacognition, processes)

How can I support my students in developing metacognition whilst **reasoning and communicating** using mathematical language?



Teachers can add Feedback Assistant - Mathematics (FA-Math) in a Free Response Question (FRQ) to **automate the process of providing students with line-by-line feedback** on their working (Fig. 2.1). Hints can be included to scaffold students' attempts (Fig. 2.1). FA-Math allows students to present their solutions as models instead of algebraic equations when teachers select the Bar Model method (Fig. 2.2).

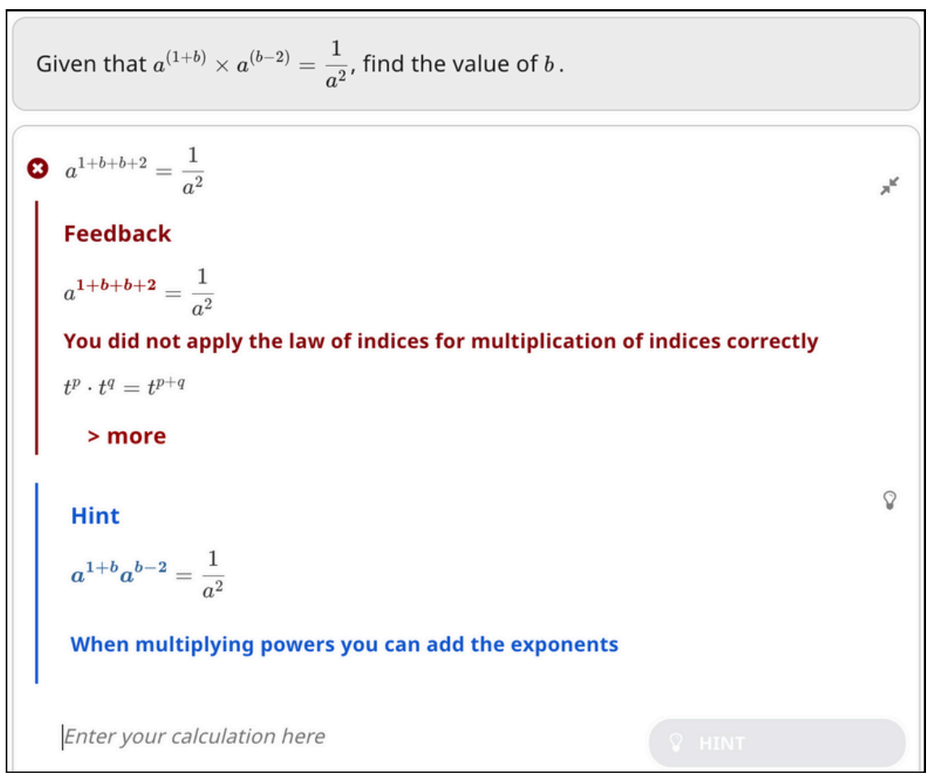


Fig. 2.1

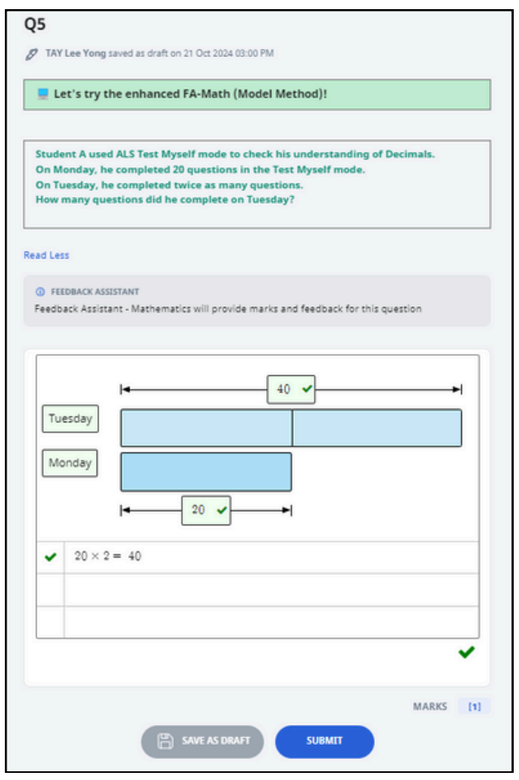


Fig. 2.2

Click on the picture for a larger view.

- If you are interested in this activity, it is available here.
- For more info on FA-Math, you may refer to the poster and video guides.
- For self-directed PD for FA-Math in SLS, you may find the Module here.

The line-by-line feedback provided by FA-Math allows students to be **more aware of their mathematical reasoning** and **correct their mistakes promptly** in subsequent steps. Metacognition is developed when students are actively engaged in monitoring their thinking and reflecting on their work through the provision of customised and automated feedback.

To help students input mathematical symbols more easily, they may use handwriting input (Fig. 2.3) for multi-step problems.

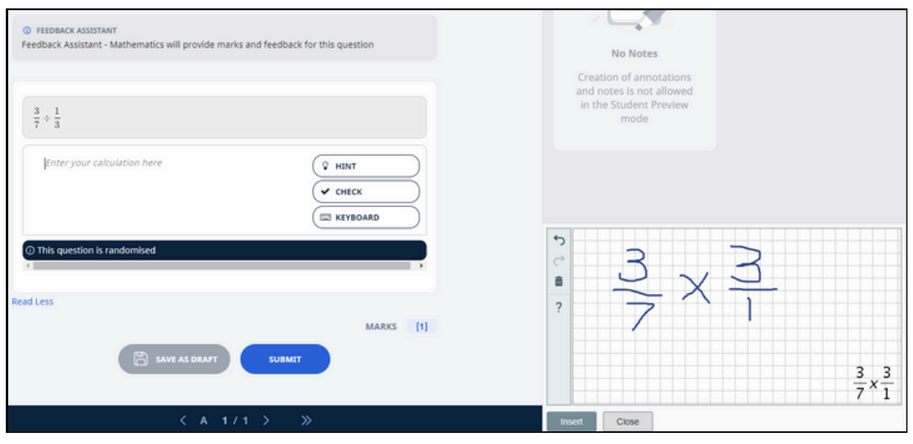


Fig. 2.3

Click on the picture for a larger view.

Teachers can use Interactive Thinking Tool (ITT) to engage students collaboratively, and FRQ to allow students to **record their observations** and **consolidate their learning**. Data Assistant (DAT) (Fig. 2.4 & Fig. 2.5) can be used to provide quick insights into students' textual responses in aggregated FRQ responses and ITT. This allows for timely interventions and targeted feedback to be provided, supporting assessment for learning. Specific student responses in ITT can be bookmarked for use in facilitating follow-up discussions.

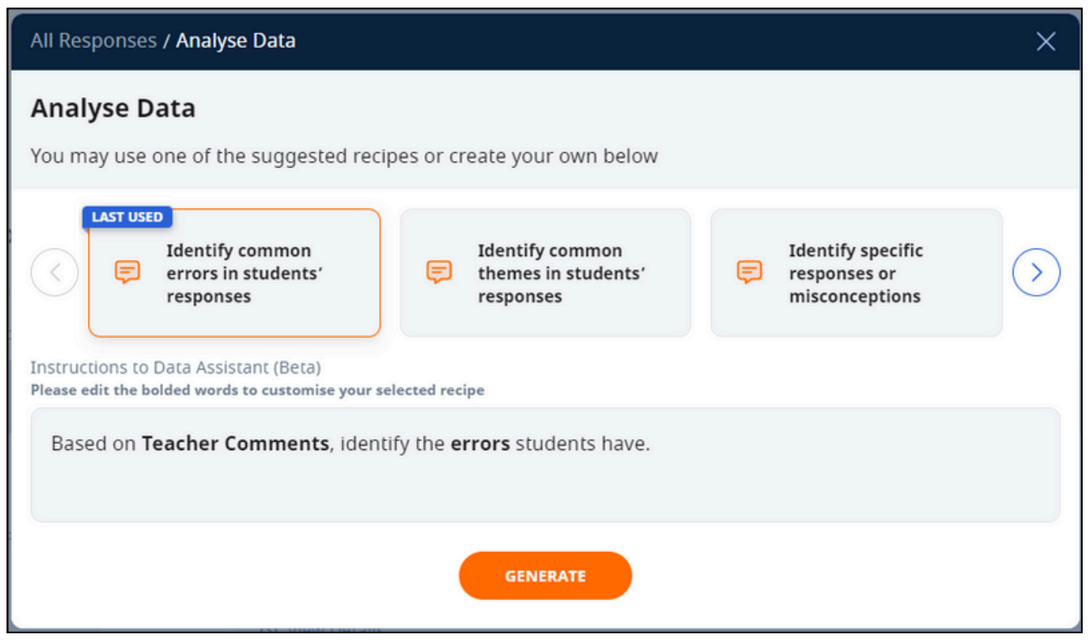


Fig. 2.4

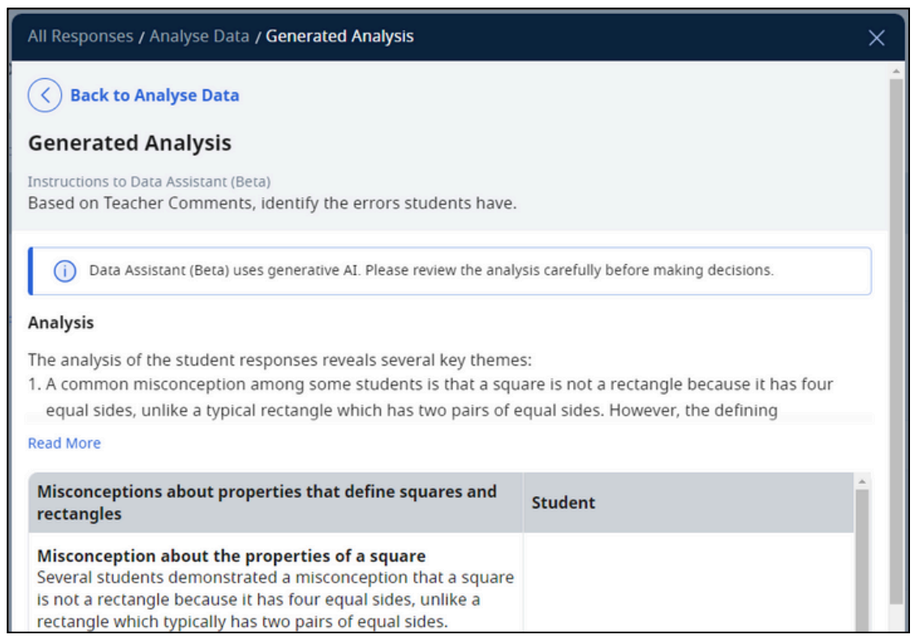


Fig. 2.5

Click on the picture for a larger view.

Students can upload files in different modes (such as audio, image, text, video) to show or explain their working to a problem (Fig. 2.6). Students can also **make their thinking visible** by Annotating Text within Activities, Add Notes to Images (Fig. 2.7) or Add Notes to Audio or Video.

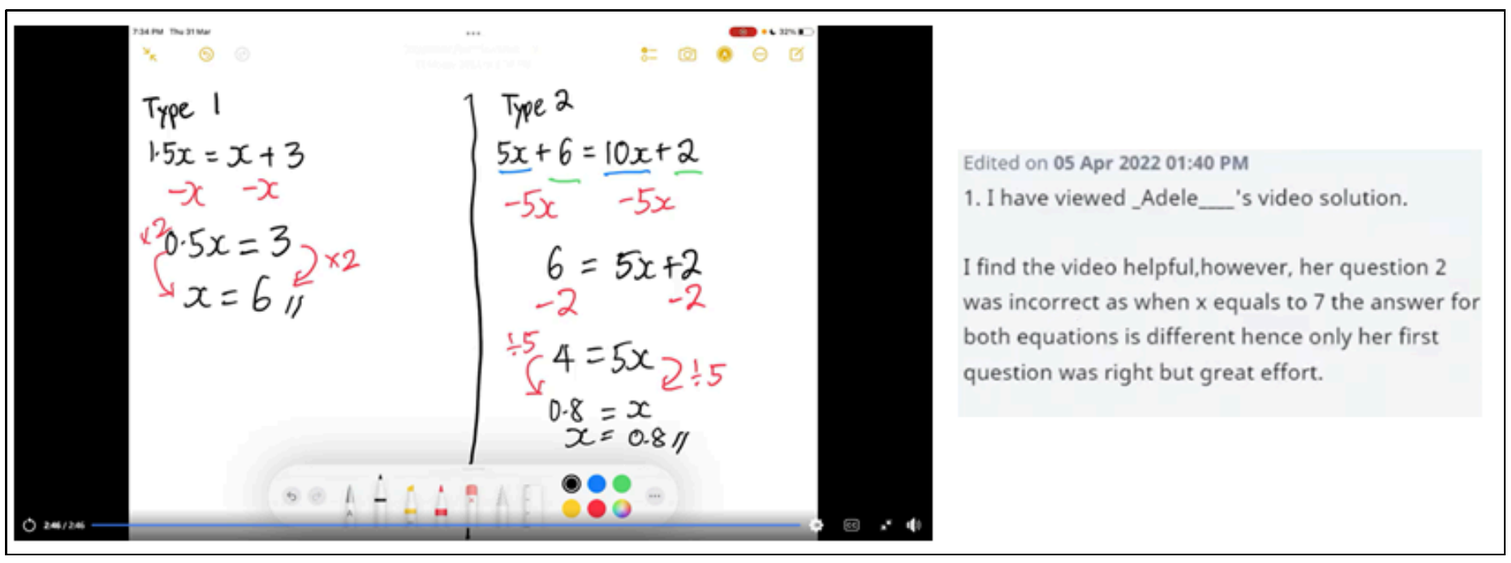


Fig. 2.6

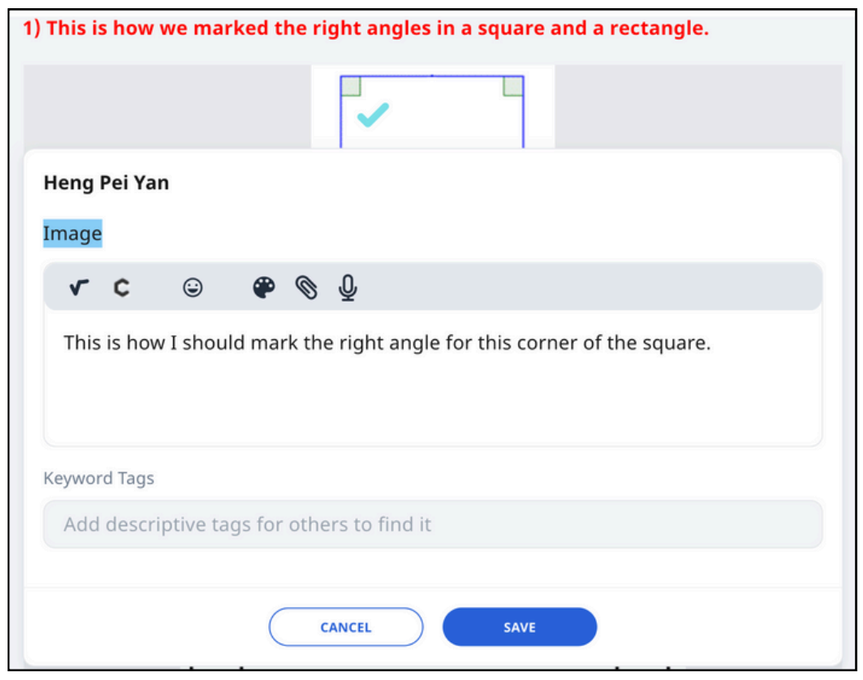


Fig. 2.7

Click on the picture for a larger view.

Mathematical Problem Solving
(e.g., skills, metacognition, processes)

Teachers and students can use symbols and conventions to write mathematical equations to **communicate their ideas, solutions and arguments** using MathType (Fig. 2.8). MathType supports handwriting input and handwritten mathematical content are auto-translated to computer notations.

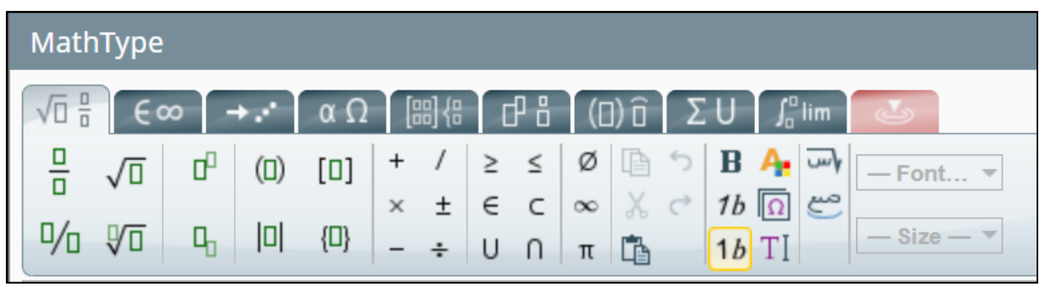


Fig. 2.8

Click on the picture for a larger view.

PEDAGOGICAL AFFORDANCES:

- The immediate feedback provided by FA-Math encourages the reinforcement of correct concepts and ensures that students are on the right track as they progress through the problem-solving process. It allows students to promptly correct any misconceptions or errors in their reasoning and **gain proficiency in carrying out operations.**
- The line-by-line feedback provided by FA-Math encourages students to **reflect and think about their problem-solving strategies** while monitoring their own learning as they progress through the problem-solving process.
- Allowing students to choose their preferred mode to **express their ideas and argument** precisely, concisely and logically is an important process for solving problems.
- The use of Data Assistant enables timely, data informed interventions that **support assessment for learning**.
- Enabling students to use mathematical notations as a writing system **facilitates the communication of mathematical ideas**.

Mathematical Problem Solving
(e.g., skills, attitudes)



How can I build my **students' confidence** and **increase their chances of success** when solving problems?

Teachers can **help students who require more support** by providing them with scaffolds such as prompts, cues or key information using the Tooltip (Fig. 3.1) or Accordion Display (Fig. 3.2) to lower the barriers to success. Teachers can also provide different scaffolds to students of different levels of readiness by setting Differentiated Access.

Students can be further supported through embedding of manipulatives from whitelisted websites in an Accordion Display (Fig. 3.2) to help them explore the simulations to **see relationships between the variables** for more complex tasks. The manipulation of digital models allow students to represent their understanding of concepts and identify critical features and patterns.

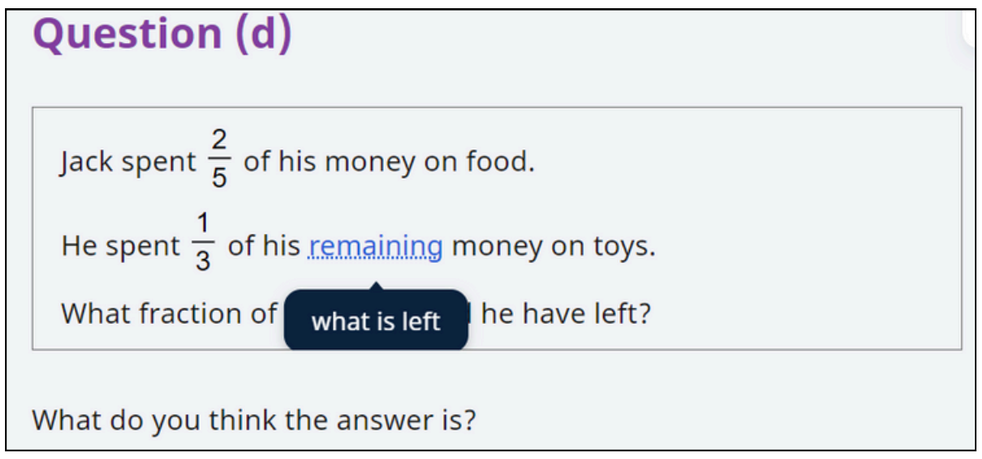


Fig. 3.1

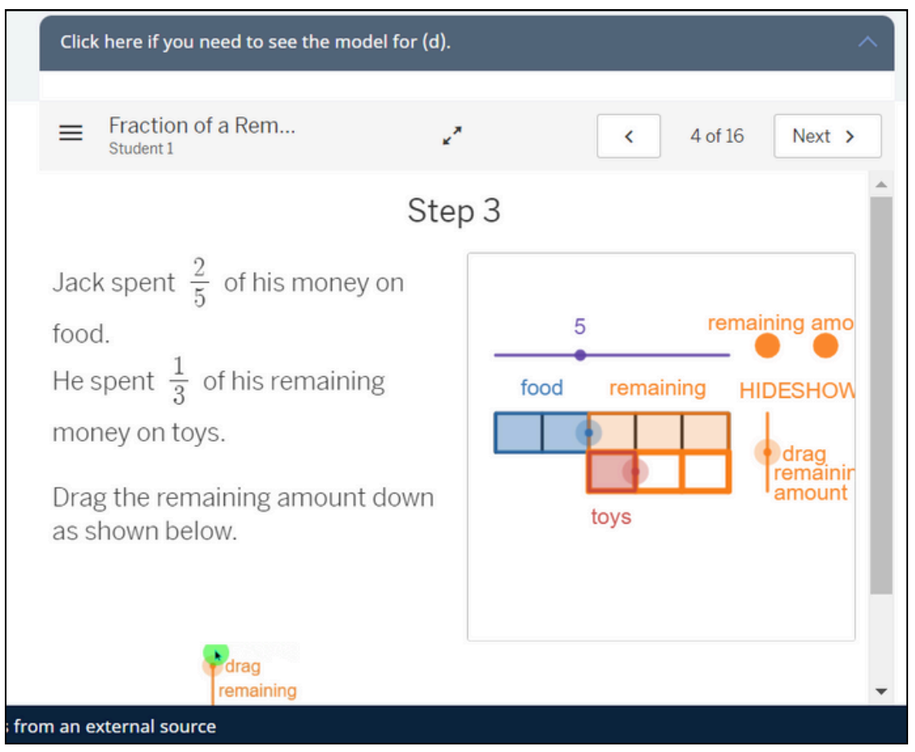


Fig. 3.2

Click on the picture for a larger view.

If you are interested in this activity, it is available here.

Teachers can Gamify a lesson to provide a narrative to **contextualise real-life situations** (Fig. 3.3).

Students can immerse themselves in the storytelling and at the same time, be awarded Experience Points (XP) and Game Badges at certain junctures in the lesson (Fig. 3.4) to **build intrinsic and extrinsic motivation**.

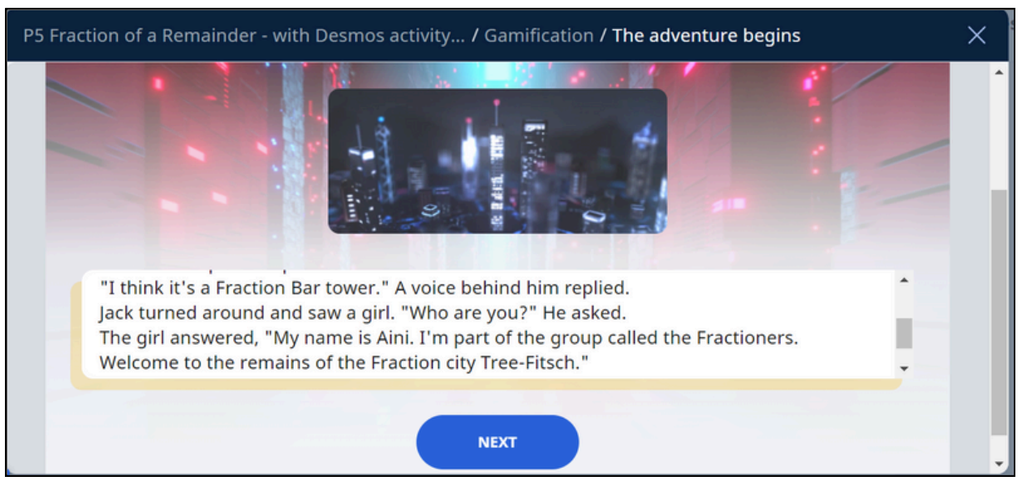


Fig. 3.3

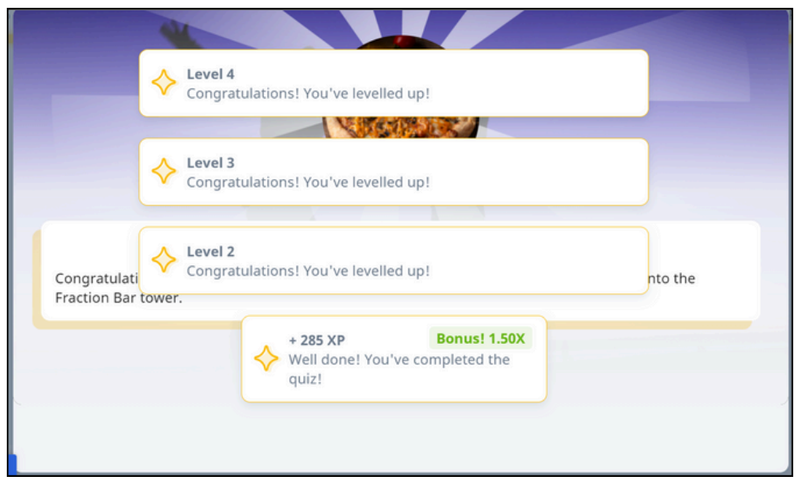


Fig. 3.4

Click on the picture for a larger view.

Mathematical Problem Solving
(e.g., skills, attitudes)

Students can access the Adaptive Learning System (ALS) for **self-directed learning**. ALS provides a **personalised learning pathway** for each student, recommending learning and assessment content based on how the student responds to the activities and his/her readiness (Fig. 3.5). Different learning modes (i.e., Guided Learning, Mastery Check, Revision, and Test Myself) are available to support students' learning, reinforce mastery, review past topics, or self-assess.

Teachers can use the ALS Learning Progress Dashboard (Fig. 3.6) to identify topics and subtopics where a student might be struggling and **provide personalised practice and support**. Teachers can monitor students' progress across multiple class groups and form subgroups based on their learning needs. Customised learning materials for identified students can be created from resources in the MOE Library, based on learning objectives, for targeted support. Teachers can also tag their own resources to the ALS content map to further customise the content that would be recommended.

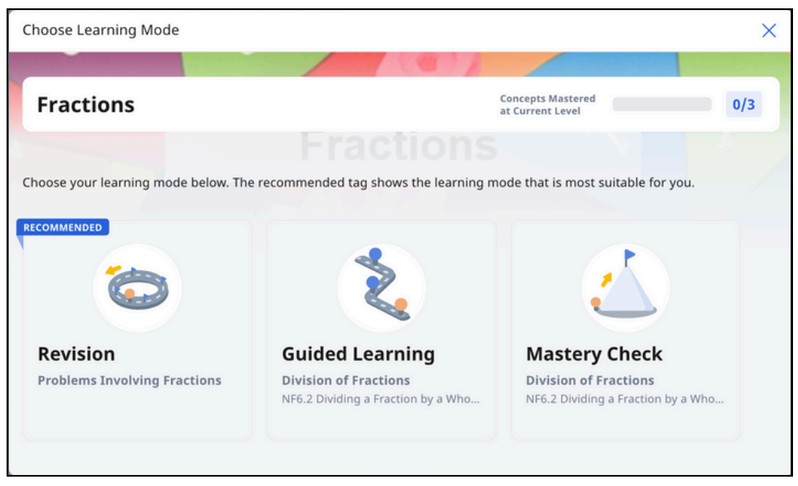


Fig. 3.5

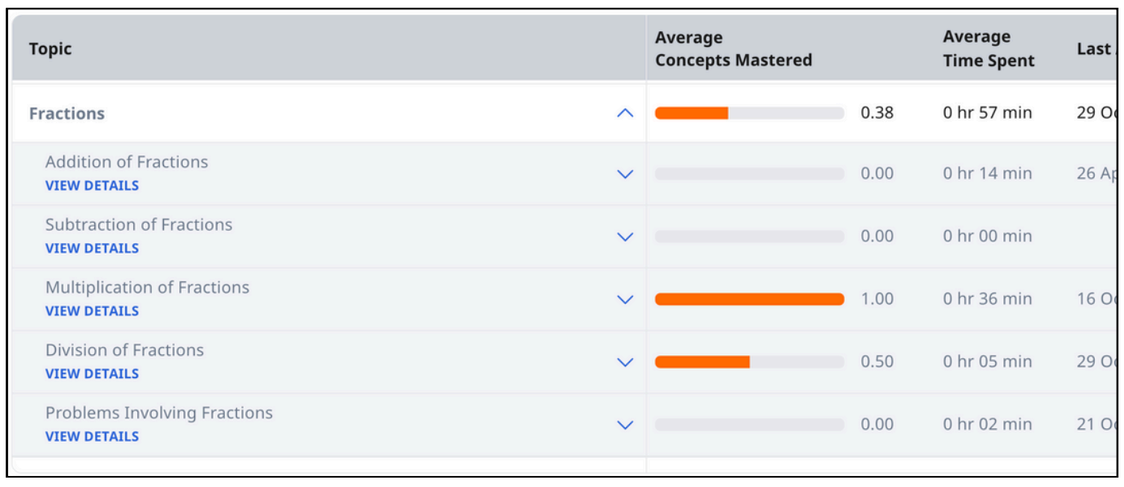


Fig. 3.6

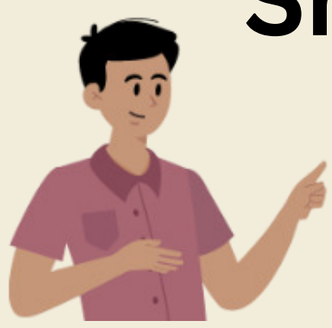
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- For more info on ALS, you may refer to the ALS Guide for Teaching and Learning and/or poster.
- For a detailed video walkthrough of how ALS works, you may refer here.
- For more lesson examples on the use of ALS, you may watch the videos here.

PEDAGOGICAL AFFORDANCES:

- Scaffolding entails offering support to students as they **learn and build proficiency**. Providing scaffolds supports the learning so that students can experience success in understanding concepts.
- Gamification allows teachers to contextualise problems, making them more relatable to students' lives, enhancing real-world application of learned concepts. Games **foster students' motivation and engagement** in the learning process.
- ALS makes learning recommendations that are customised for each student, based on how the student responds to the learning materials and activities. Students' learning is therefore enhanced through greater personalisation and they are **supported to engage in self-directed learning**.

Share your feedback!





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