GES GRIZZLIES · PROFESSIONAL LEARNING · SERIES 04

Bloom's Two Sigma Problem

& the AI Opportunity

What the most important finding in educational research means for every GES teacher — and why AI may finally be the answer.

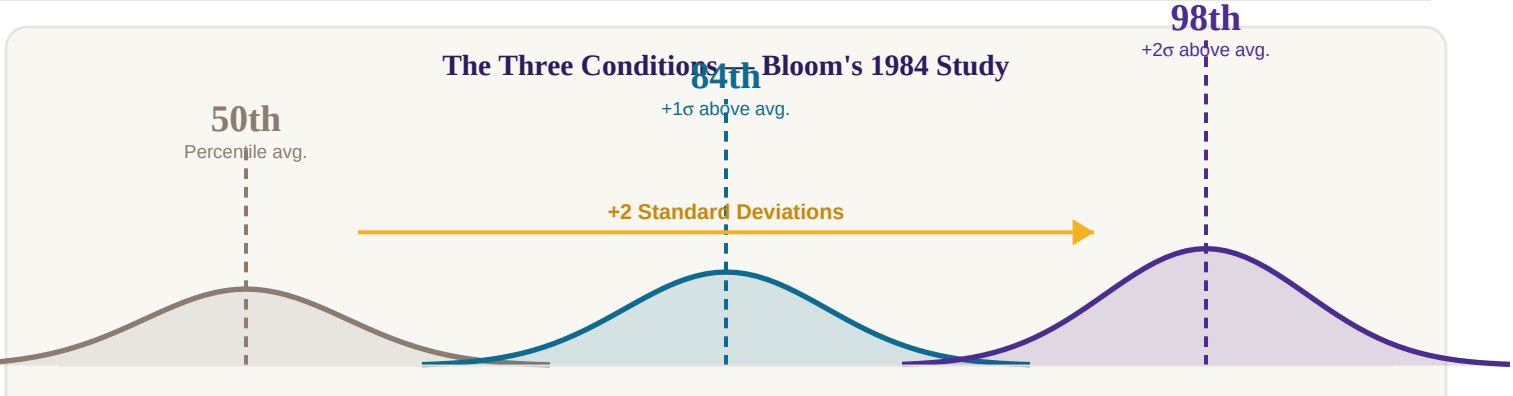
2σ	98%	1984
STANDARD DEVIATIONS	STUDENTS OUTPERFORMED	BLOOM'S ORIGINAL FINDING

In 1984, educational psychologist Benjamin Bloom conducted one of the most significant studies in the history of education. He compared three ways of teaching the same content to students — and what he found has haunted educators ever since.

THE DISCOVERY

Bloom compared three instructional conditions:

CONDITION	SETTING	RESULT
Conventional Instruction	1 teacher · ~30 students	50th percentile (baseline)
Mastery Learning	Same class + mastery checkpoints	84th percentile (+1σ)
One-to-One Tutoring	**Single tutor per student**	**98th percentile (+2σ)**



Why Bloom Called It a "Problem"

The tutored student outperformed 98% of students taught in a conventional classroom. Bloom called this a "problem" because the solution — a personal tutor for every child — is economically impossible at scale. For 40 years, this finding just sat there, a quiet reproach: we know what works. We just cannot afford it.

WHAT A GREAT TUTOR ACTUALLY DOES

Understanding why tutoring works is the key to understanding the AI opportunity. A skilled tutor does several things a classroom teacher simply cannot do for 25 students simultaneously:

Knows exactly where this student is right now— not the class average, not last year's data, but this moment.

Gives immediate feedback the moment a mistake happens— before the wrong thinking solidifies into habit.

Adjusts the next question based on the last answer— always in the student's zone of proximal development.

Never runs out of patience— never has a bad day, never moves on because time ran out.

Is available when the student is actually working— at 9pm doing homework, not just during the 45-minute lesson block.

Why AI May Finally Be the Answer

AI tutoring systems can now replicate the mechanical conditions that made one-to-one tutoring so effective — at essentially zero marginal cost per student. Not perfectly. But closer than anything education has seen in 40 years.

■ Diagnose in Real Time

- Assesses current understanding instantly
- Not the class average — this student, now
- Identifies the exact gap before moving on

■ Immediate, Specific Feedback

- Responds the moment a mistake happens
- Tells the student WHERE their thinking went wrong
- Re-presents the concept a different way

■ Adaptive Pacing

- Adjusts difficulty based on last response
- Always in the student's learning zone
- Moves faster for ready students; slows for others

■ Always Available

- No bad days, no running out of time
- Available at 9pm when homework actually happens
- Consistent patience across every student

THE HONEST LIMITS — WHAT AI CANNOT DO

- Build the human relationship that is itself a learning variable
- Introduce genuinely new, complex ideas as well as an expert teacher can
- Recognize when a student is struggling for emotional or social reasons
- Exercise the judgment that comes from knowing a child over time

The Teacher's Role Does Not Shrink — It Sharpens

AI is not a replacement for teachers. It handles the practice and feedback loop — the part of learning that benefits most from immediate, individualized response. Teachers handle the I Do: expert modeling, discussion facilitation, relationship, and the judgment calls that require knowing a child.

WHAT THE 2 SIGMA OPPORTUNITY LOOKS LIKE AT GES

1 — STRONG I DO
Teacher models explicitly — AI cannot do this

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2 — BRIEF WE DO
Teacher + students work together with scaffolding

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3 — AI-SUPPORTED YOU DO
Students practice with AI tutor while teacher monitors

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4 — TEACHER SYNTHESIS
Teacher pulls small groups, closes the lesson

When a teacher finishes a strong explicit instruction lesson and then sends students into an AI-supported practice session while pulling a small group for re-teaching, that is the closest most schools will ever come to the two-sigma promise. Not because the AI is magic — but because the **teacher's time gets concentrated where it matters most,** and every student simultaneously gets something approaching their own tutor for the practice phase. Bloom would likely recognize it.

Original Study Bloom, B.S. (1984). The 2 Sigma Problem. *Educational Researcher*, 13(6), 4–16.	**AI Tutoring Today** Khan Academy Khanmigo khanacademy.org/khan-labs	**GES PD Series 04** AI as an Instructional Tool See the full series at ges-pd-hub.html