

Dr. Tin Lam Toh's Q&A Session

June 25, 2026

(due to lack of time the questions below were not addressed during the webinar, but the speaker addressed them afterwards. The answers have been edited by the moderator, Dr. Hollylynne Lee)

1. Singapore's approach says 'teachers amplified, not replaced.' But if AI becomes excellent at diagnosing student misconceptions and giving personalized feedback, what should remain uniquely human in mathematics teaching—and how will we measure whether teachers are truly being amplified rather than gradually deskilled?

If teaching mathematics is only about imparting the procedural skills, diagnosing students' misconceptions, and giving students feedback, AI will likely replace teachers. It is thus time to re-think what teaching mathematics is about. Perhaps a look at a mathematician's work on mathematics will tell much. Their work is not about solving known problems, but about exploring new approaches to old problems, or new problems. In the process, critical thinking skills, mathematical creativity etc are involved. Thus a teacher's focus is channeled to this new direction, which cannot easily be replaced by AI.

2. How do you decide which mathematical tasks students should never outsource to AI, even if AI can perform them perfectly?

I believe there is not a hard-and-fast rule to decide this. In the Singapore context, we believe that ALL basic skills should never be outsourced to AI. For example, solving linear equations $ax+b=c$. We still need students to possess this skill of solving. But for teachers teaching linear equations, the emphasis should NOT be solely on the skills in solving this equation. Rather, in teaching solving this equation, a teacher could have a larger picture of developing in students the concept image of balancing, and even the big idea of equivalence (i.e., in solving the equation, we are preserving the equivalence of the statements, i.e., all equations have the same solution space), that will eventually be connected to so many other topics in the math curriculum. In AI-enhanced curriculum, in short, the skills are still necessary and should never be completely outsourced, but should be linked to bigger ideas in the syllabus which only the teachers could make the connections with. So, using this example, the topic solution of linear equations should never be one that focuses purely on the skills of solving such equations (AI can solve all the questions within seconds!), but rather, what solving this equation eventually leads to. Procedural skills are the scaffold, which are still important, but in the AI era, the emphasis should never be solely on the scaffold.

3. Do teachers in Singapore have special AI tools that are allowing them to control how much information students can get when they are asking the bot how to help them solve a math problem?

There are many AI tools for teaching and learning in the controlled space of the Ministry of Education. However, there is no restriction for teachers to use other Open AI tools, or create their own Chatbot. Outside classrooms, students also have access to other AI tools, so it is important that teachers should know this as well.

4. Your framework aims to develop learners who can go beyond AI. In mathematics, what does 'beyond AI' actually look like in practice? Which mathematical habits of mind do you believe should always remain uniquely human, regardless of how powerful AI becomes?

Going beyond AI summarily means to develop the qualities that complement AI. For mathematicians, the use of any such tools can simplify many tedious computations, so that they are freed of the onerous task and could focus on exploring new problems to solve, or new approaches to old problems. Such a spirit of mathematical inquiry, which is more authentic than executing procedures fluently, is definitely important for mathematicians and mathematics students.

5. Have any of the national mathematics organizations in the US, like AMTE, MAA, NCTM, NCSM, or the National Academy published a framework for the use of AI like the one the Ministry of Education in Singapore has?

Sorry I am not in a position to answer.

Hollylynne Lee: Here are links to some statements and guidelines from different US-based organizations:

- NCTM: [Artificial Intelligence and Mathematics Teaching](#)
- NCSM: [Educational Technology and AI: Guidance for Mathematics Leaders](#)
- MAA: Held in a convening in June 2026 on [Generative AI and Mathematics Education](#). I'd expect some documents or publications to be forthcoming.
- Digital Promise offers resources and guidelines for [AI literacy in education](#).
- AI4K12 is developing guidelines to support [AI Instruction](#).

6. This is a specifically tailored IA toolkit that Singapore has designed to fit the classroom needs?

Yes, all are in the Student Learning Space

7. Thank you so much for the wonderful introduction and for explaining how AI has been implemented in Singapore's education system. I was wondering whether AI is currently used primarily in mathematics, or whether it has also been integrated into other subject areas. In addition, who is mainly responsible for teaching AI literacy and broader AI-related competencies? Is this primarily the role of mathematics teachers, or are there dedicated courses or school-wide initiatives being developed to support students' AI literacy and responsible AI use across the curriculum?

To the best of my knowledge, there is no subject known as "AI literacy" in Singapore schools that I know. However, some schools did get external vendors to engage their students in AI literacy as an enrichment course. Still, with AI infused in all subjects, all subject teachers I believe are responsible for harnessing AI into teaching the subject. Thus, it is necessary to re-think the objective of mathematics instruction, exactly the same thing we faced when we first introduced scientific calculators and later graphing calculators into the mathematics curriculum, but of course now this is occurring at a much faster pace (This is only to the best of my knowledge).

8. Much of Singapore's success stems from centralized infrastructure and intensive teacher training. How can the frameworks discussed here be adapted or lightweighted for public school systems in developing regions that lack ubiquitous high-speed connectivity or high-end device access?

Apologies, I might not be able to answer this question. But what I believe is we should identify the underlying spirit of the use of the tool. For example, the use of an AI tool is NOT to replace human beings, but to develop mathematical inquiry, critical thinking and mathematical creativity – these in a sense transcend technology.

9. A known risk of adaptive, tutor-like systems is the homogenization of student thinking—steering everyone toward a single 'optimized' path. How does your framework protect mathematical diversity and multiple ways of knowing? For instance, how might a teacher use SLS to highlight and contrast students' divergent, rough-draft reasoning rather than just validating the final, standardized solution?

Based on what I know, the adaptive learning system charts individualized learning trajectories for individual students. It is not a single 'optimized' path, but one that is optimized for different individuals. Several years ago, I already heard of staff exploring individualized instruction using technology, the idea was simply too difficult to execute in reality. I believe with Adaptive Learning System, this can be done easily. I cannot comment much as I do not have direct access.

10. How shall schools manage the misuse of AI outside of school, then? Since school is a controlled environment, nothing is stopping them from misusing it outside of school.
Thank you

You are totally right. Hence, through the controlled environment, students should develop the critical ability and the ethics principles so that the chance of misuse outside the environment could be minimized. Teachers should also be familiar of AI outside the controlled environment, so that they can take necessary actions based on their professional judgement.

11. Is AI used for "learning mathematics" or just for doing math? Can you give an example if so?

Definitely, it is important for AI to be used for "learning mathematics". However, "doing mathematics" can also lead to "learning mathematics" and "learning mathematics" cannot be delinked from "doing mathematics". In other words, AI should transcend that of just solving textbook practice questions. Even if used in that way, it must lead to student learning. That is why the role of teachers is even more important.

12. With AI teaching would the IT department and cyber security department be in charge of the software and hardware and are teachers input implementing into the teaching AI programme and tools ?

Yes, definitely cyber security and the IT departments in schools will be involved, and teacher inputs too. But I don't have the details to answer.

13. Is SLS open-source? How might other countries or organizations leverage the substantial investments in SLS?

SLS is a platform developed by the Singapore government for the Singapore schools. I believe other countries do have their own platforms, but not sure.

14. I agree that one promise of AI is for the teaching of mathematics to focus on important concepts without being so bogged down in mundane computations. However, for many students (myself included, when I was a K-12 student), understanding is derived through experience. There are other students (less than 50%, in my experience, but they do exist) who do not need such grounding. The pity is that all students are currently forced to learn in more or less the same way, and by the time students become skilled in the quadratic formula (or factoring, or whatever), most of the first type of students (the experience-based learners) are so exhausted that they never learn the higher concepts, and many of the second type of students (the deductive or conceptual learners) are so bored that they have already dropped all interest in mathematics. American students need an ethic of learning for learning's sake, on the promise that mind development is worthwhile on its own. Do you have any suggestions for improving our culture?

Yes, in the traditional curriculum development and design model, the learning experience is as important as the content that students learn. With an individualized Learning Trajectory, different students will have different amounts of exposure to what they need. Students who need to engage more hands-on will have a chance to do that, and students who do not need can skip much of that. I believe Individualized Learning Trajectory takes care of that.

15. Can we see concrete examples (at least at screenshot level) on how are they implementing these customized tools? Are they embedded in electronic textbooks?

Apologies, I do not have access to this. Yes, based on my knowledge, all the new school textbooks will be in electronic form, and will be embedded in the Student Learning Space. These electronic textbooks might be AI-enhanced.