



GUIDE TO USING **ADAPTIVE LEARNING SYSTEM** FOR TEACHING & LEARNING



<http://go.gov.sg/als-guide>

Updated 4 October 2024

Copyright © 2024 Educational Technology Division,
Ministry of Education, Singapore. All rights reserved.

Outline

3	<u>About Adaptive Learning System (ALS)</u>
4	<u>Key Features of ALS</u>
4	• Range of Learning Modes that Enables Customisation and Personalisation of Learning
9	• Learning Progress Dashboard that Provides Information on Students' Learning Progress
12	• Goal-setting and Motivating Messages that Encourage Student Self-Directed Learning
13	<u>Suggested Uses of ALS to Support Students' Learning</u>
14	• Support Learning Before Teaching a New Subtopic
15	• Enhance Learning During Lesson
16	• Reinforce Learning After Teaching a New Subtopic
18	<u>Annex</u>
18	• Annex A – About how ALS Works
20	• Annex B – Key Applications of Technology (KAT) and ALS
21	• Annex C – Examples of SLS Features which Complement Use of ALS

About Adaptive Learning System (ALS)

What is Adaptive Learning System (ALS)?

- Adaptive Learning System (ALS) is an AI-enabled feature in Student Learning Space (SLS) which provides a customised learning pathway for each student by recommending learning resources (e.g., videos and simulations) and assessment items based on their individual readiness levels.
- ALS is currently available for selected topics in Primary 5 to 6 Mathematics and Secondary 3 to 5 Geography. Primary 4 to Junior College Year 2 students can also access ALS where there is content tagged to the level and subject. Students can access content for one level above their current level of study, as well as content at all levels below their level of study, where available. For instance, a Secondary 1 student can view Mathematics topics up to Secondary 2.
- To find out more about how ALS works, please refer to [Annex A – About how ALS works](#).

How can teachers and students access ALS?

- Students can access ALS through SLS for self-directed learning without the need to be assigned any lessons. For guidance on how to access ALS as a student, please read [\(A1\) Access ALS](#).
- Teachers can also use SLS Student View to experience ALS as a student by first adding themselves as a student to an applicable Class Group with ALS subject such as Upper Pri Math and Upper Sec Geography. For guidance on how to access ALS as a teacher, please read [\(E1, iv\) About ALS](#).

Key Features of ALS

Range of Learning Modes that Enables Customisation and Personalisation of Learning

Other than recommending content based on its analysis of students' ability estimates, ALS personalises students' learning pathways by offering and recommending customised learning modes.

There are four learning modes in ALS. Students can attempt the **Guided Learning**, **Mastery Check** or **Revision** mode where they will receive differentiated support based on their level of readiness. Students can also choose to attempt the **Test Myself** mode to assess themselves on selected topic(s) and/or subtopic(s).

If students want to focus on a specific subtopic, they can select it by clicking **1) View All Topics**, selecting the **2) Level of Learning**, **3) expanding the topic**, and selecting the subtopic indicated by the **4) blue arrow**. Subsequently, students can choose **Guided Learning**, **Mastery Check** or **Revision** mode.

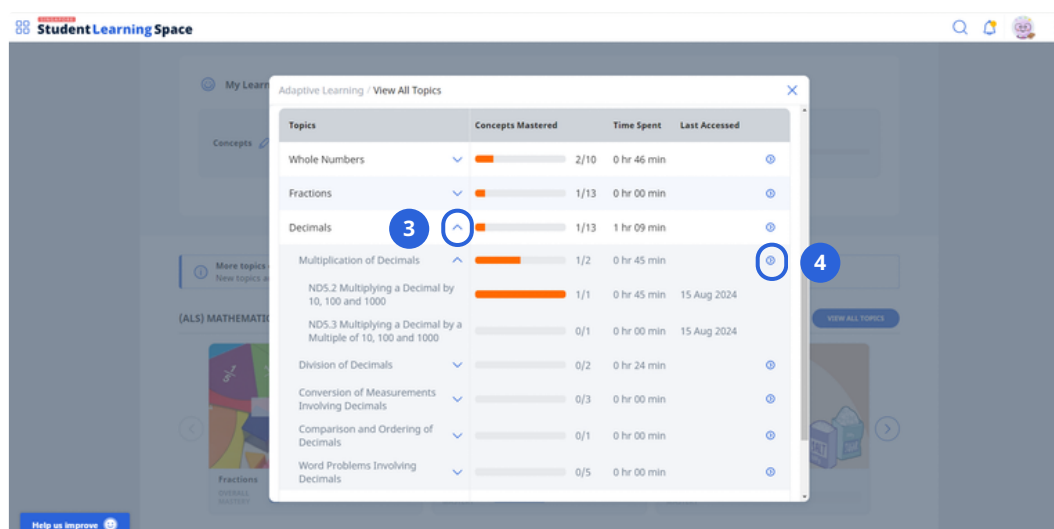


Diagram 1: Choosing a specific subtopic under View All Topics

¹ Students can choose to start with the ALS recommendation of learning mode and sub-topic, or to start with their preferred learning mode and/or subtopic.

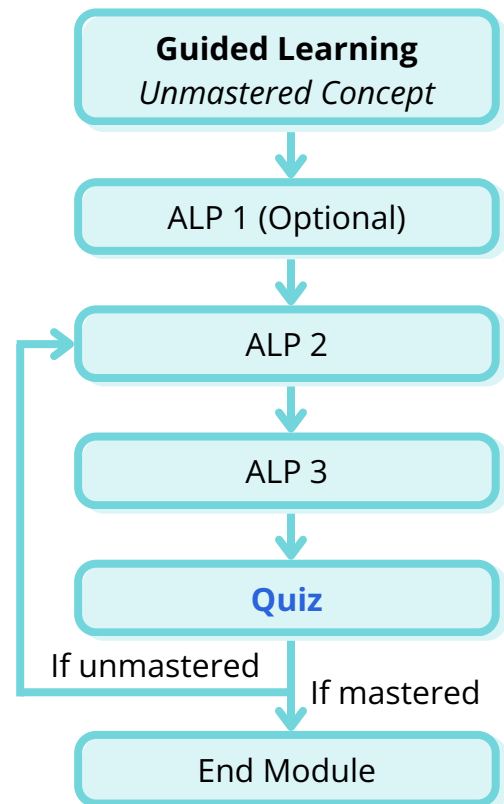
Content in ALS is designed based on different Active Learning Processes (ALP) as indicated below:

ALP	ALS Content
ALP1: Activate Learning	• Elicits students' prior knowledge
ALP2: Promote Thinking and Discussion	• Connects, challenges, deepens or extends students' thinking
ALP3: Facilitate Demonstration of Learning	• Encourages students to apply their learning through questions with hints, retries, feedback
Quiz: Monitor and Provide Feedback	• Checks for students' understanding through quizzes, with each question recommended based on its demand level and current student mastery • Each question's solution is shown immediately after submission

Guided Learning Mode



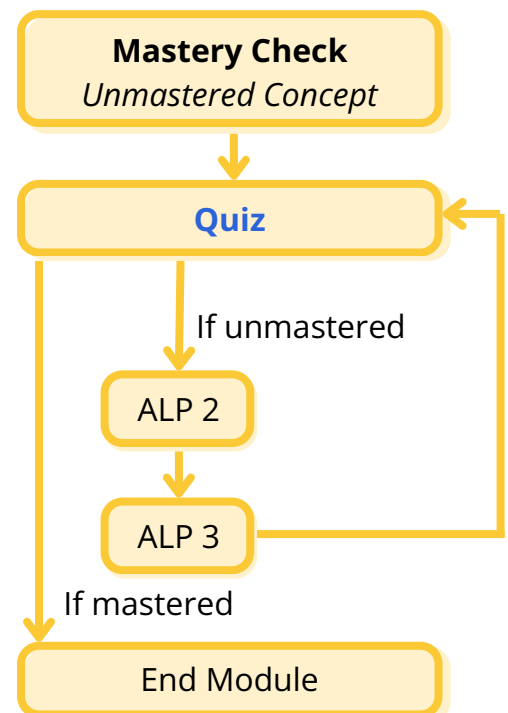
- The flowchart on the right shows the ALS content recommendation process for **Guided Learning** mode.
- This is the default mode recommended to students to gradually gain mastery of the concepts.
- Students will learn the topic through learning materials (e.g., videos and simulations) and be provided with hints and automated feedback as they attempt questions (ALP 1, 2, 3).
- Students will be given two attempts for each practice question in ALP 1, 2, 3 and progress to diagnostic quiz questions to determine their mastery.



Mastery Check Mode



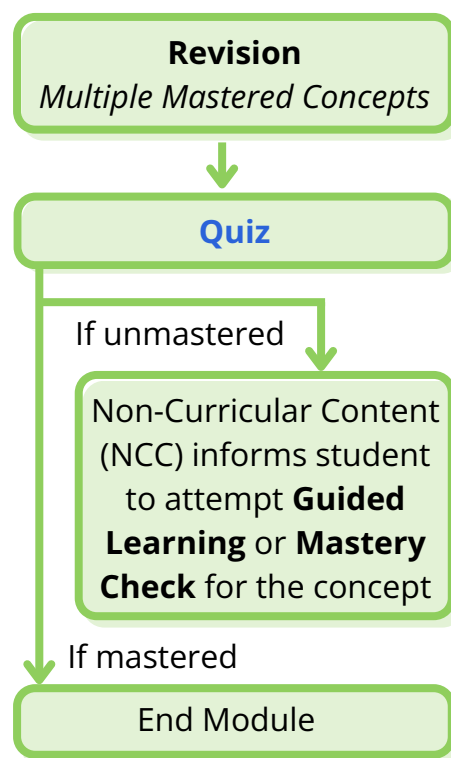
- The flowchart on the right shows the ALS content recommendation process for **Mastery Check** mode.
- This mode assesses students' mastery of concepts through quiz questions.
- Students who are not able to answer sufficient questions to demonstrate mastery will then be directed to learning materials (ALP 2, 3) which explain the concept and offer practice questions before providing more diagnostic questions.
- If students are still unable to answer the questions, the system will recommend that they switch to the **Guided Learning** mode.



Revision Mode



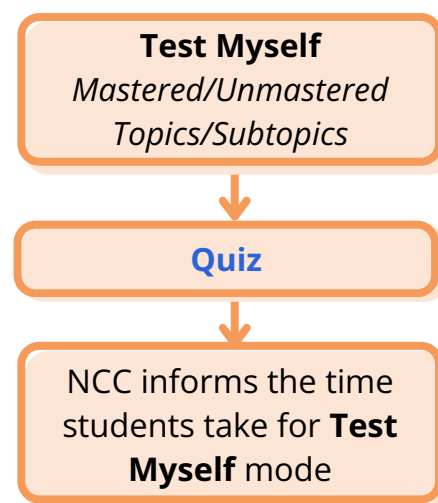
- The flowchart on the right shows the ALS content recommendation process for **Revision** mode.
- This mode allows students to revisit previously mastered concept(s) through a series of quiz questions. For students accessing ALS for the first time, and deemed to be of low readiness through the profiling questions, revision of concepts in lower levels of learning may be recommended.



Test Myself Mode



- The flowchart on the right shows the ALS content recommendation process for **Test Myself** mode.
- This mode allows students to select a variety of topic(s) and/or subtopic(s) to test themselves.
- Students can select 10, 20 or 30 quiz questions within their current level of learning.
- Students will be given feedback immediately after submitting their answers.
- The mastery level of selected topics and/or subtopics will be updated as the students progress through the quiz, and will be visible to students upon completion of **Test Myself** mode.



In addition to existing content in ALS developed by MOE HQ, teachers can also **tag their own content and assessment items** to ALS content maps, **for ALS to recommend to their students**. This would allow teachers to better customise the system according to the needs of their students. For step-by-step guidance on how to add school-based resources to ALS, read [\(E1, v\) Tag Resources to ALS](#). We encourage schools to create level/school-wide Student Groups so that all students in the Student Group may be recommended the school-based resources. This also helps to ease individual teacher workload in tagging their own content and leverages intra-department collaboration.

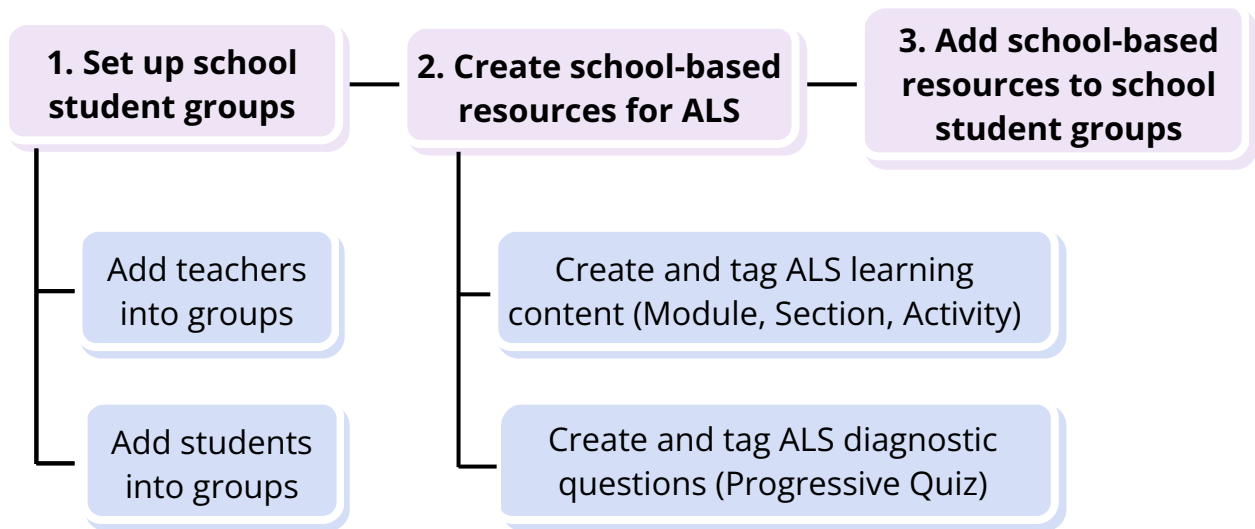


Diagram 2: Steps to tag school-based content to ALS



Learning Progress Dashboard that Provides Information on Students' Learning Progress

Teachers can refer to the **Learning Progress Dashboard** for information on learning progress at the topical and individual student level, which can be downloaded for further analysis. For step-by-step guidance on how teachers can access the **Learning Progress Dashboard**, please read [\(A2, 4\) View ALS Learning Progress](#).



Topical – Overview of concepts mastered and time spent by the entire class group, categorised by topics



Student – Overview of concepts mastered and time spent by individual students

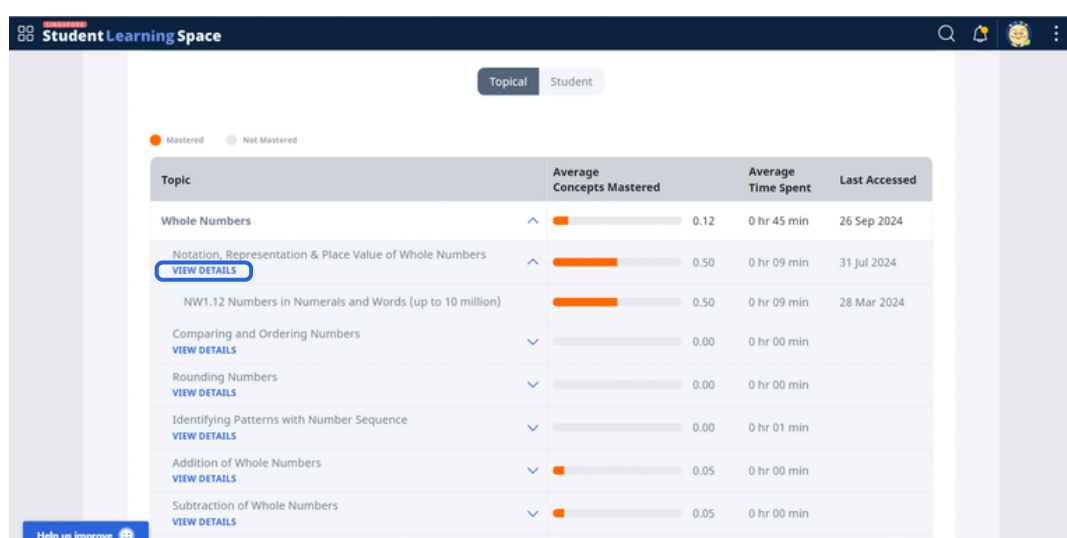


Diagram 3: Learning Progress Dashboard (Topical View)

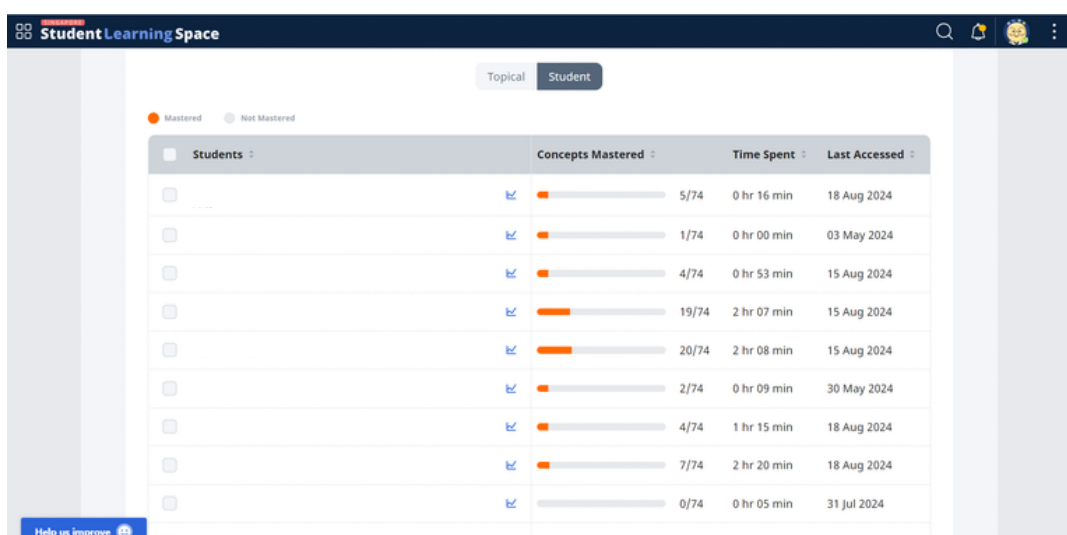


Diagram 4: Learning Progress Dashboard (Student View)

When teachers click on **View Details** in Topical view, they can review the **Curriculum Map** for more details of the concept and its connections.

To find out the breakdown of the number of students who have and have not started on the concept, as well as the distribution of levels of mastery in the class group, teachers can click on the corresponding **concept node** inside the **Curriculum Map**.

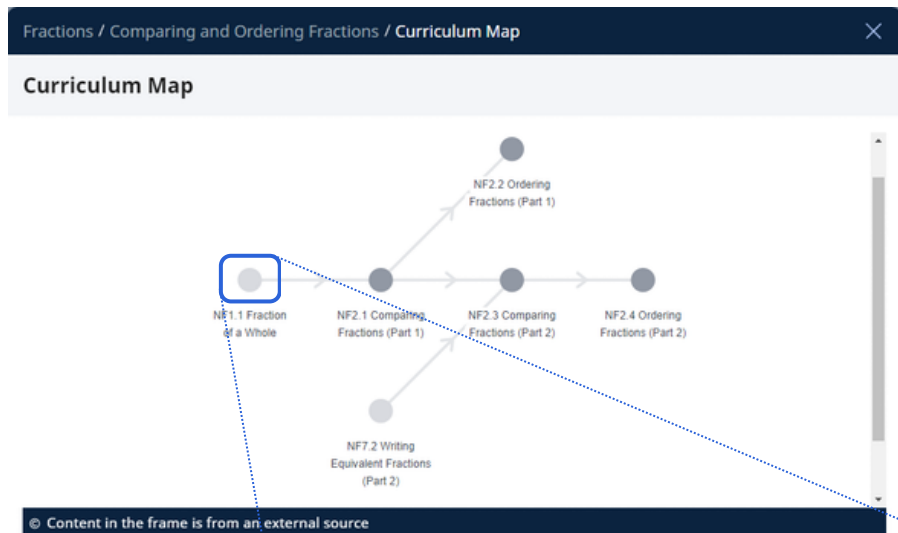


Diagram 5: Curriculum Map offers a visualisation of the concepts and how they are connected to others

NF1.1 Fraction of a Whole	
Started: 38	
Not started: 2	
Mastery Level	Number of Students
Needs attention	7
Progressing	11
Mastered	14
Expert	6
OK	

Diagram 6: Summary of number of students at different Mastery Levels for a concept

The **Mastery Levels** (i.e., Needs attention, Progressing, Mastered, and Expert) are determined based on the students’ mastery scores in ALS, which is calculated based on a variety of factors, including students’ correct responses, performance in related concepts, and choice of learning modes. The concept mastery levels of students will be adjusted over time, based on the forgetting curve, to optimise retention and learning.

To support students in their self-directed learning, ALS also provides students with information to help them keep track of their individual learning progress. By clicking **View All Topics**, selecting the **Level of Learning** and **expanding a topic and/or subtopic**, students will be able to track their concepts mastered, amount of time spent, and last accessed date.

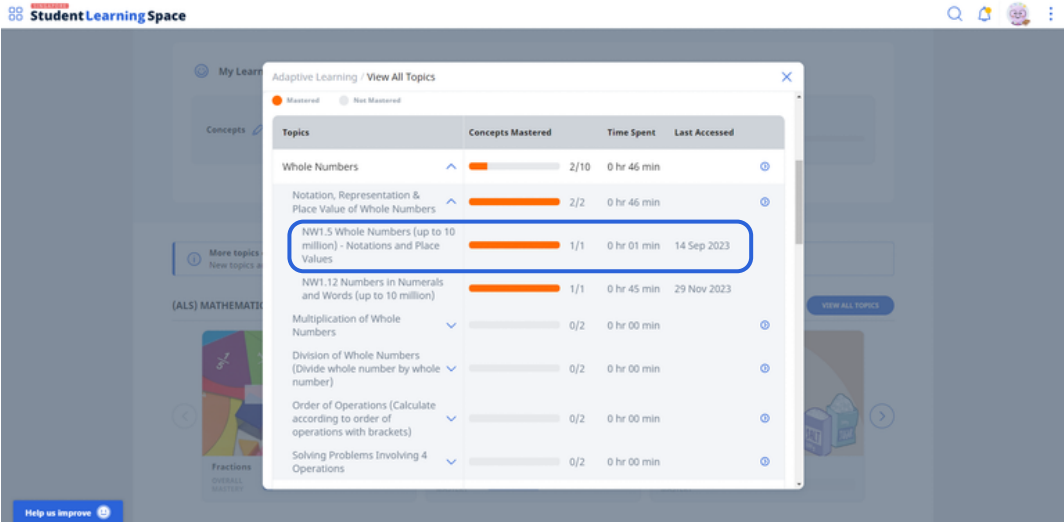


Diagram 7: Overview of learning progress for topics, subtopics and concepts

Goal-setting and Motivating Messages that Encourage Student Self-Directed Learning

ALS prompts students to set weekly learning goals for number of concepts to be mastered and amount of learning time.

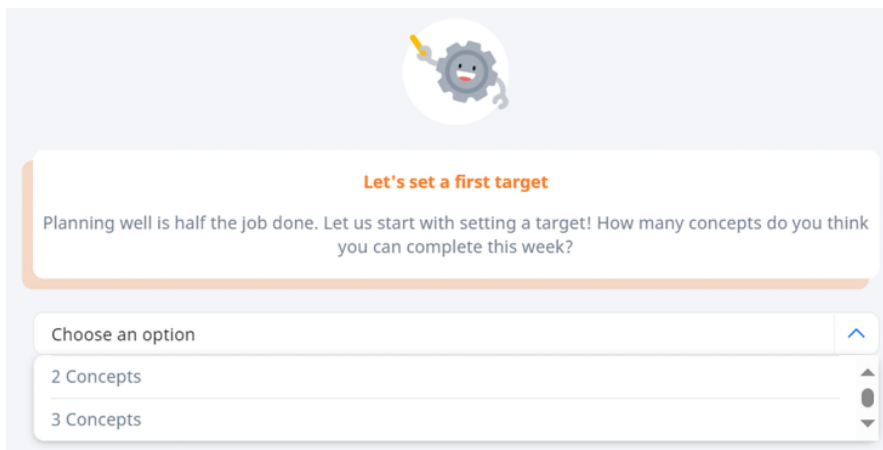


Diagram 8: Example of a question asked when students first access ALS

Students can then monitor and work towards these goals, which can be adjusted using the **student dashboard**. This dashboard also allows students to easily pick up from where they have left off in their previous ALS journey.

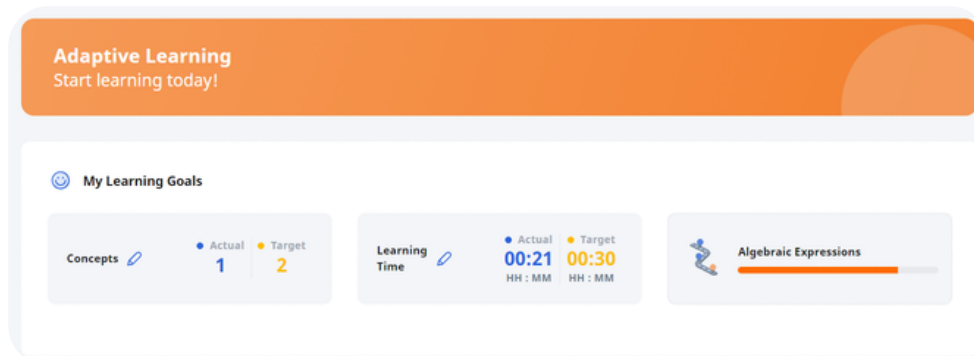


Diagram 9: ALS student dashboard enables students to monitor and adjust goals, and easily continue their last accessed ALS module

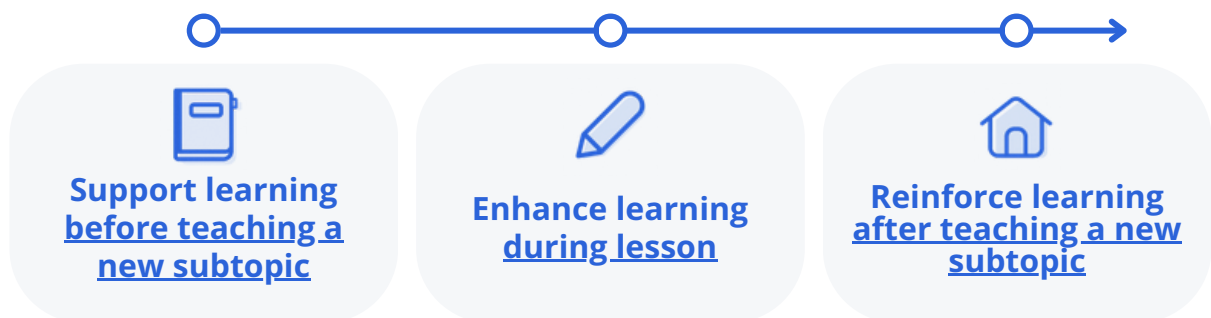
As the students progress in ALS, the system also engages students through reassuring messages based on their responses to develop students' belief in their ability to achieve their learning goals. These messages would also inform students on their learning progress at various intervals (e.g., when they have successfully mastered a concept, suggestion to change learning mode or concept).

Suggested Uses of ALS to Support Students' Learning

While ALS can be a very useful self-learning tool, it can be much more effective when the teacher thoughtfully integrates its use as well as other complementary SLS features into the lesson(s).

For examples of how existing SLS features can complement the use of ALS in teaching and learning, please refer to [Annex C – Examples of SLS Features which Complement ALS](#). For videos of how teachers are using ALS in class, please access the [e-Pedagogy Conversation Package](#) (SLS login required).

Here are suggested scenarios for which ALS can be used to support, enhance or reinforce students' learning:





Support Learning Before Teaching a New Subtopic

Before Class

Recommend students to learn a new subtopic via the default **Guided Learning** mode. (For steps on how students can choose a specific subtopic, refer to [Page 4 on Key Features of ALS](#).)

- Students access materials to learn about new concepts, attempt practice questions with hints (if available) and receive immediate feedback to check their own understanding.



Tip: Teachers can also recommend students with lower readiness to revise pre-requisite concepts using ALS prior to learning a new subtopic to close learning gaps.

- Teacher uses the **Learning Progress Dashboard** to monitor students' learning progress, and gather insights about their readiness.
- Teacher identifies groups of students by readiness levels based on the insights from the Learning Progress Dashboard and prepares differentiated activities. For example:

Low readiness

- Spend more class time with these students to close their learning gaps.
- Alternatively, assign students of higher readiness to provide peer support.

Mid/High readiness

- Assign more complex questions with scaffolds to extend students' learning.
- Group these students for collaborative learning.

In Class

Teach the new subtopic, focusing on concepts with lower mastery rates across the class. Then, assign students differentiated activities based on their readiness levels.

Enhance Learning During Lesson

In Class

Briefly introduce the key concepts for a new subtopic, before getting students to learn about the subtopic in ALS. For classes who require more support, teacher may want to spend more time to discuss key concepts before students attempt ALS.



Tip: Revising established classroom routines at the start of lesson (e.g., collection of devices, raising of questions and cyber wellness etiquette) can ensure a more conducive learning environment.

- Teacher assigns students to go through the Guided Learning mode, where they will learn various concepts through resources such as videos and practice questions.



Tip: As students may watch different videos at various intervals when accessing **Guided Learning** mode, it is recommended to prepare headsets in advance for students' use.

- Students may choose to access the hints (if available) when attempting their quiz questions and will be given immediate feedback after submitting their answers.
- Teacher monitors students' learning in ALS through the **Learning Progress Dashboard** to determine the key concepts to address.



Tip: For students who have mastered the subtopic (as observed from the **Learning Progress Dashboard**), teachers may wish to direct them to other modes, including **Test Myself** mode, or assign seated work so that students do not go into a new subtopic.

For students who have been revisiting the same learning materials but are still unable to master the subtopic, teachers may wish to group them together for direct instruction.



Tip: Teachers with a tablet can consider using it to monitor the students' learning progress while walking around the class to provide timely support for students.

- Informed by classroom observations and data from the **Learning Progress Dashboard**, teacher consolidates the key concepts and addresses common misconceptions for the subtopic for all students at the end of the lesson.

Reinforce Learning After Teaching a New Subtopic

In Class

Teach a new subtopic and consolidate learning by highlighting key ideas and addressing learning gaps.

After Class

Students attempt different learning modes on ALS to reinforce their learning, starting first with **Guided Learning** mode as it provides scaffolds to support their learning.



Tip: ALS recommends learning modes (**Guided Learning**, **Mastery Check** and **Revision**) for students based on their mastery progress and readiness levels. Students can look out for the “Recommended” banner when choosing learning modes.

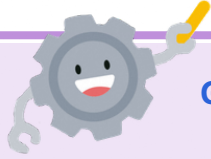
- Students who are more ready can choose the **Mastery Check** mode to practise selected subtopics. Students who are not able to answer sufficient questions to demonstrate mastery will then be directed to learning materials (ALP 2, 3) which explain the concept and get students to attempt practice questions before attempting more diagnostic questions.
- Students who wish to select specific topic(s) and/or subtopic(s) to reinforce learning can choose the **Test Myself** mode, which allows students to specify the number of quiz questions before directing them to the quiz.

Before the Next Class

Monitor students’ learning in the ALS through the **Learning Progress Dashboard** and use the data to differentiate subsequent learning activities, e.g., set further practice or provide remediation for low readiness students.



Tip: The data from the Learning Progress Dashboard can be used in corroboration with results from students’ past work on this subtopic to better inform teachers of students’ readiness levels and indicate which students would require further support.



General Tips on Using ALS

- Before students first interact with ALS, it will be helpful for teachers to introduce ALS to students and walk them through the initial process of target setting and choosing learning modes. This will enable students to better understand and harness the system for self-directed learning.
- Students should try to complete their learning loops (i.e., their chosen learning modes) as this provides ALS with a more comprehensive overview of individual student's level of understanding to make more useful learning recommendations that are more personalised to each student's learning needs.
- Teachers may find it helpful for students to record their workings, thought processes and reflections using notebooks (either digital or non-digital) as required by the subject.

Annex A – About how ALS Works

- ALS **gathers information** about each student based on how they respond to learning content, including learning resources and activities (e.g., choice of learning modes, performance in related concepts).
- By **analysing** the students' responses to the content and diagnostic quiz questions using Item Response Theory and considering the forgetting curve (i.e., time lag between the last time students accessed/mastered the content), ALS makes inferences on each student's ability estimates and concept mastery.
- ALS then **recommends** personalised learning pathways to effectively address each student's learning gaps, with content and questions targeted to keep them in their Zone of Proximal Development.

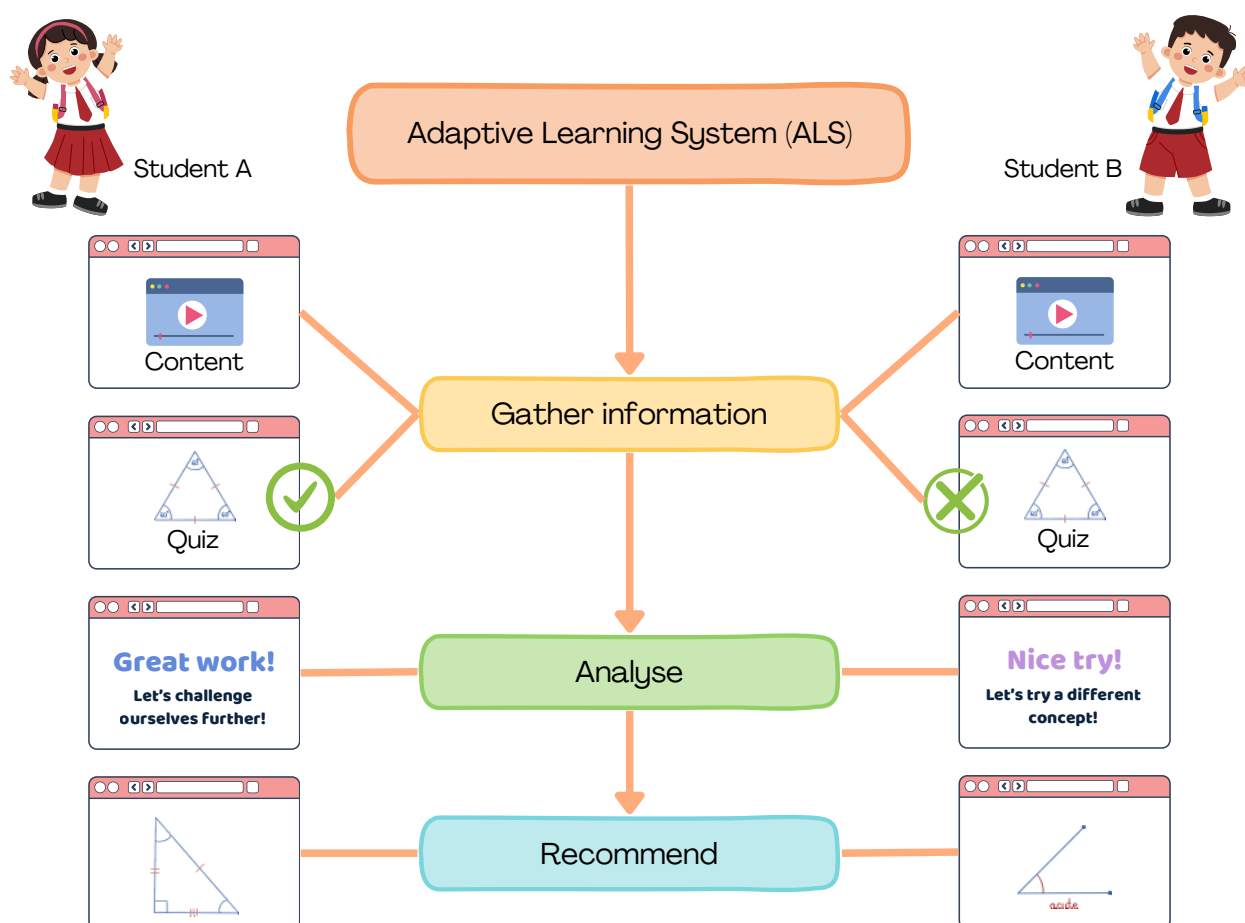


Diagram 10: Illustration of how different learning content and assessment items are recommended to students, based on their readiness

- The recommendations made by ALS are informed by the curriculum model. The diagram below shows an example of a curriculum model with topics, subtopics and concepts. The concepts are also linked by pre-requisite relationships.

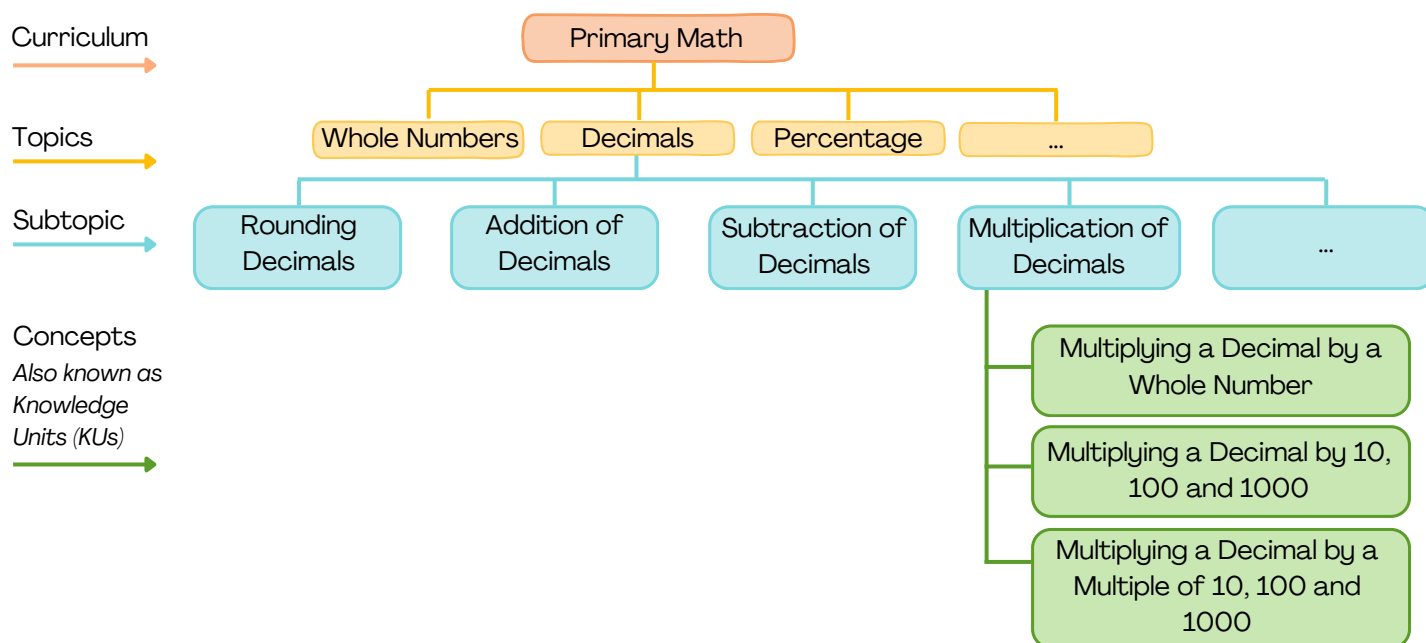


Diagram 11: Example of curriculum model used in ALS

As students continue to progress in ALS, their estimated ability level is continuously updated, allowing the system to adapt the difficulty of the content immediately.

Annex B – Key Applications of Technology (KAT) and ALS

ALS applies the following KAT to support students in their learning.

Support



Teachers can track students' learning progress using the **Learning Progress Dashboard** and provide students with targeted feedback and resources to move their learning forward.

Provide



ALS content and recommended learning modes are differentiated based on students' readiness.

Increase



ALS encourages students to take ownership of and persist in their learning by providing students with the choice of learning modes and encouraging messages based on students' interaction with the system.

Enable



ALS provides students choice in their learning goals, learning modes and pace of learning.

Embed



ALP 2 and ALP 3 content are embedded as part of **Guided Learning** mode, and will be recommended to students when students experience difficulty mastering concepts in **Mastery Check** mode.

Annex C – Examples of SLS Features which Complement Use of ALS

The table below shows examples of SLS features, categorised by different KAT, which complement the use of ALS in teaching and learning.

Support



- Create SLS Free Response Questions and leverage the AI-enabled Learning Feedback Assistants: [Feedback Assistant - Mathematics \(FA-Math\)](#), [Short Answer Feedback Assistant \(ShortAnsFA\)](#) and [Language Feedback Assistant for English \(LangFA-EL\)](#) to automate grading and provide immediate and targeted feedback to students. Tag these questions to the ALS content map for ALS to recommend them to students.
- Get students to complete different types of [SLS quiz](#) to demonstrate their understanding.
- Use the [SLS heatmap](#) to analyse the learning data and provide feedback to close students' learning gaps.

Provide



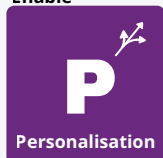
- Get students to [insert Mathematical equations](#) to show their working using the SLS [Free-Response Questions](#). Review their working to check their understanding and assess their readiness levels.
- Use the [Subgroup](#) and [Differentiated Access](#) feature in SLS to assign differentiated sets of learning resources for students to achieve the same learning objective.

Increase



- Use SLS to [create a game layer](#) in the lesson resource to motivate students.

Enable



- Use SLS, provide students a choice to access a given list of learning resources.
- This can be done by sharing suggested lessons within [SLS Class Group Resources](#) with students.

Embed



- Support students' learning by embedding scaffolds such as question prompts and cues in existing SLS lessons.
- Scaffolds can be given in the following forms:
 - automated hints provided by [FA-Math](#);
 - model method in [FA-Math](#) for students to visualise the problem;
 - [tooltips](#) for text-based prompts to appear when students mouse over certain terms;
 - hints for MCQ, fill-in-the-blanks and click-and-drop questions in the form of guiding questions; and
 - [accordions](#) to add a text, video, image, MCQ or Free Response question.

For more examples on how SLS features can be used to enhance the teaching and learning of various subjects, please refer to the [SLS Subject Guides](#).