

MASTERY LEARNING

Learning That Matters

How Generative AI
and Large
Language Models
can Transform
Companies' Ability
to Make
Intelligent E-learning

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Mastery learning is **not** about **what**
you have learned...

... but about what you **can do** with
what you have learned...

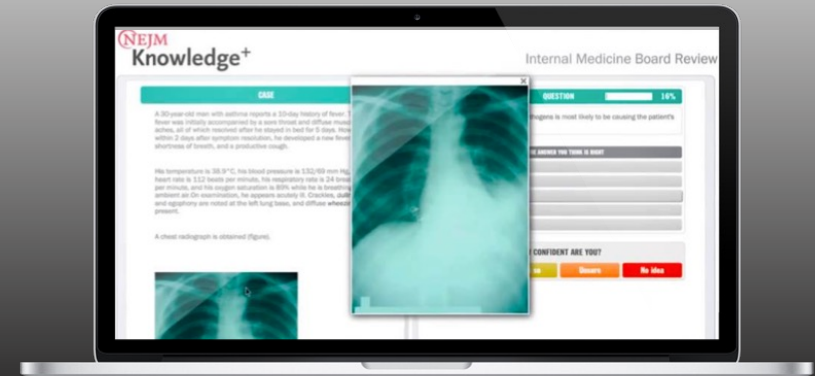
... and your **ability to learn** more





SMARTBOOK®

NEJM
Knowledge+



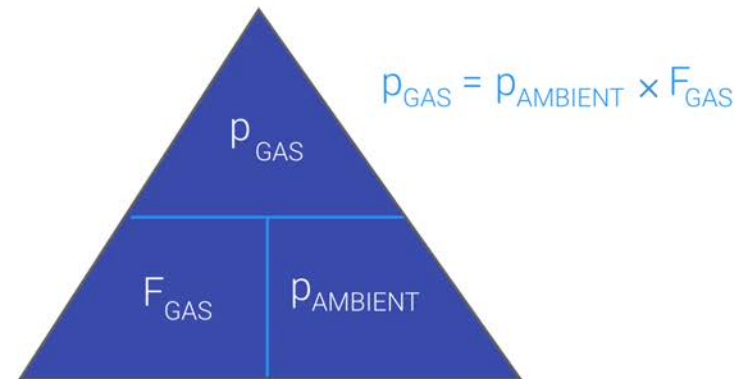
- Over **25 years of research** in human factors, learning science and computer science
- Powered the learning of over **50m students** in over **2,000 products**
- **Billions** of learning **data-points**



Partial Pressure of Nitrox 32

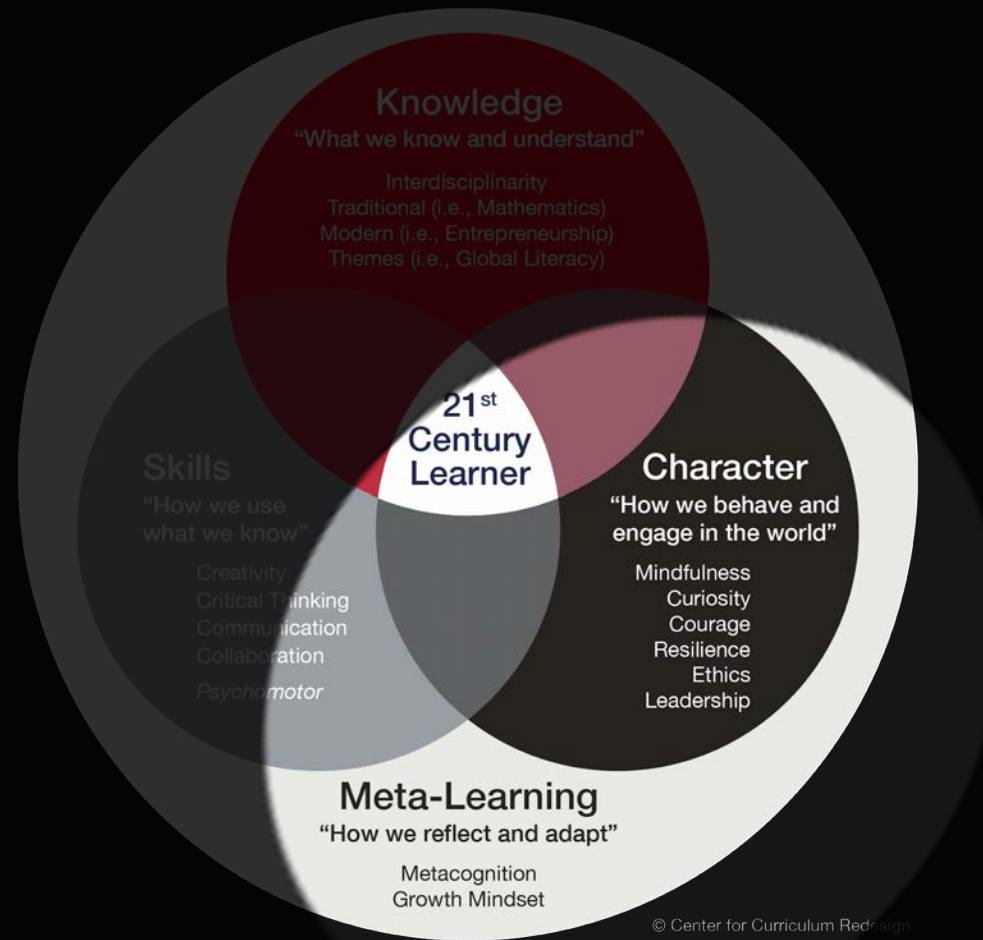
Depth (m)	Pressure (bar)	Partial Pressure Oxygen	Partial Pressure Nitrogen
10	2	0.64 (0.32 x 2)	1.36 (0.68 x 2)
20	3	0.96 (0.32 x 3)	2.04 (0.68 x 3)
30	4	1.28 (0.32 x 4)	2.72 (0.68 x 4)

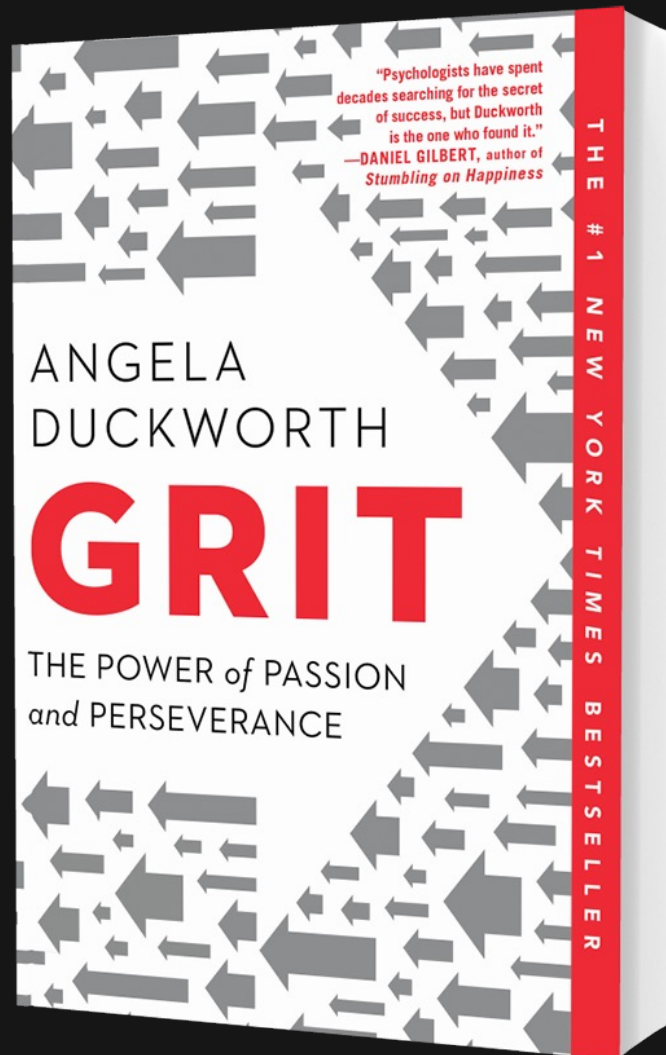
As depth increases partial pressure of all gases increases



Generated by







GRIT =
PASSION × PERSEVERANCE



WHAT WORKS IN LEARNING?

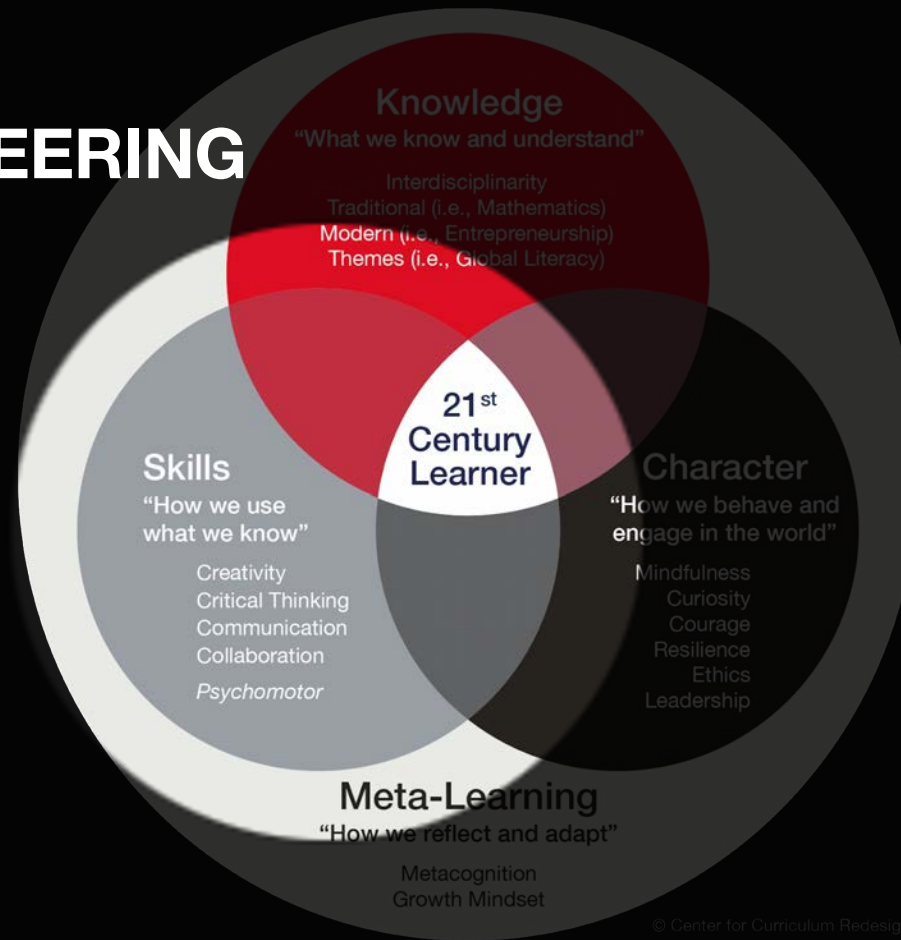
- Learner agency
- Self-awareness/meta-learning
- In situ remediation
- Dynamic modality
- Zone of proximal development
- Reinforcement



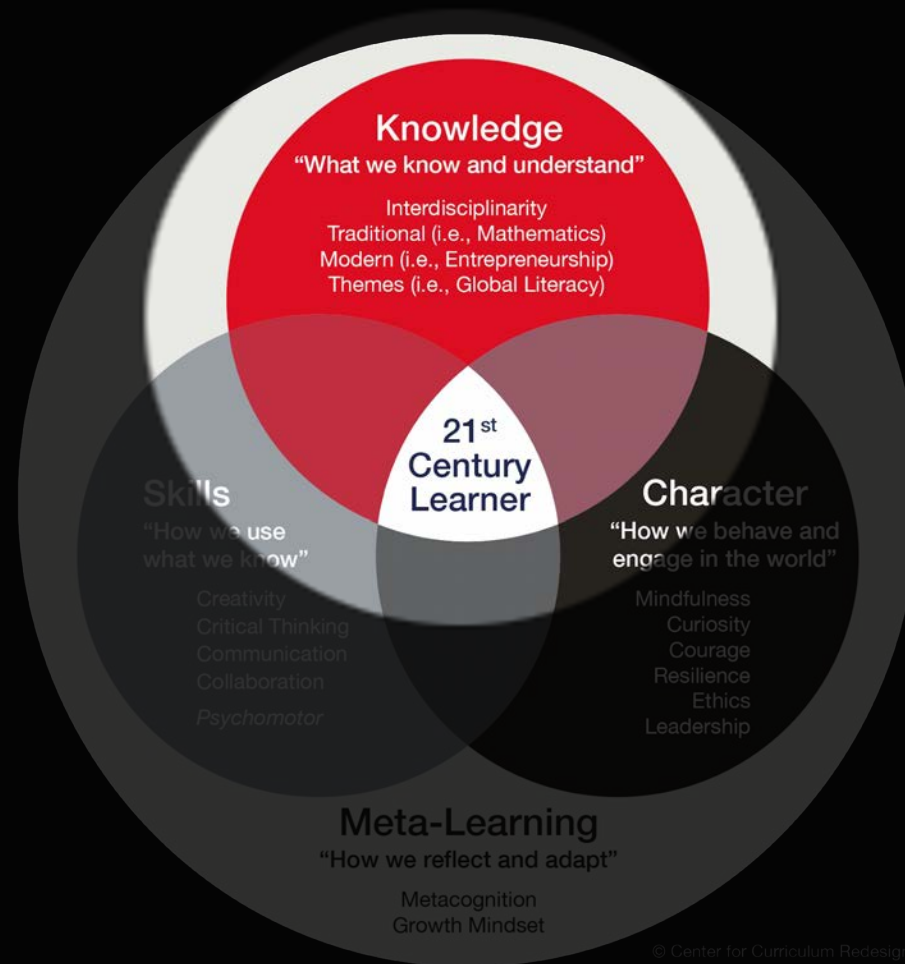
DELIBERATE PRACTICE



SKILLS ENGINEERING

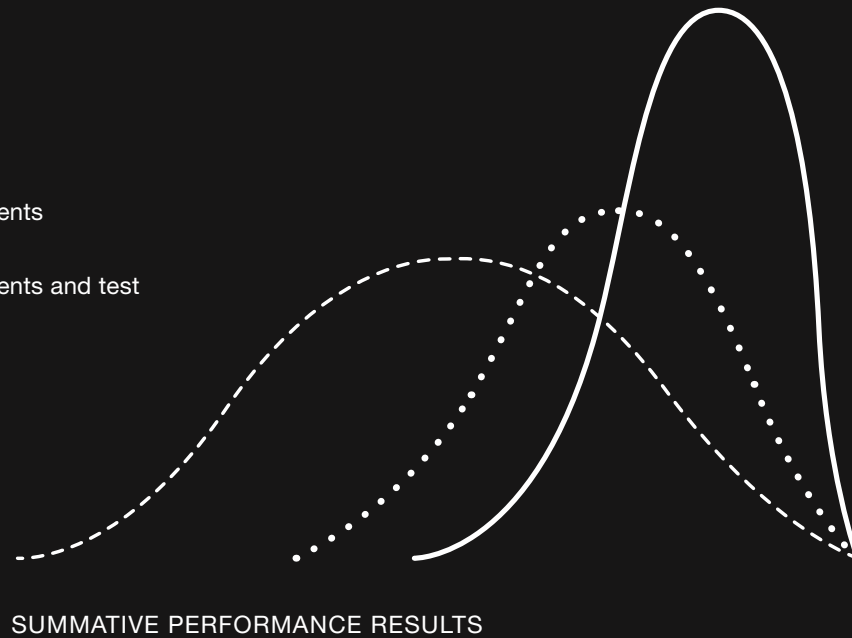






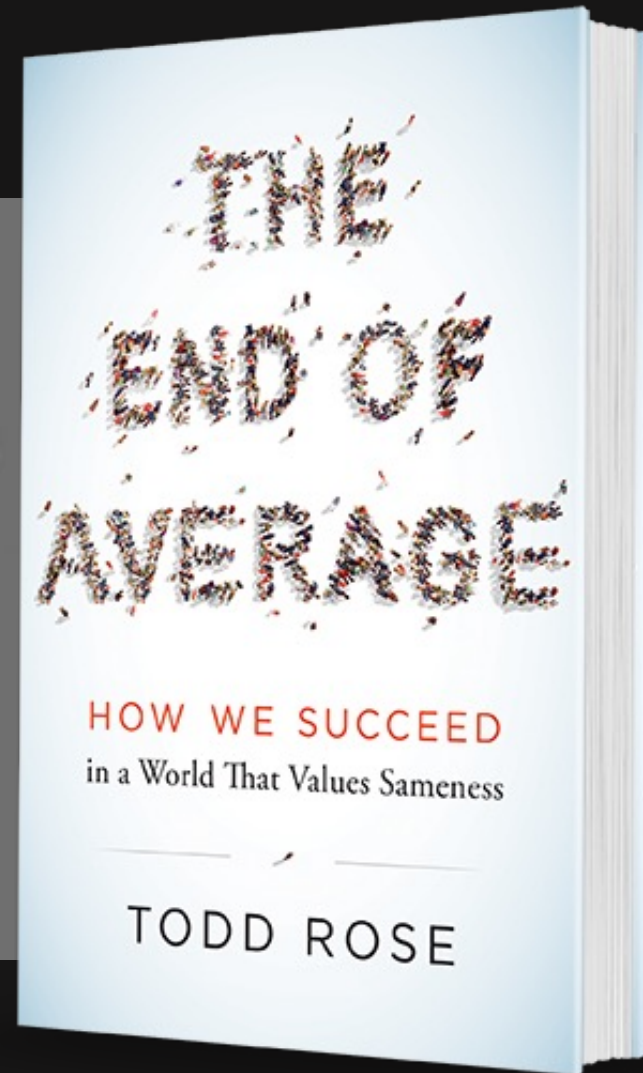
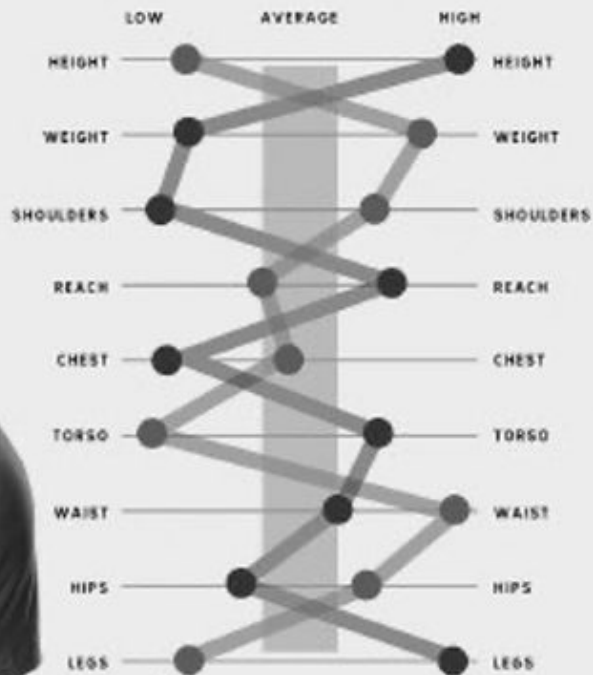
BLOOM'S 2-SIGMA PROBLEM

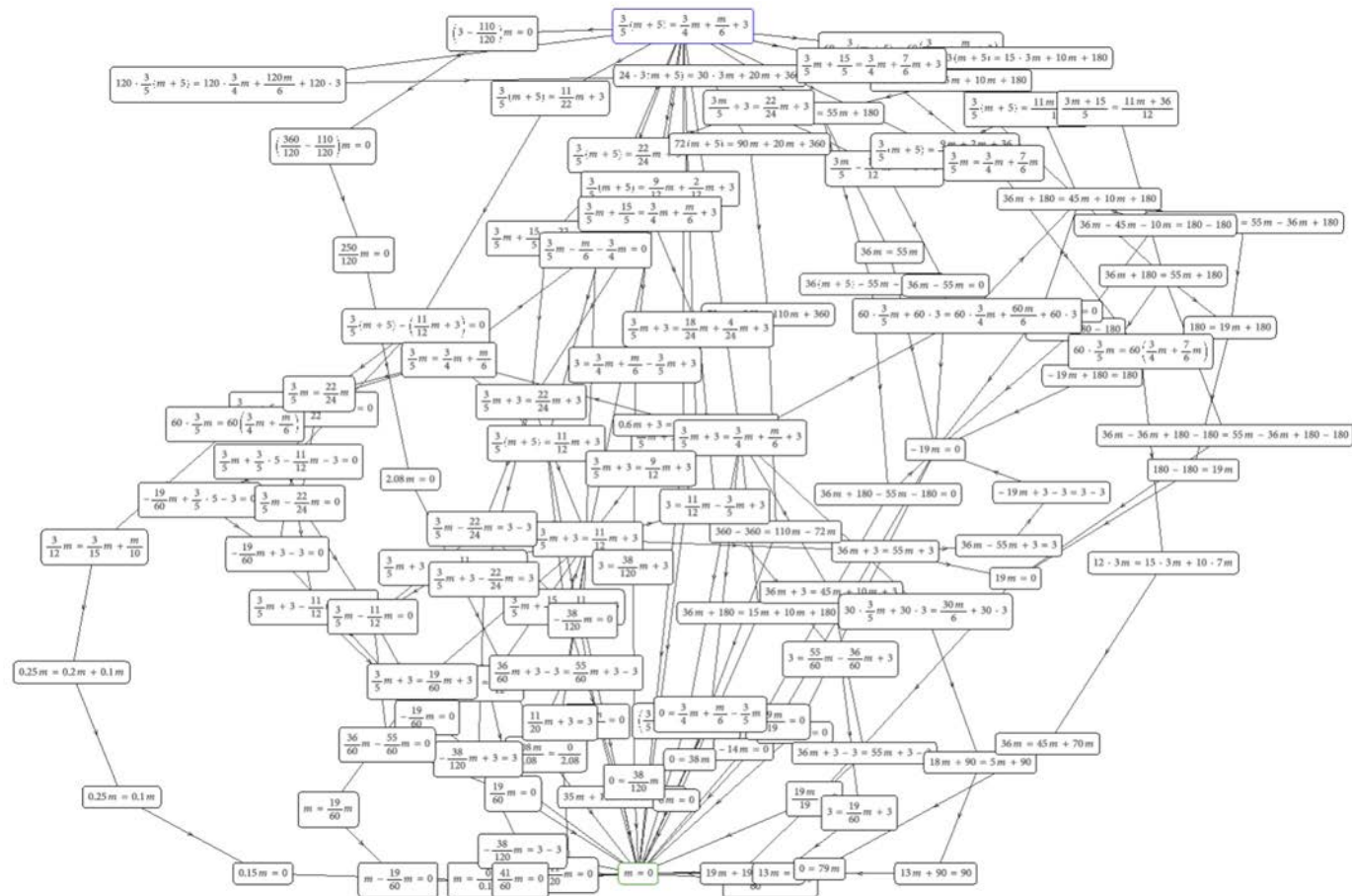
- Class teaching with many students
- Class teaching with many students and test
- ~ Personal guidance



Benjamin Bloom proved that the effect of a 1:1 teacher/student situation has a standard deviation of 2 (2-sigma) or 98% better compared to traditional class teaching. Adaptive learning ensures advantages of personal guidance at a large scale and a low price.







Non-Linear Learning

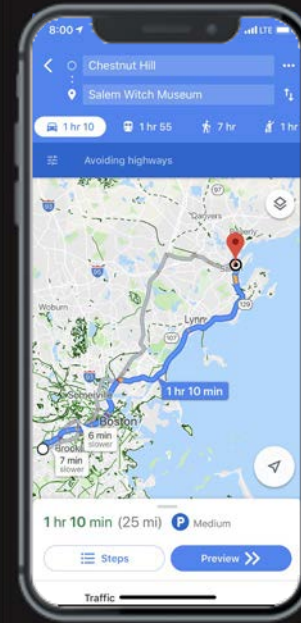
Personalized and Adaptive Learning



HOW TO GET THERE



Traditional e-Learning



Adaptive Learning



MULTIPLE LEVELS OF ADAPTIVITY



Curricula adaptivity

DESIGN

Where do you want go?



Next-task adaptivity

TASK

What's the best next step?



Intra-task adaptivity

STEP

How to best help with a task

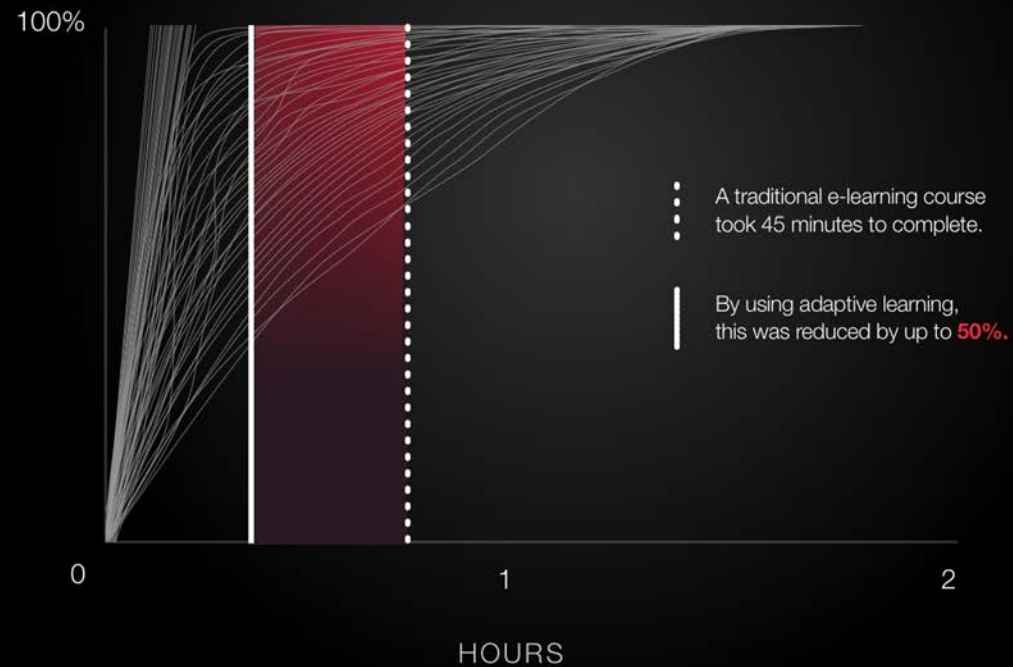


WHAT IS ADAPTIVE LEARNING?

- An online delivery method that **automatically adjusts to the needs of each learner.**
- Recreates at scale the **optimal teaching approach of a one-on-one personal tutor.**
- Uses proven data analytics and intelligent technologies to **adjust in real-time** to deliver an optimal experience.



ADAPTIVE LEARNING REDUCES THE TIME SPENT ON LEARNING



DELIBERATE PRACTICE



Education
Conservation
Exploration

9%

PROGRESS: GUE Gas Management (Master)

~53min left

DEMO

Ulrik Juul Christensen

UC



What influences the diver's breathing **gas supply**?

SELECT ALL THAT APPLY

- | | |
|--|---|
| <input type="checkbox"/> Cylinder size | <input type="checkbox"/> Start Pressure |
| <input type="checkbox"/> Consumption during the dive | <input type="checkbox"/> Nitrox |
| <input type="checkbox"/> Cylinder type | <input type="checkbox"/> Trimix |
| <input type="checkbox"/> Temperature | |

I KNOW IT

THINK I KNOW IT

NOT SURE

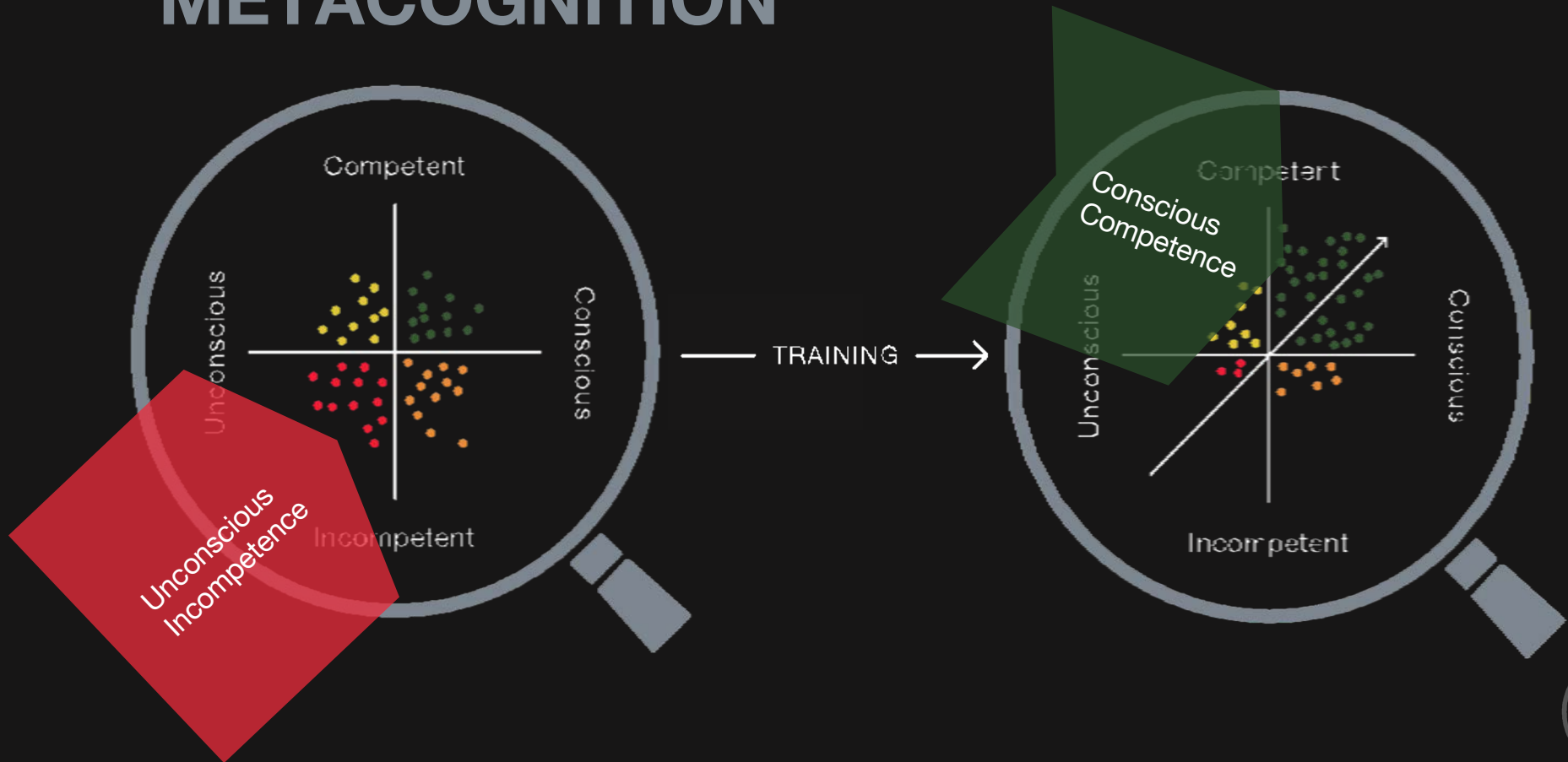
NO IDEA



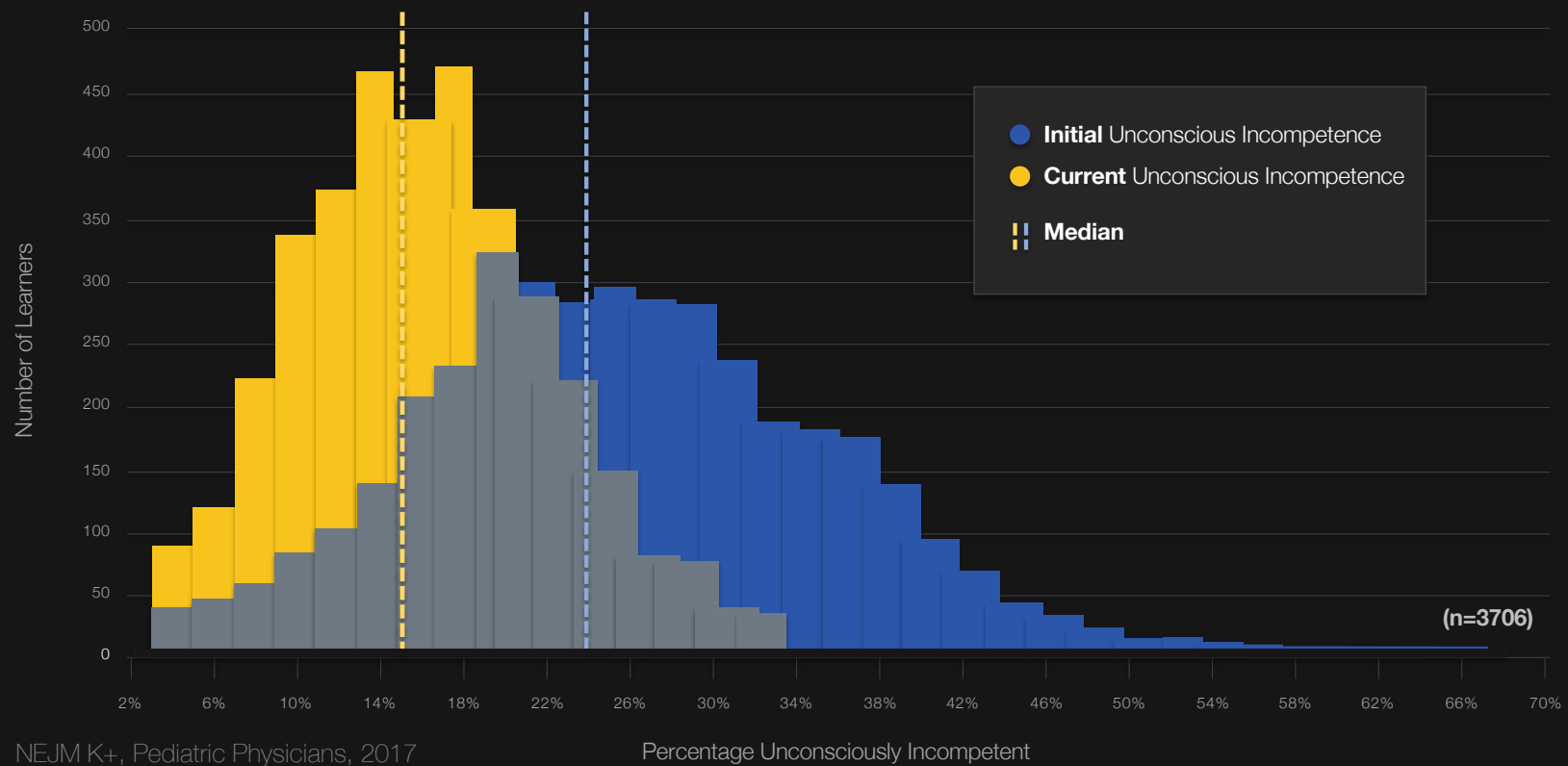
AUTOMATICITY



METACOGNITION



UNCONSCIOUS INCOMPETENCE IMPROVEMENT



TRAIN FOR RETENTION

Lockheed Martin Aviator Ground School:

63%

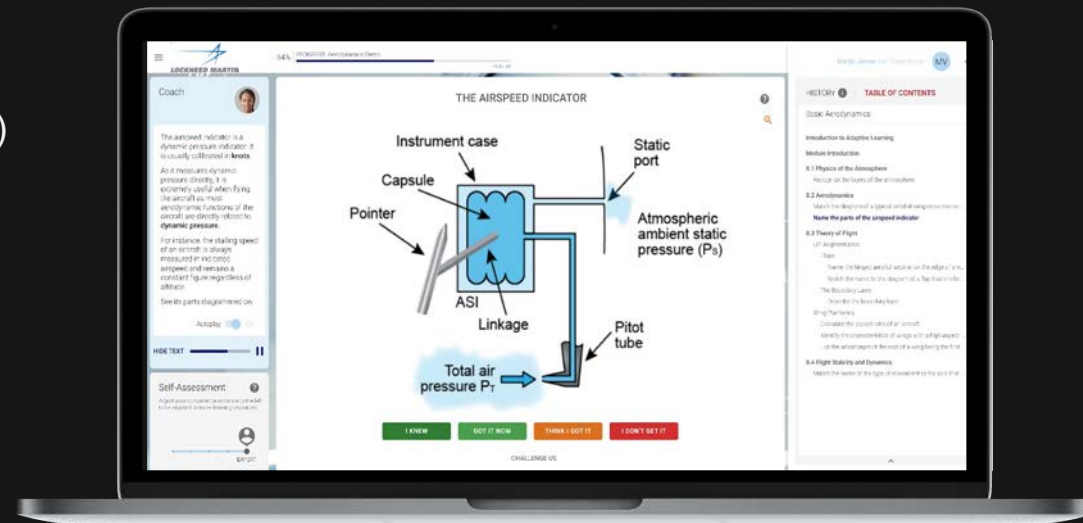
in the blended learning (Area9 Rhapsode™)

vs

29%

in pure classroom

group passing test 10 weeks later

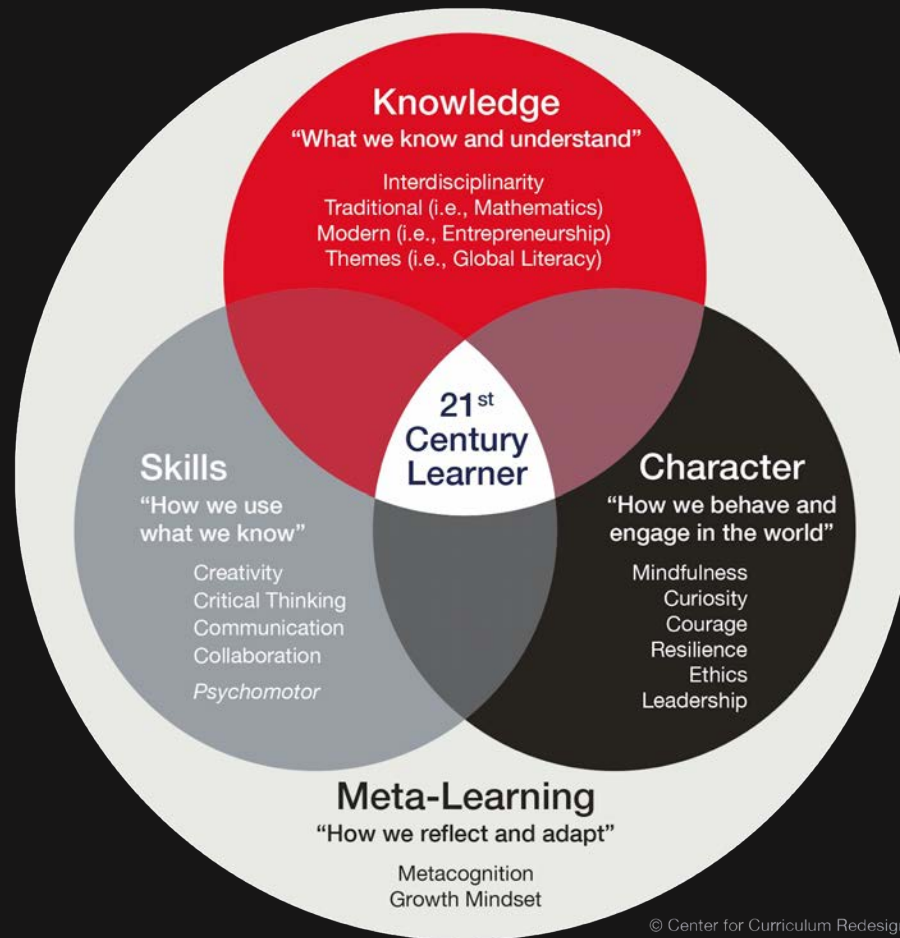


Source:

Blended and Adaptive Learning in Ground School Instruction for Aviators

Paper presented December 2021 at Interservice/Industry Training, Simulation, and Education Conference (I/ITSEC)





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