

MONTHLY NEWSLETTER

Monthly Reflections: Advancing Computer Science Education
Through ICSEC



LUNAR NEW YEAR GREETINGS

As we welcome the new lunar year, we extend our sincere greetings to our community around the world. By sharing knowledge and experience and strengthening collaboration across borders, let us continue advancing Computer Science education together.

DESIGNING FOR PRODUCTIVE STRUGGLE

At **ICCE 2025**, members of our network attended key sessions to gather insights that we can bring back and share across our community. One powerful concept presented by Dr. Manu Kapur was **Productive Failure**, the idea that students learn more deeply when they are first given time to explore and struggle with a problem before receiving direct instruction. This exploration phase is followed by structured instruction that consolidates and refines their thinking.



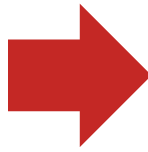
Instead of immediately teaching a formula or solution method, learners attempt to generate their own approaches. This exploration phase is followed by structured consolidation, where key concepts are clarified and refined. Research shows that while direct instruction may improve short-term performance, Productive Failure strengthens conceptual understanding and long-term knowledge transfer.

A Two-Phase Design

(Kapur & Bielaczyc, 2011)

Problem - Solving

Generation & Exploration
Phase



Instruction

Consolidation & Assembly
Phase

Phase 1: Problem-Solving

Generation & Exploration Phase

Students are first presented with a complex problem before being taught the formal method to solve it.

- They explore different strategies.
- They generate ideas, even if incomplete or incorrect.
- They compare multiple possible solutions.

Importantly, initial solutions may be flawed and that is intentional. This “productive struggle” activates prior knowledge, reveals misconceptions, and prepares the mind for deeper learning.

Phase 2: Instruction

Consolidation & Assembly Phase

After exploration, the teacher introduces the formal concepts and canonical solution methods.

- Students reflect on their earlier attempts.
- Key principles are clarified and structured.
- Correct methods are connected to the strategies students generated.

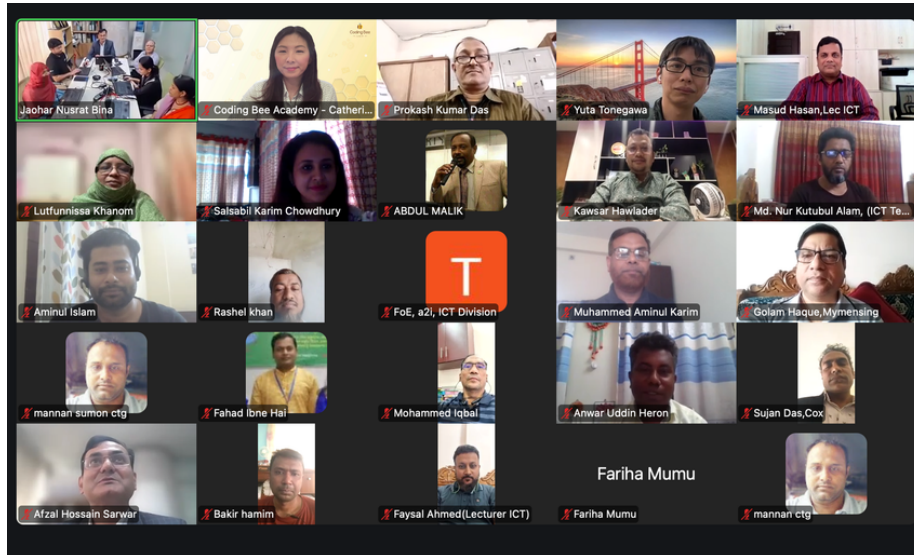
Because learners have already wrestled with the problem, the instruction becomes more meaningful, better organized, and easier to transfer to new contexts.

Productive Failure works by first allowing students to grapple with and explore a complex problem on their own, generating ideas and encountering difficulties, before receiving structured instruction that consolidates, clarifies, and formalizes their understanding — turning initial struggle into deeper, more transferable learning.



We extend our appreciation to **Ashwini Chandrasekhar** for her insightful presentation on Productive Failure, which informed this reflection and discussion.

SHARED PURPOSE, SHARED PROGRESS



At ICSEC, we have always believed in the enduring value of educators in shaping the future of computer science education. Whether as teachers, lecturers, or mentors, each plays a pivotal role in nurturing curiosity, strengthening confidence, and shaping the beliefs of the next generation.

On **26 February 2026**, ICSEC officially launched its first cross-country teacher training initiative, designed to empower educators in navigating this era of rapid technological change. As a starting point, **Bangladesh** and **Indonesia** will conduct regular joint training sessions, creating meaningful opportunities for teachers to exchange best practices, share classroom experiences, and learn from one another across borders.

Through this initiative, ICSEC continues to strengthen international collaboration while placing educators at the heart of sustainable and future-ready CS education.

ICSEC continues to grow through shared values and meaningful collaboration.

If you're interested in contributing to or collaborating on the **RPP** or **Teacher Workshop**, please reach out to us at yuta@i-csec.org