

Silver Bullets, Killer Apps, and the Transformation of the Golden Paradigm

```
elif operation == "MIRROR_Y":
    mirror_mod.use_x = False
    mirror_mod.use_y = True
    mirror_mod.use_z = False
elif operation == "MIRROR_Z":
    mirror_mod.use_x = False
    mirror_mod.use_y = False
    mirror_mod.use_z = True

#selection at the end -add back the deselected mirror modifier object
mirror_ob.select= 1
modifier_ob.select=1
bpy.context.scene.objects.active = modifier_ob
print("Selected" + str(modifier_ob)) #modifier ob is the active ob
#mirror_ob.select = 0
#me = bpy.context.selected_objects[0]
#me.data.objects[me.name].select = 1
```

Myk Garn, PhD

Assistant Vice Chancellor for New Learning Models
University System of Georgia



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The Opportunity Space Where Teaching and Learning is Catalyzed by Technology

Myk Garn, PhD

Assistant Vice Chancellor for New Learning Models



**UNIVERSITY SYSTEM
OF GEORGIA**

Tele-Learning
Virtual University
EdTech Cooperative
State HE-DL Director
Internet Start-up
New Learning Models



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NSF Institute for Artificial Intelligence in Adult Learning and Online Education

Principal Investigator

AL Research
Embedded Tutors
Feedback Loops
Data Repository

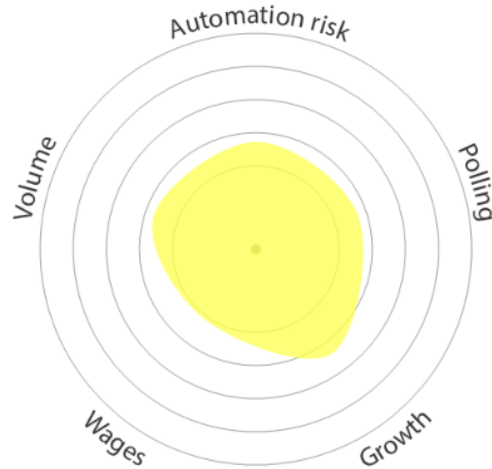


Will there be LESS Technology?



Will Robots Take YOUR Job?

Quality Control Analysts



★5.0/10 job score ⓘ

AUTOMATION RISK

52%

risk level

POLLING

There hasn't been enough votes on this occupation yet

GROWTH

8.3%

by 2030

WAGES

\$52,460

or \$25.22 hourly

VOLUME

62,080

as of 2020



© Alamy

<https://willrobotstakemyjob.com/>

HYPOTHESES:

**The Gold Standard of Classroom instruction
is both irrational and inappropriate.**

**Technology enables new ways to address the embedded biases
and limitations of current teaching and learning models.**

**New Learning Models using AI can make
assessing Quality of Digital Instruction
more equitable, efficient, effective, and transparent.**

The Classroom-Cohort Instructional Model is Irrational



A photograph of a classroom. In the foreground, there are many rows of empty, worn wooden chairs. In the background, a blackboard is mounted on the wall with the text "Why is the Classroom-Cohort Model IRRATIONAL?" written on it in white. To the left of the blackboard is a wooden podium with a laptop on it. Above the podium is a clock. The room has a white wall and a doorway in the background.

Why is the Classroom-Cohort Model
IRRATIONAL?

How Time is Used Makes a Difference



We Use Time Wrong

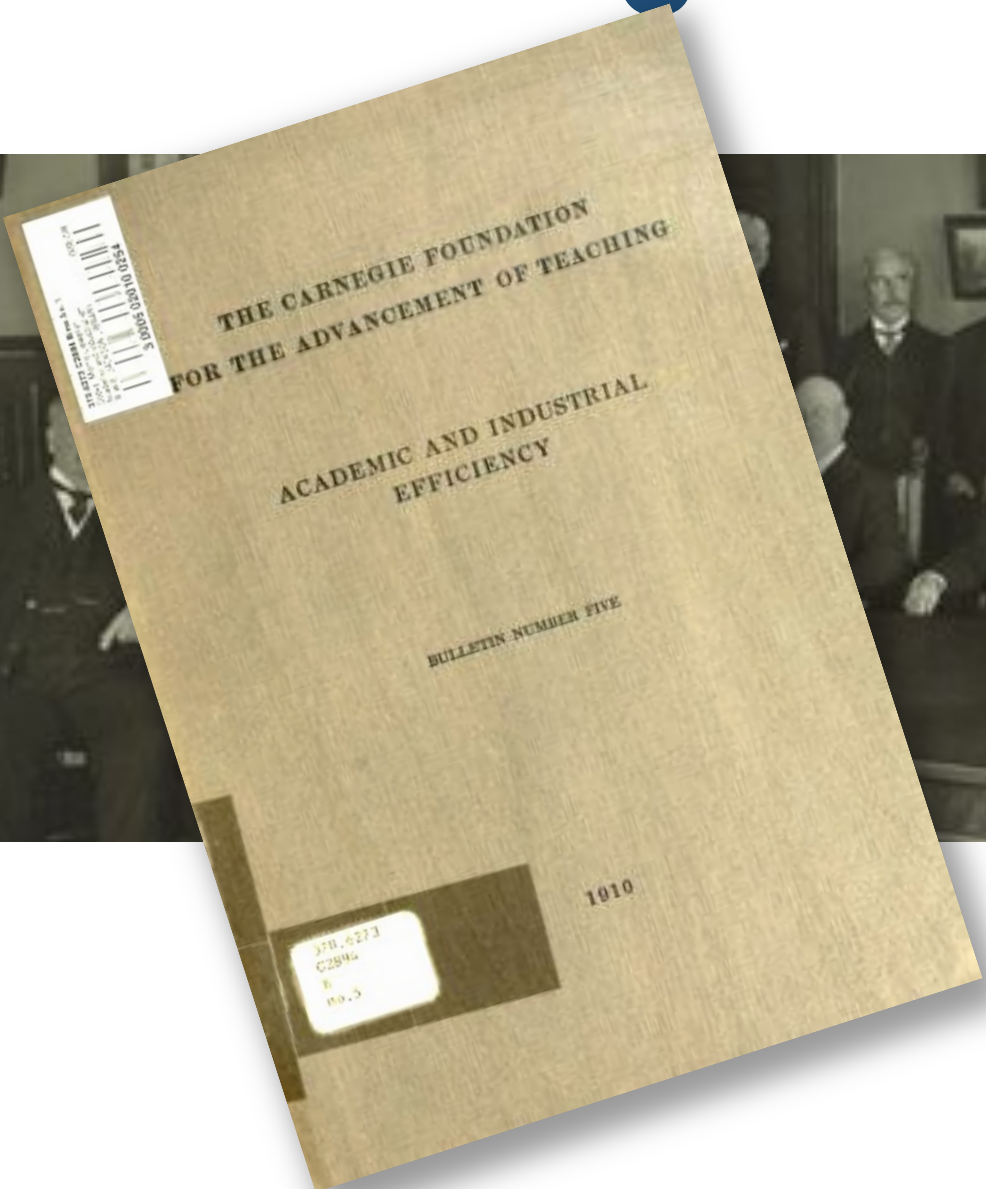
Teaching and Learning Takes Time



Teachers can only teach so many students

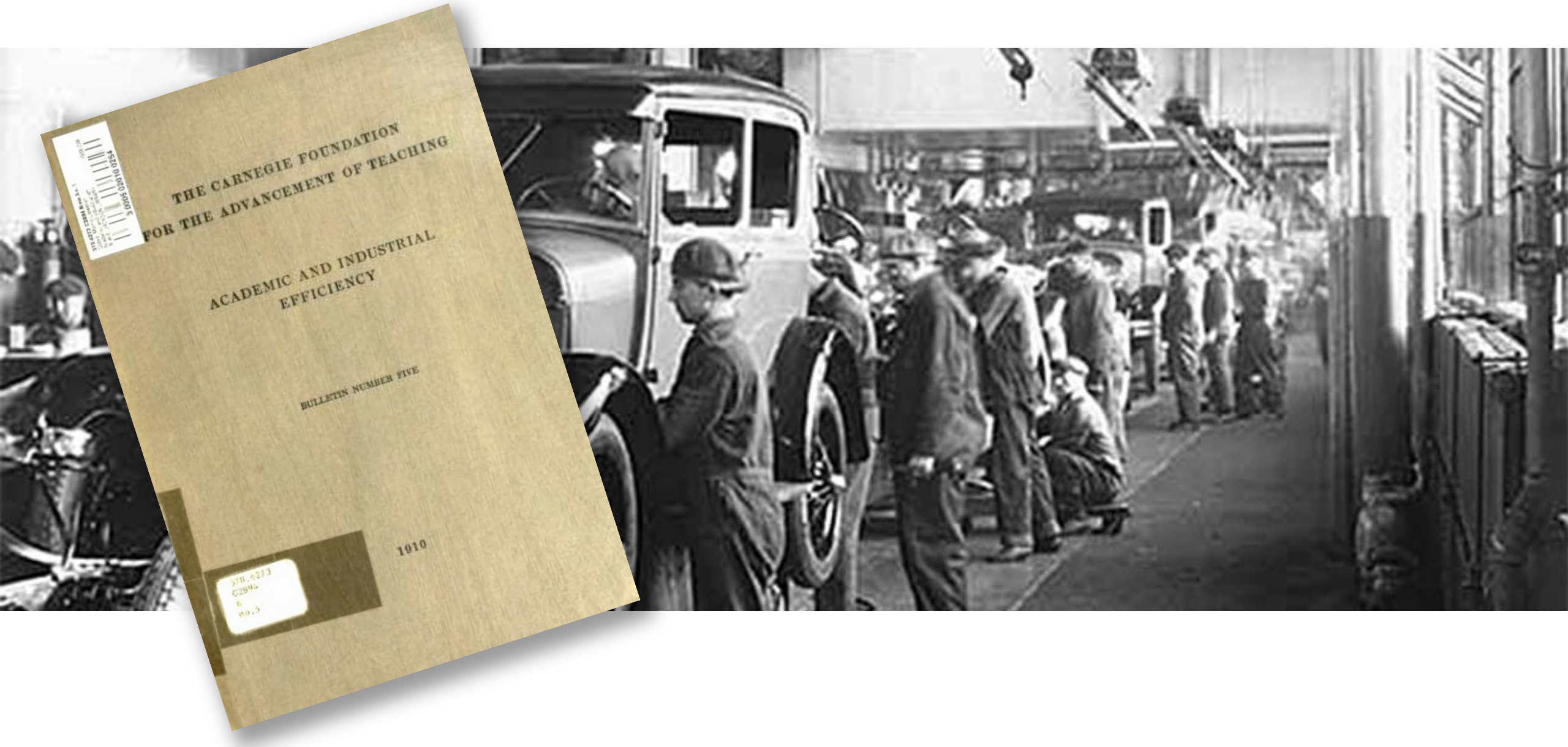


Driving the Models of Education



Carnegie Foundation for the Advancement of Teaching

The Assembly Line is a Game Changer



THE CARNEGIE FOUNDATION
FOR THE ADVANCEMENT OF TEACHING

ACADEMIC AND INDUSTRIAL
EFFICIENCY

BULLETIN NUMBER FIVE

1910

JPL 6273
G2894
B
no. 5

1543010025

Classroom Cohorts Save Time

The 20th Century Assembly Line Model of Education

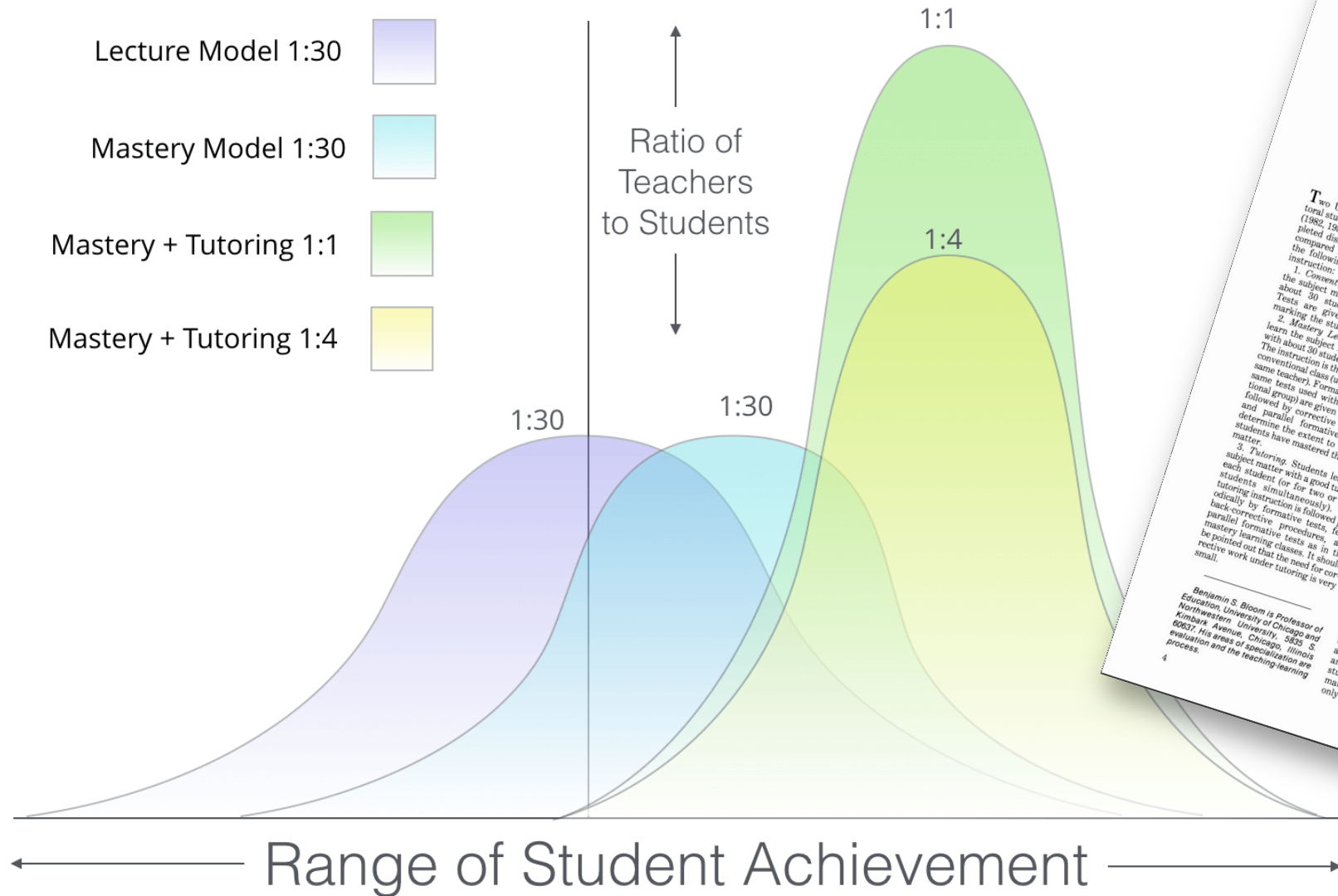


EVERY STUDENT HAS AN EQUAL OPPORTUNITY TO LEARN

Term-Based Models Give Students **EQUAL TIME** to Learn



Why is That Irrational?



Lecture Model 1:30

Mastery Model 1:30

Mastery + Tutoring 1:1

Mastery + Tutoring 1:4

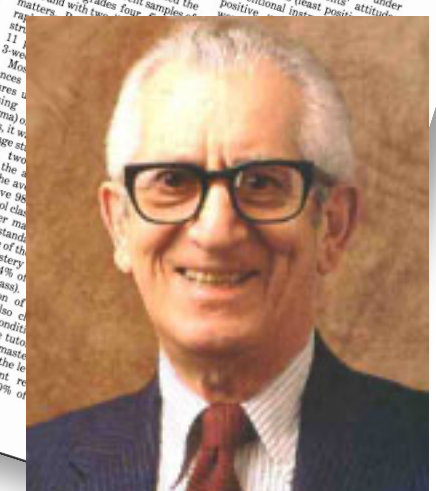
The 2 Sigma Problem: The Search for Methods of Group Instruction as Effective as One-to-One Tutoring
 BENJAMIN S. BLOOM
 University of Chicago and Northwestern University

Two University of Chicago doctoral students in education, Anania (1982, 1983) and Burke (1984), completed dissertations in which they compared the following three learning under-conditions:

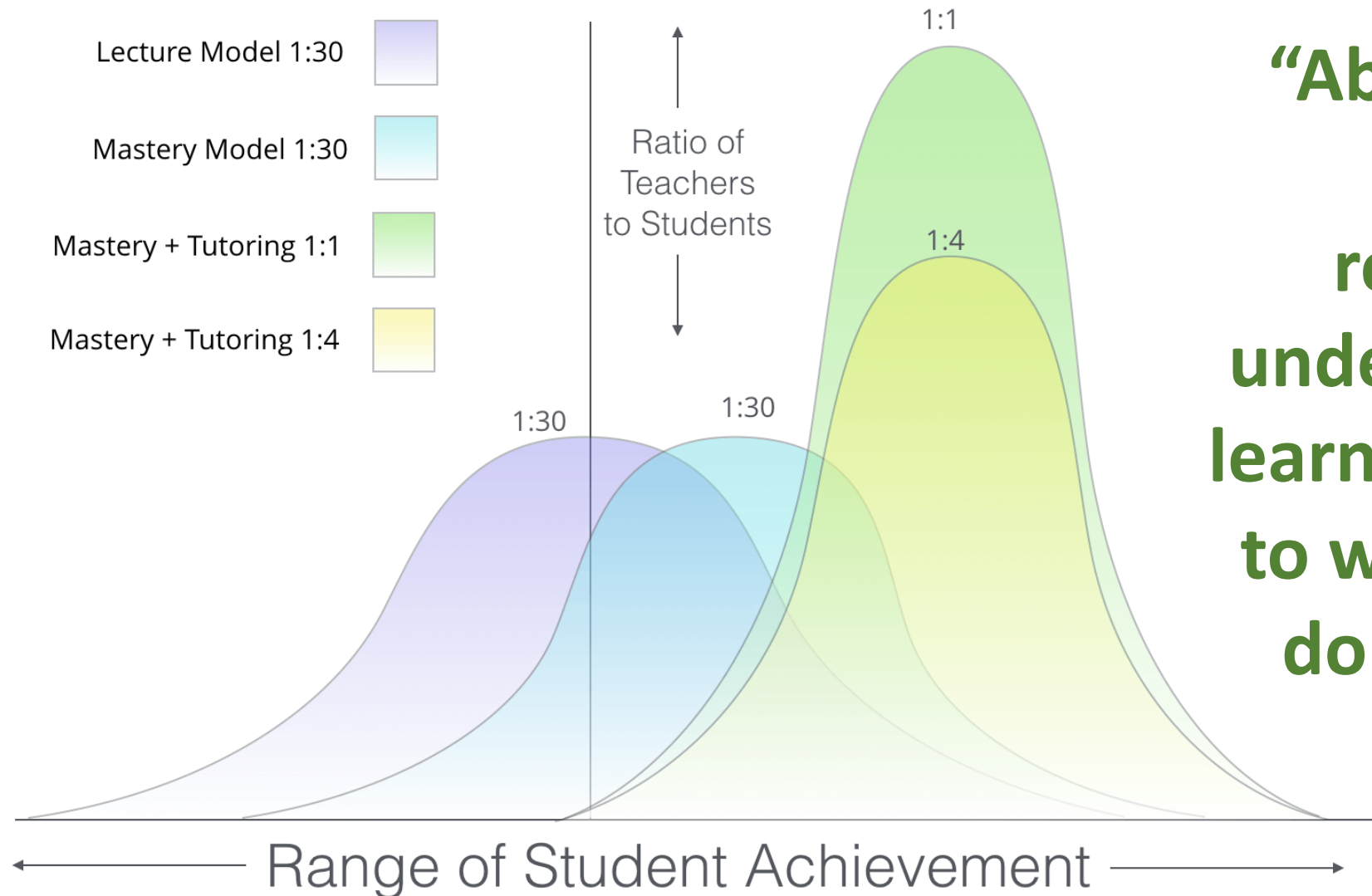
- Conventional.** Students learn the subject matter in a class with about 30 students per teacher. Tests are given periodically for marking the students.
- Mastery Learning.** Students learn the subject matter in a class with about 30 students per teacher. The instructional time is the same as in the conventional class (usually with the same teacher). Formative tests (the same tests used with the conventional group) are given for feedback and parallel formative procedures determine the extent to which the students have mastered the subject matter.
- Tutoring.** Students learn the subject matter with a good tutor for each student (or for two or three students simultaneously). This tutoring instruction is followed periodically by formative tests. This lack-corrective tests, and parallel formative procedures, and mastery learning classes. It should be pointed out that the need for corrective work under tutoring is very small.

The students were randomly assigned the three learning conditions, and their initial aptitude tests scores, previous achievement in the subject, and initial attitudes and interests in the subject were similar. The amount of time for instruction was the same in all three groups except for the corrective tutoring groups. Burke (1984) and Anania (1982, 1983) replicated the study with four different samples of students at grades four, eight, and high school. The results were positive for the mastery learning and tutoring conditions. (See Figure 1.) There were corresponding changes in students' time on task in the classroom (65% under mastery Learning, 75% under tutoring) and students' attitudes and interests (least positive under conventional instruction).

Benjamin S. Bloom is Professor of Education, University of Chicago and Northwestern University, 5835 S. Kimbark Avenue, Chicago, Illinois 60637. His areas of specialization are evaluation and the teaching-learning process.



Efficient – but NOT EFFECTIVE



“About 80% of the students do relatively poorly under conventional learning as opposed to what they might do with tutoring.”

Mastery Means More Students LEARN



“The tutoring process demonstrates that most students do have the potential to reach this high level of learning (mastery).”

Mastery Means More Students SUCCEED



“Students receiving mastery learning did better than 84% of conventionally instructed students.”

Competency-Based Learning Model

**KEEP LEARNING CONSTANT
MAKE TIME THE VARIABLE**





**Every Student Gets the TIME
THEY NEED to Achieve Mastery**



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WESTERN GOVERNORS UNIVERSITY

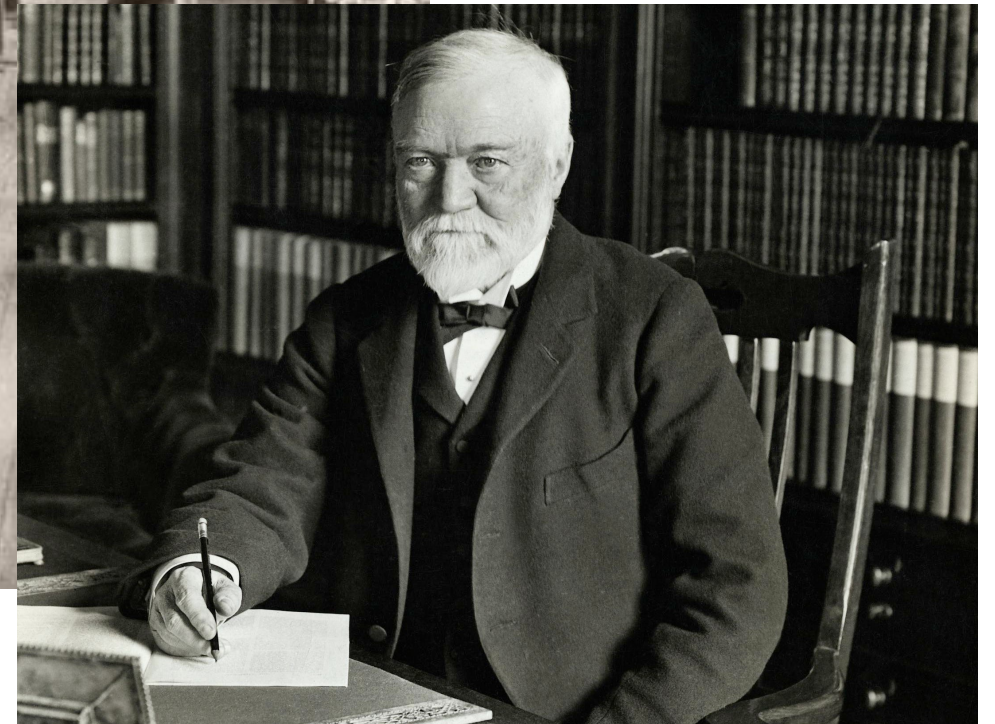
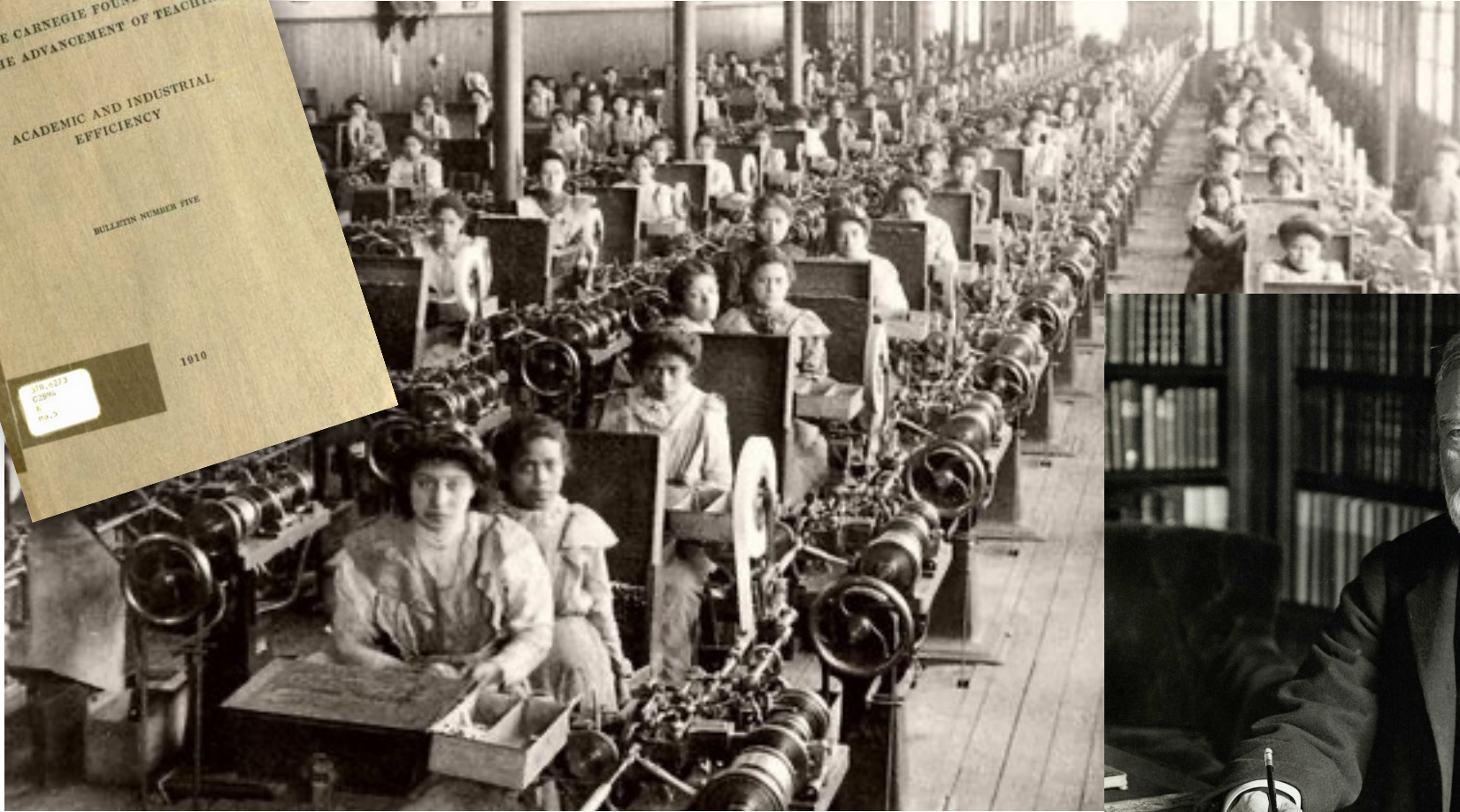
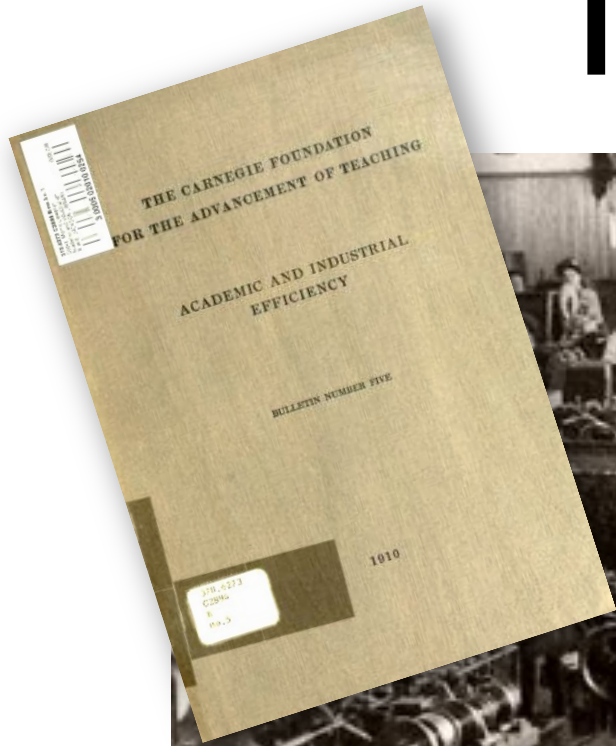


WGU  [®]
WESTERN GOVERNORS UNIVERSITY

A photograph of a classroom. In the foreground, there are many rows of empty, worn wooden chairs. In the background, a blackboard is mounted on the wall with the text "Why is the Classroom-Cohort Model INAPPROPRIATE?" written on it in white. To the left of the blackboard is a wooden podium with a laptop on it. Above the podium is a clock on the wall. The room has a white wall and a doorway in the background.

Why is the Classroom-Cohort Model
INAPPROPRIATE?

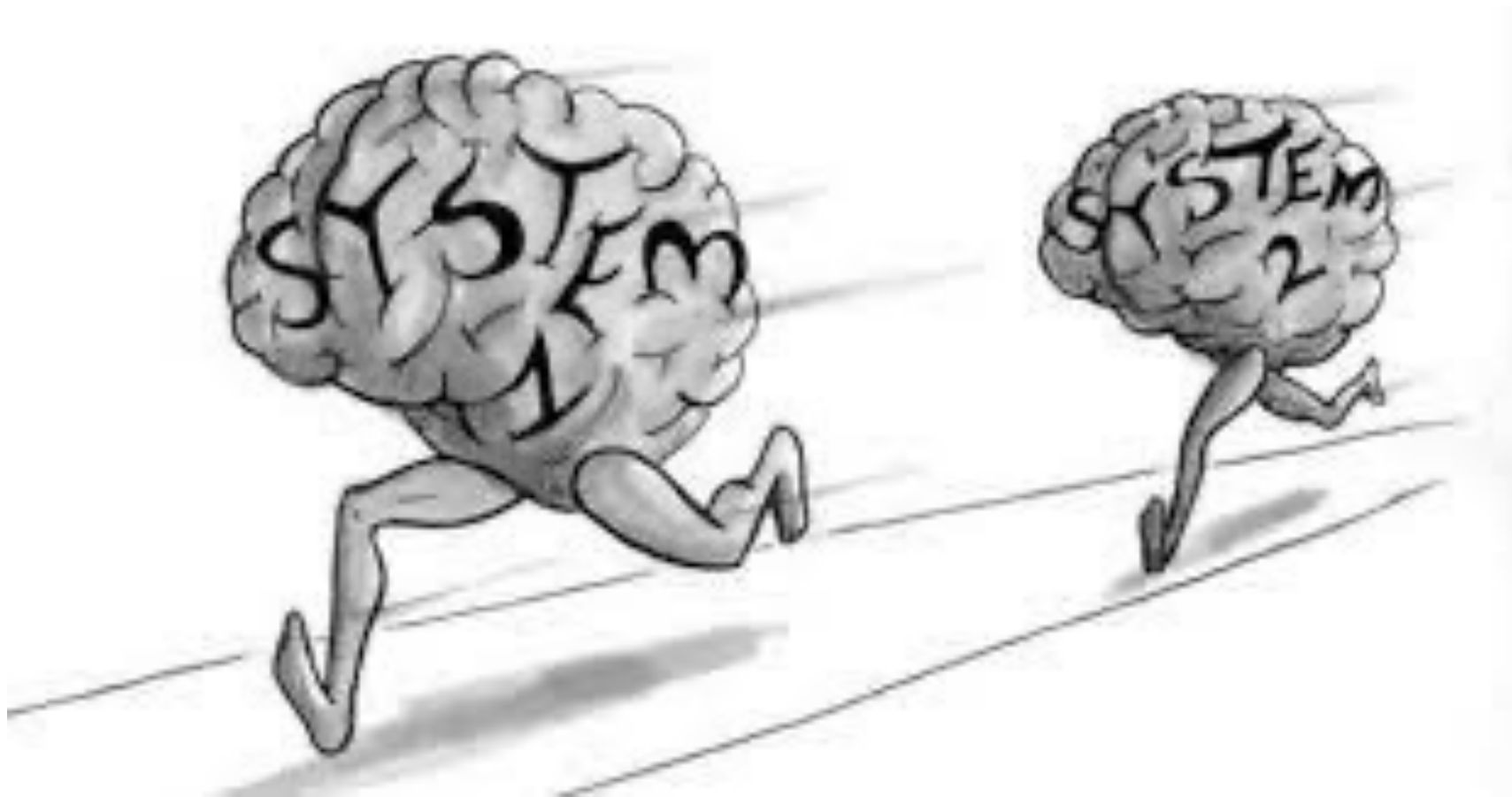
The Values of Industry



Faster Workers Means More Profit

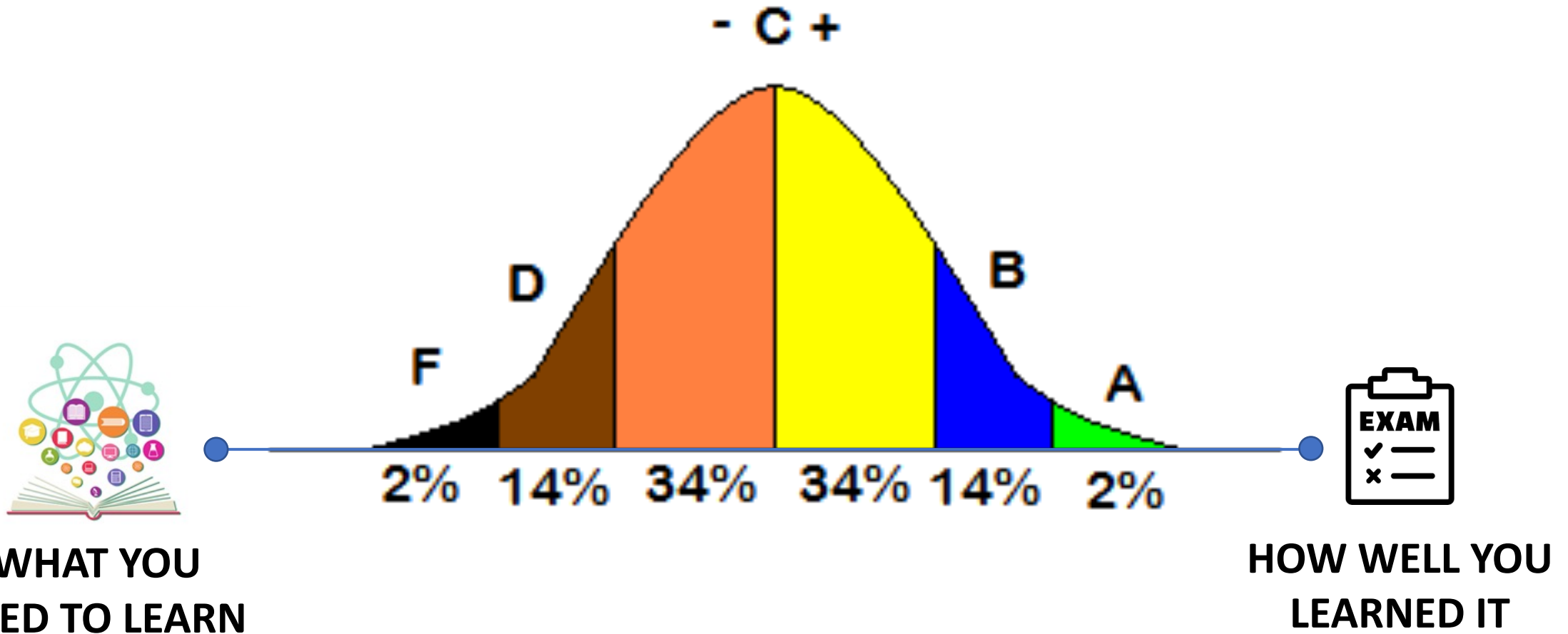
Leveraging Cognitive ‘Science’

“Faster Thinkers are Smarter People”



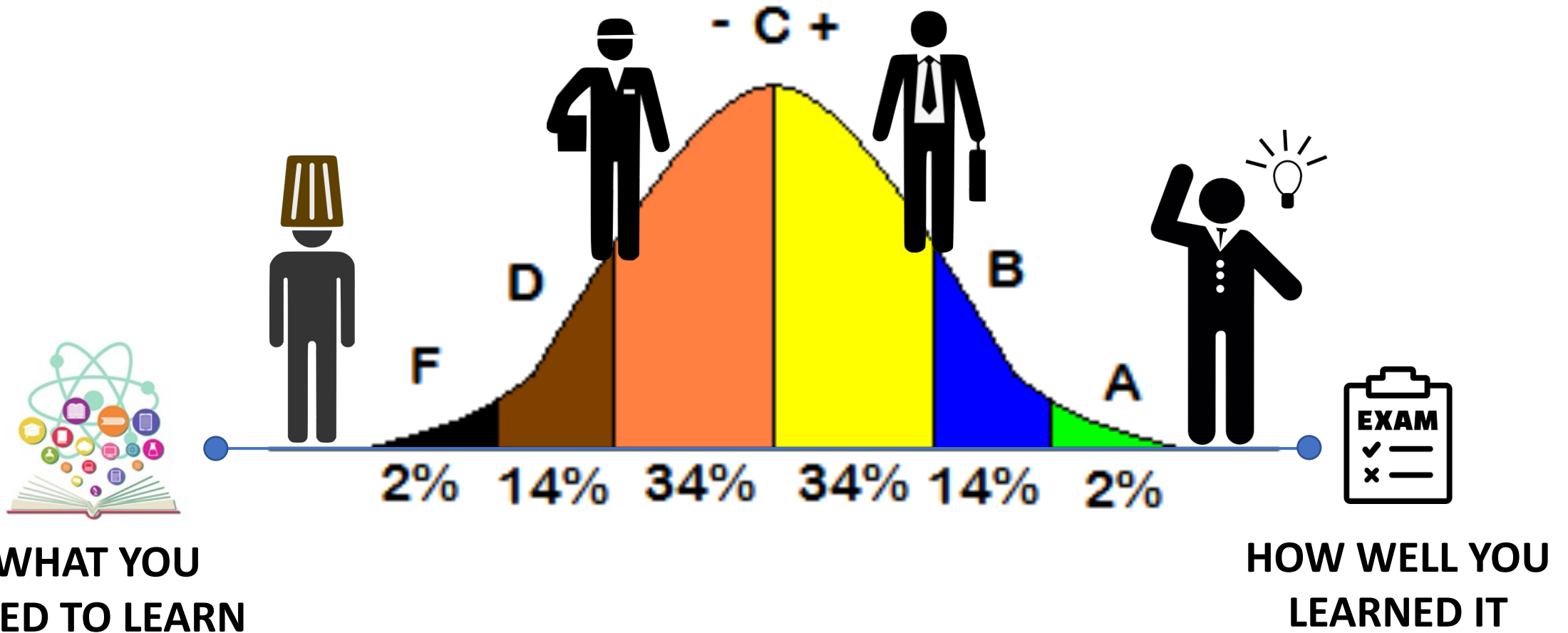
Measuring 'Quality' in Cohorts

The Bell-shaped Curve



Meeting the Needs of Industry

Ranking & Sorting by Fast Thinking



**The Gold Standard of Classroom instruction
is both irrational and inappropriate**



Equal is not Equitable

The classroom-cohort model ranks & sorts using equal time limits to the disadvantage of 80% of learners



Making Time the Variable



The competency-based model gives individuals time to learn so 84% (or more) of learners can achieve mastery

So...Why Don't We See More Use of Mastery/CBE?

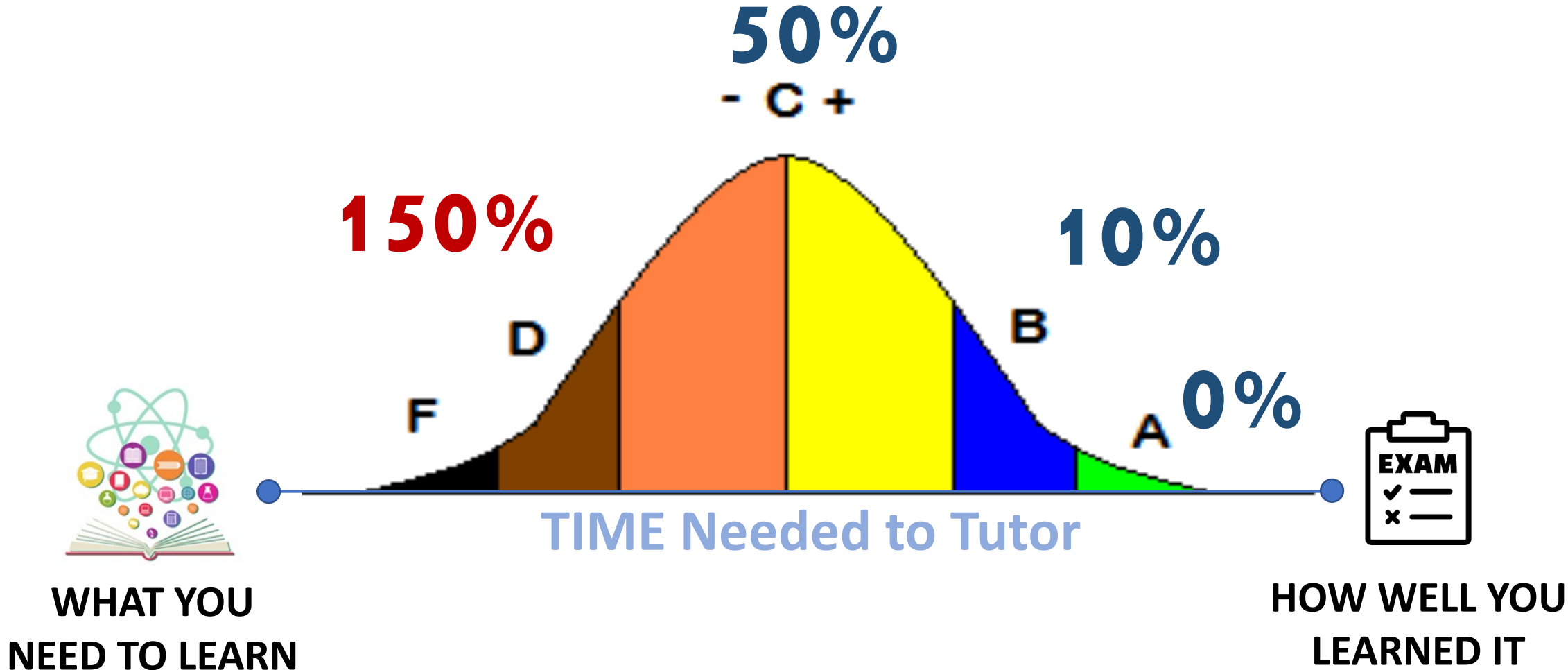


**80% of
Students
need MORE
time to learn**

**Managing Students
Learning at Different
Paces is Hard**

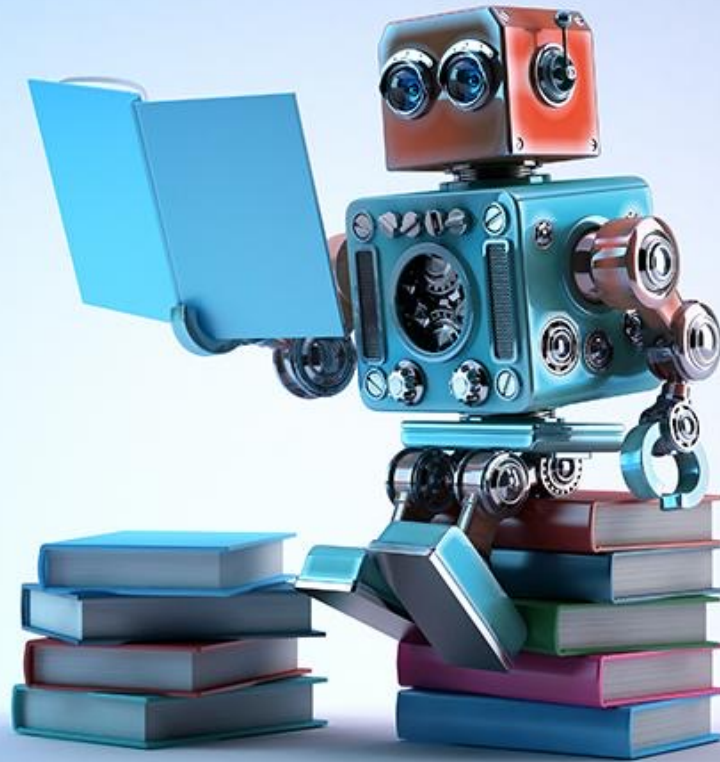


Tutoring Takes EXTRA TIME



Hypothesis Two

Technology enables new ways to address the embedded biases and limitations of current teaching and learning models.



The Search for Silver Bullets

Is Online Learning a Silver Bullet?

1st Generation
Technology

Access
Flexible Times
CBE



Gold Standard: The Classroom is the best PLACE to Learn



Unless you can't get to the classroom...



Defining Learning at a Distance



Technology **CONNECTS** Learners to Teachers



Is Artificial Intelligence a Silver Bullet?

2nd Generation
Technology

Adaptive
Learning



Is Artificial Intelligence a Silver Bullet?

2nd Generation
Technology

Adaptive Learning



**Feedback
when and
where
learners
need it**

Is Artificial Intelligence a Silver Bullet?

2nd Generation
Technology
Adaptive Learning

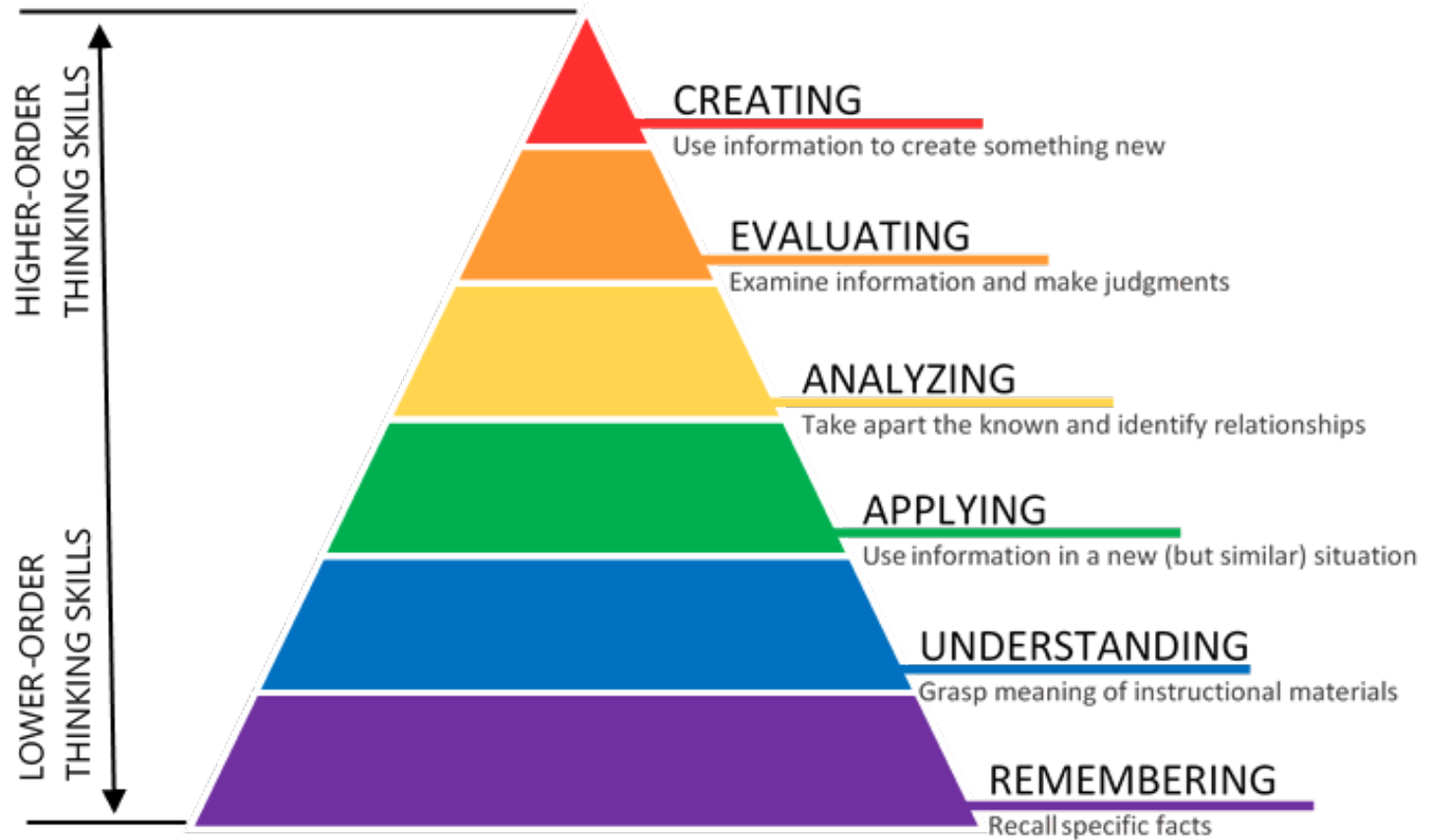
Individual Feedback@ Scale



Is Artificial Intelligence a Silver Bullet?

2nd Generation
Technology
Adaptive Learning

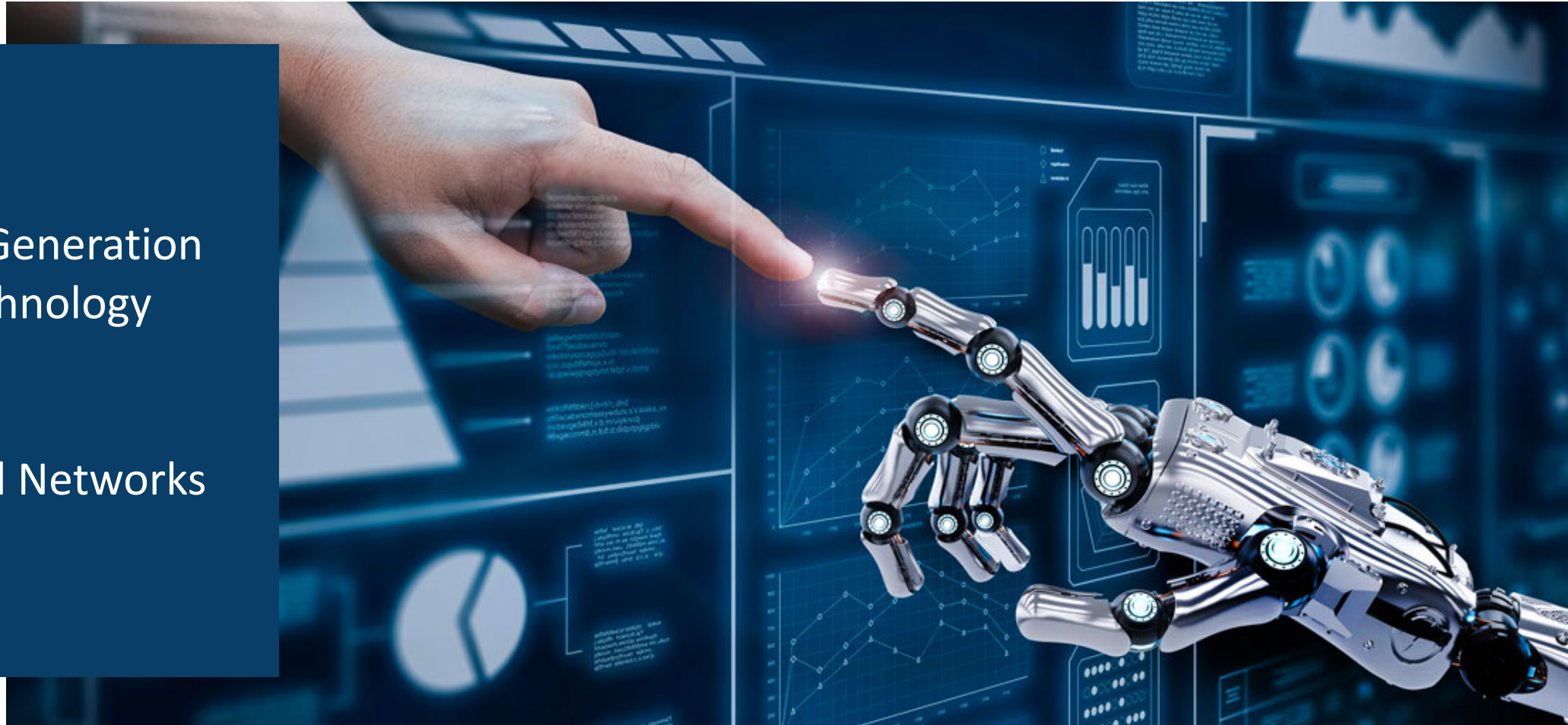
BLOOM'S TAXONOMY – COGNITIVE DOMAIN (2001)



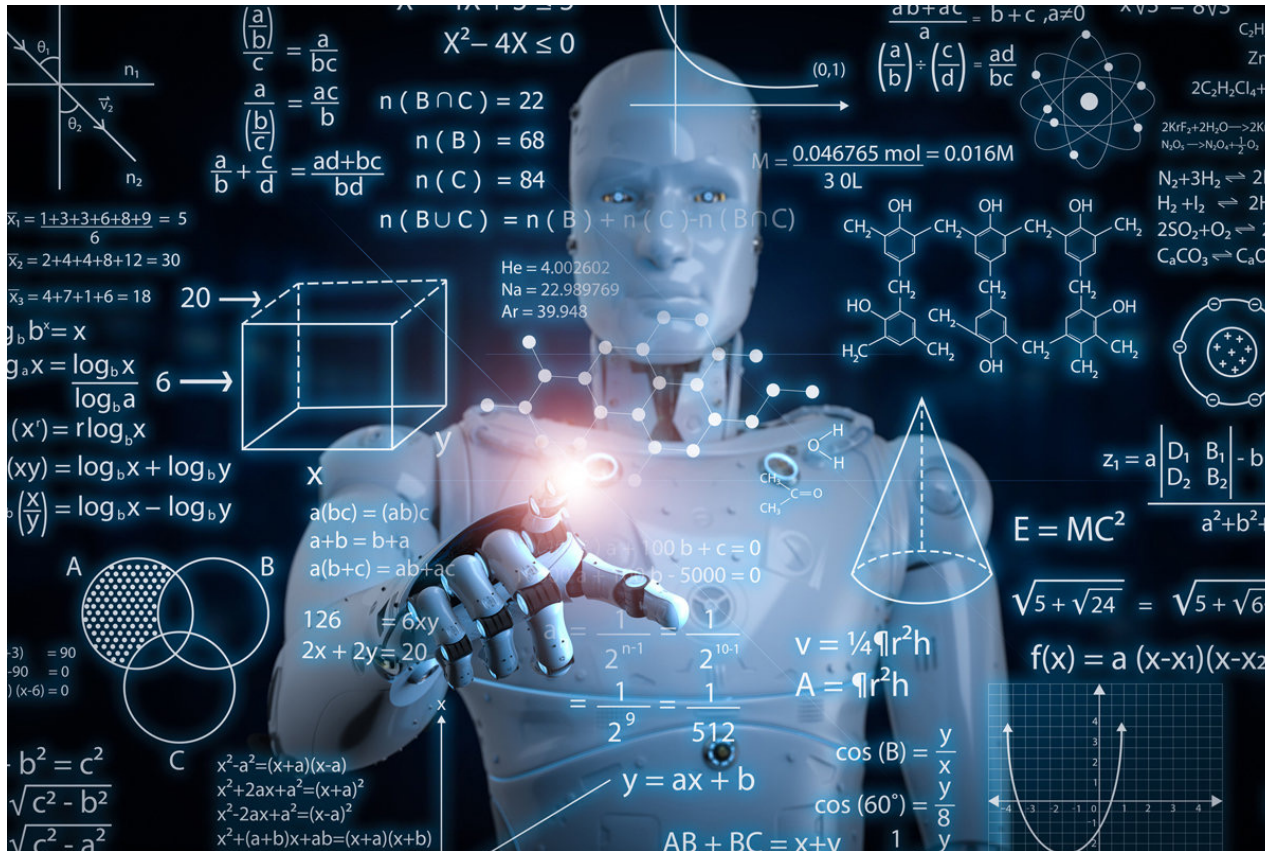
Is Artificial Intelligence a Silver Bullet?

Next Generation
Technology

Neural Networks



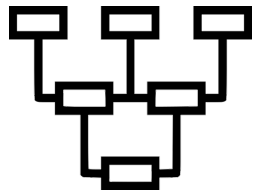
Computers are FASTER than Humans - But they are not SMARTER



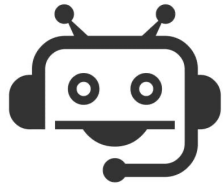
“Currently, there exists no machine that can outperform a typical human at any given task, with the exceptions of digital speed and chance.”

AI Development Timeline

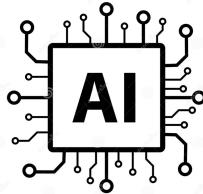
We are here!



Differentiated
Response



Conversational
Agents



Individualized
Feedback



Personal
Tutors



Embedded
Students



Virtual
Professors

**Hard-coded Branching
Natural Language Processing (NLP)**

**Adaptive Algorithms
Machine Learning**

**Neural Networks
Metaverse**

Moravec's Paradox

What is hard for Humans is easy for Computers

Delivering instruction to 30 different students in 30 different locations



Moravec's Paradox

What is easy for Humans is hard for Computers

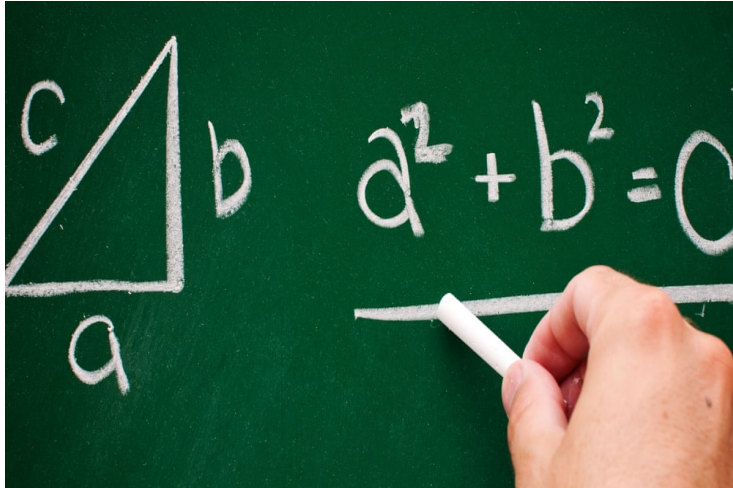
Knowing what a student needs to solve a problem



Hypothesis Three

Digital Forward Learning Models
can make assessing Quality
more equitable, efficient, effective, and transparent.

What's Important?



MATH



WRITING

What's Important?



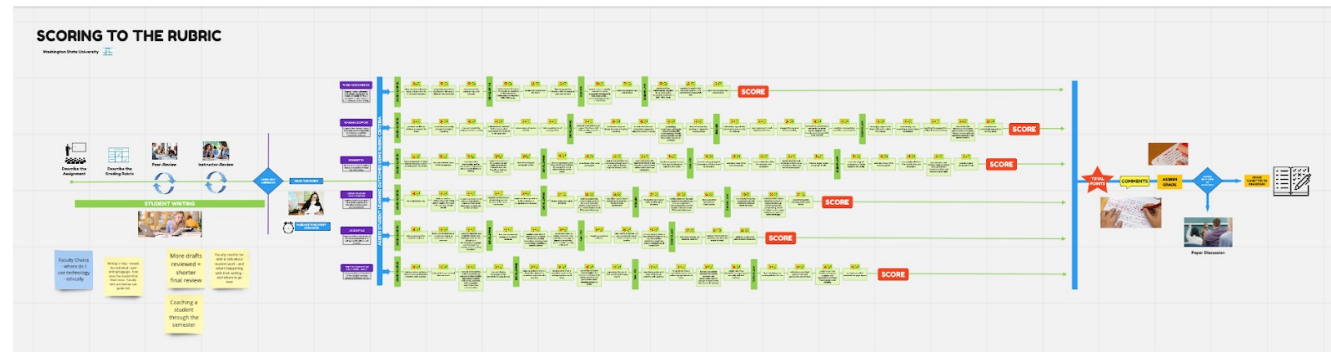
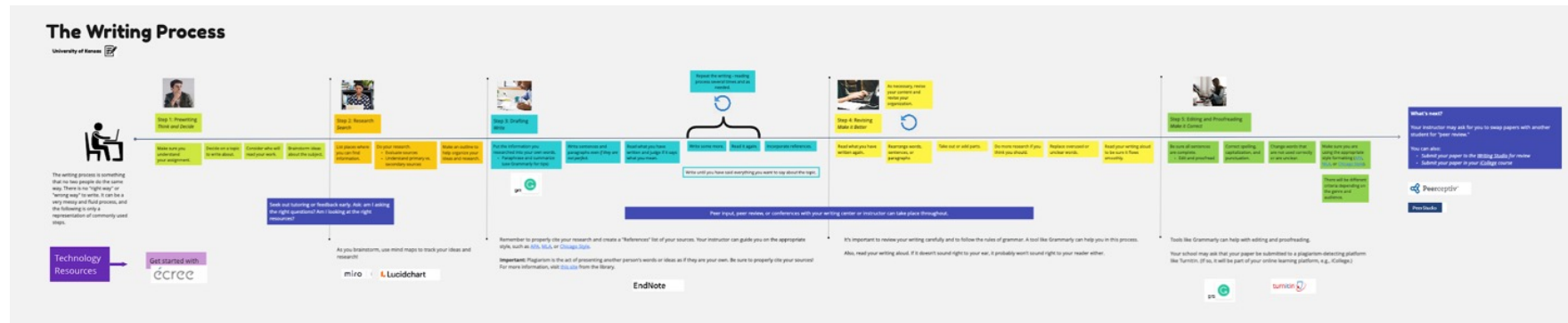
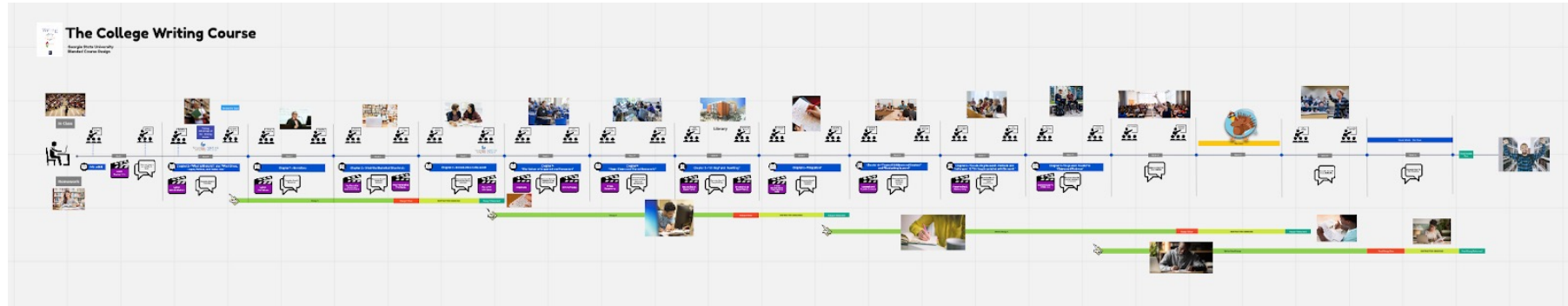
MATH

WRITING

Digital Forward Design



User Journeys



Digital Design Tools



Digital Forward Design

The collage features several educational slides:

- The College Writing Course** (George Washington University): A horizontal timeline diagram showing the progression of a writing course with various icons representing different stages and activities.
- The Writing Process** (University of Kansas): A flowchart illustrating the writing process from idea generation to final revision, including a section on 'Technology Resources' and 'Get started with eCree'.
- SCORING TO THE RUBRIC** (Washington State University): A diagram showing the relationship between a rubric, student work, and instructor feedback.

ReWriting Writing

Establishing Pedagogical and Evidentiary Paradigms for Digital-Forward Instructional Design in Postsecondary Writing Courses

A Workshop Report by
Myk Garn
Rob Kadel
Elizabeth Sanders Lopez

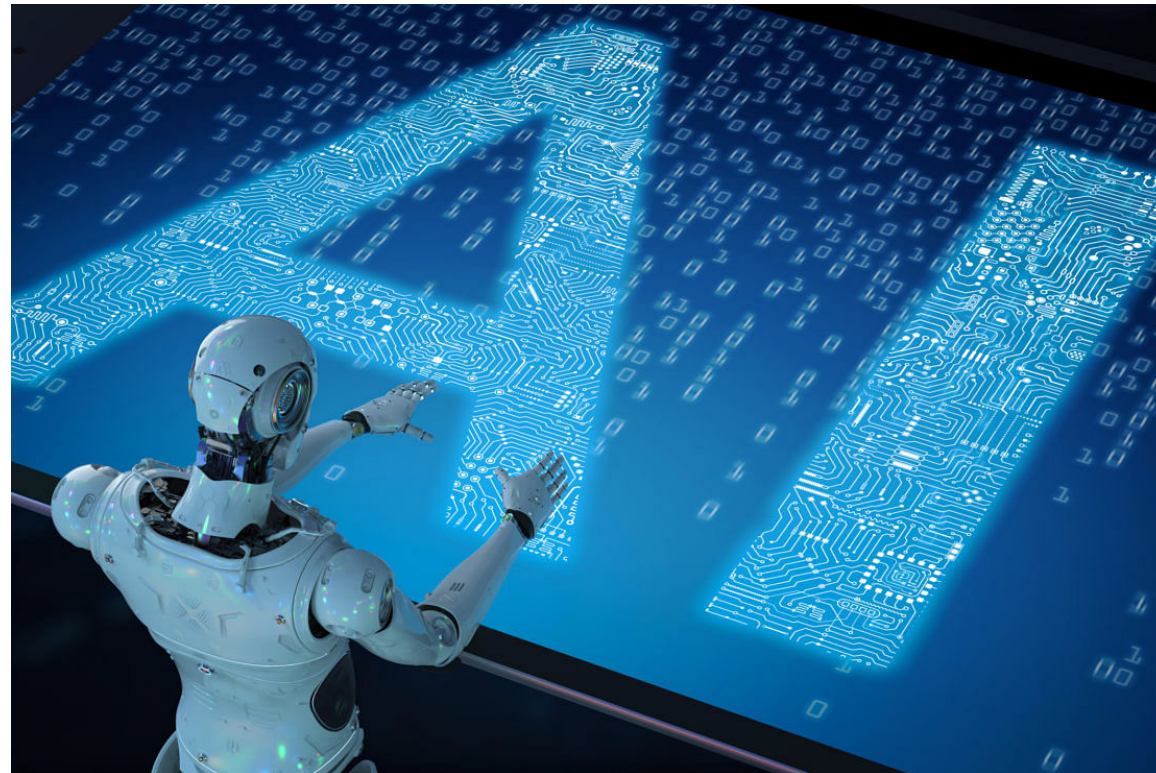
Additional Contributors:
Michael Feldstein
Peter Foltz



ASSOCIATION OF PUBLIC LAND-GRANT UNIVERSITIES

every learner everywhere

What are the Synergies between Artificial and Human Intelligence and How can we Optimize Them?



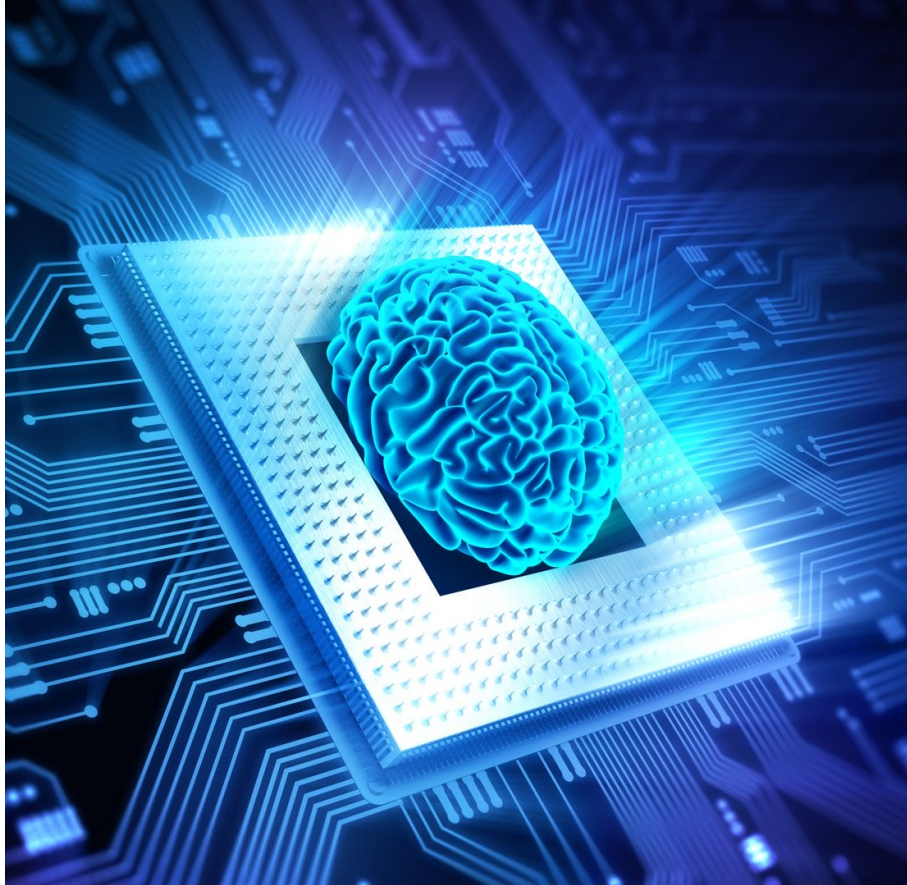
Data Data Data



Adaptive Technologies



Neural Networks

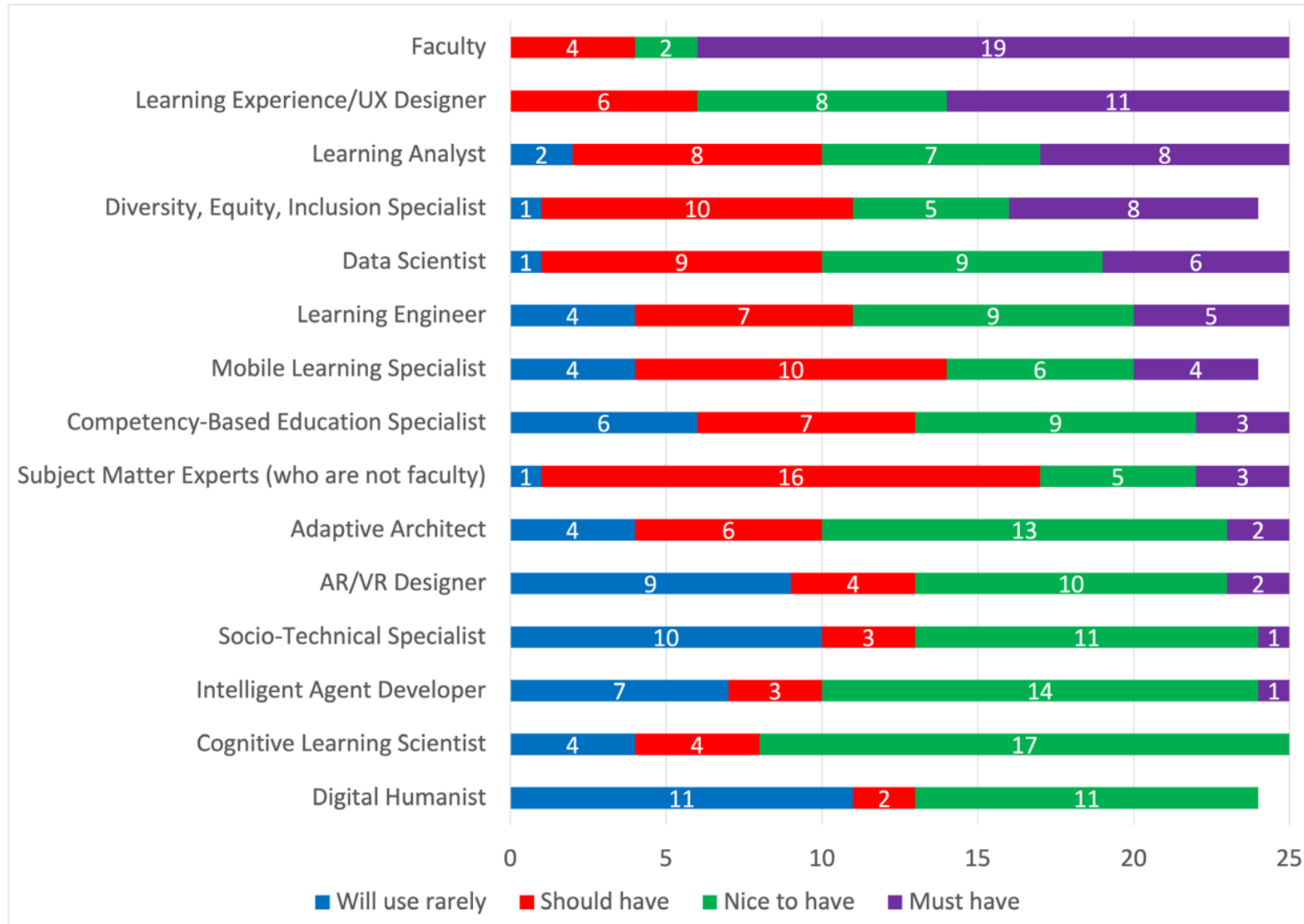


The important point is that the network generalized. It was able to predict new words it had never seen before.

METAVVERSE



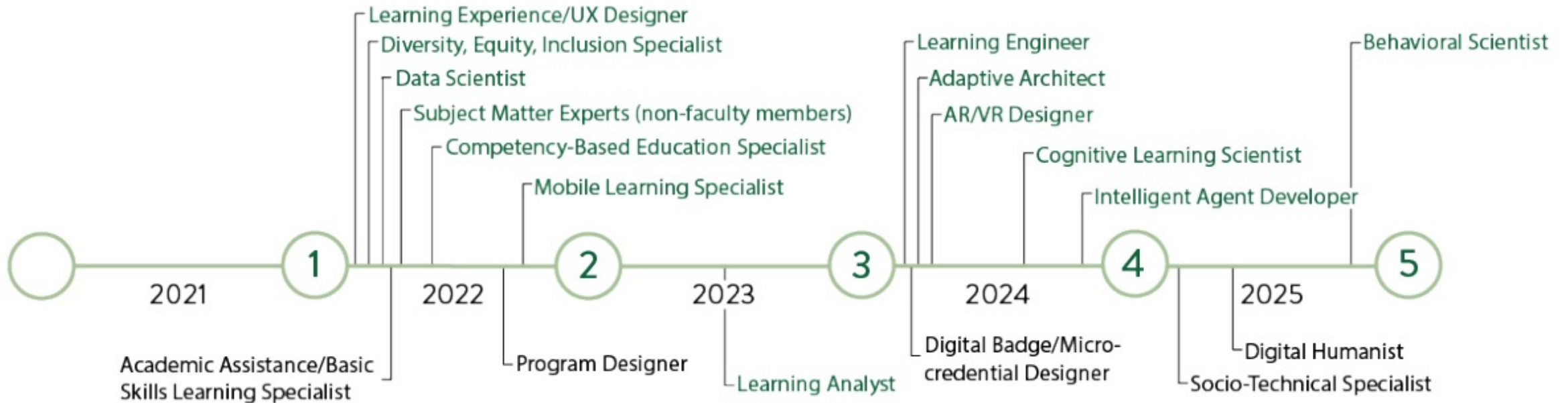
New Digital Forward Roles



New Digital Forward Skills & Roles



When Will Emerging Roles Emerge?



Indicators of Digital Quality

Does the Institution use time as an opportunity or is it a limitation?

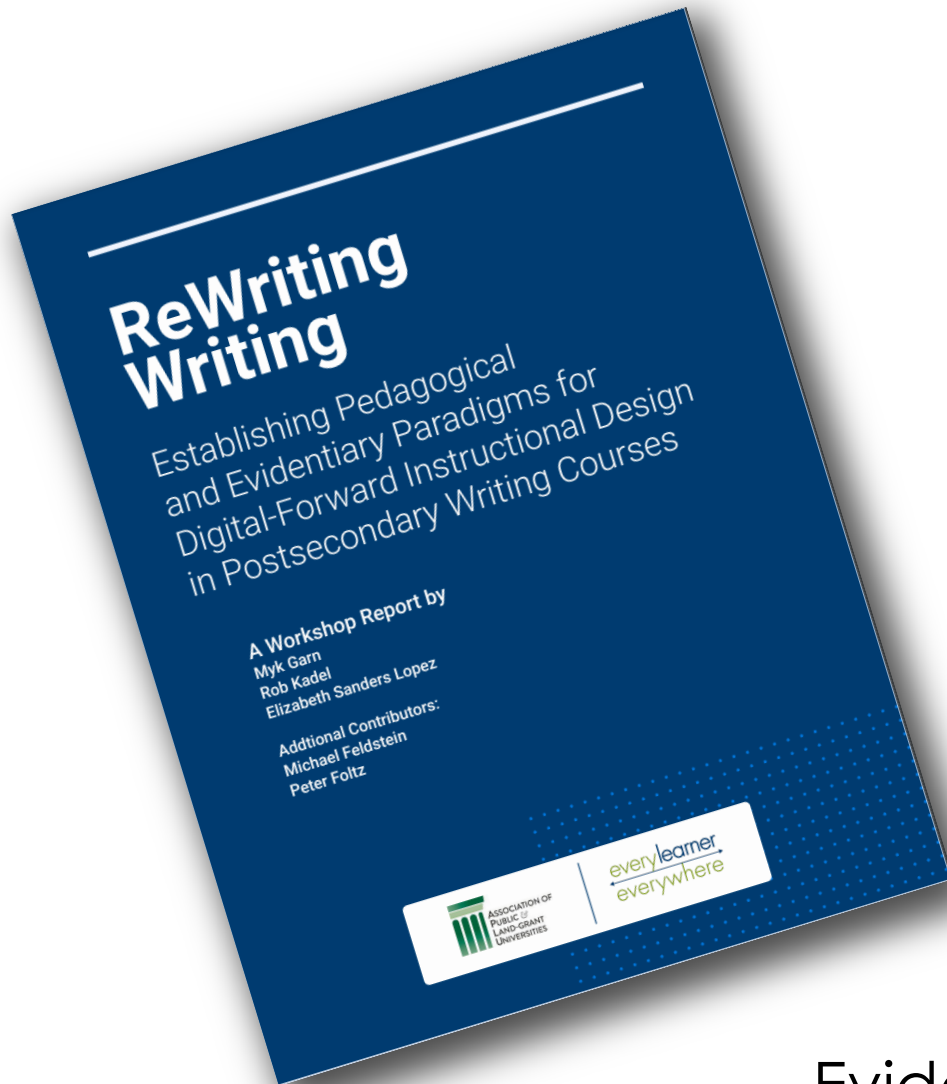
Are there new roles for faculty and new roles emerging?

What new technologies and pedagogies are being used?

How does the institution capture, use data?

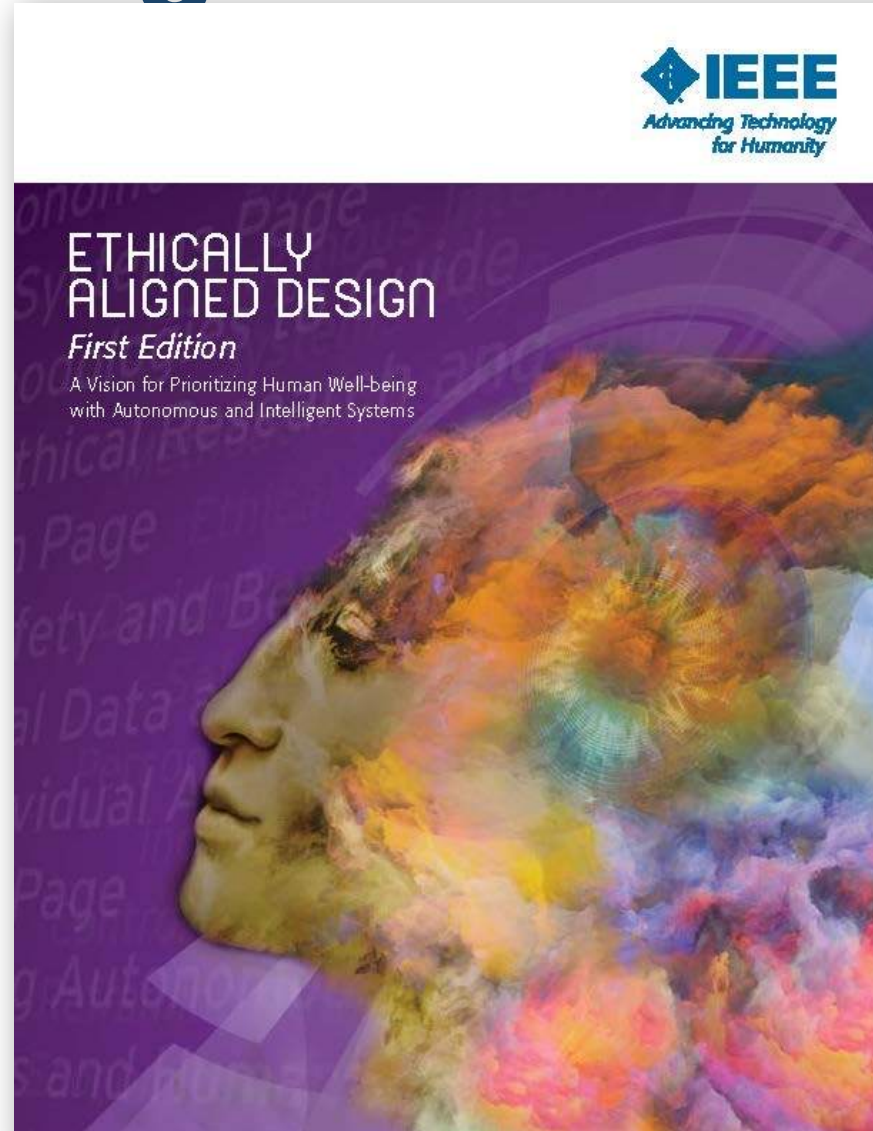
Does it make a difference?

Principles for Digital Forward Design



Equity
Engagement
Interaction
Instruction
Process and Practice
Feedback
Timeliness
Availability
Tutoring and Remediation
Flexibility
Scalability
Evidence-based Decision Making

Considering Human Well-Being



HYPOTHESES:

The Gold Standard of Classroom instruction is both irrational and inappropriate.

Technology enables new ways to address the embedded biases and limitations of current teaching and learning models.

New Learning Models using AI can make assessing Quality of Digital Instruction more efficient, effective, and transparent.

HYPOTHESES:

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**Using CBE 84% (or more) of learners
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HYPOTHESES:

Technology enables new ways to address the embedded biases and limitations of current teaching and learning models.

Individualization @ Scale

HYPOTHESES:

New Learning Models using AI can make assessing Quality of Digital Instruction more equitable, efficient, effective, and transparent.

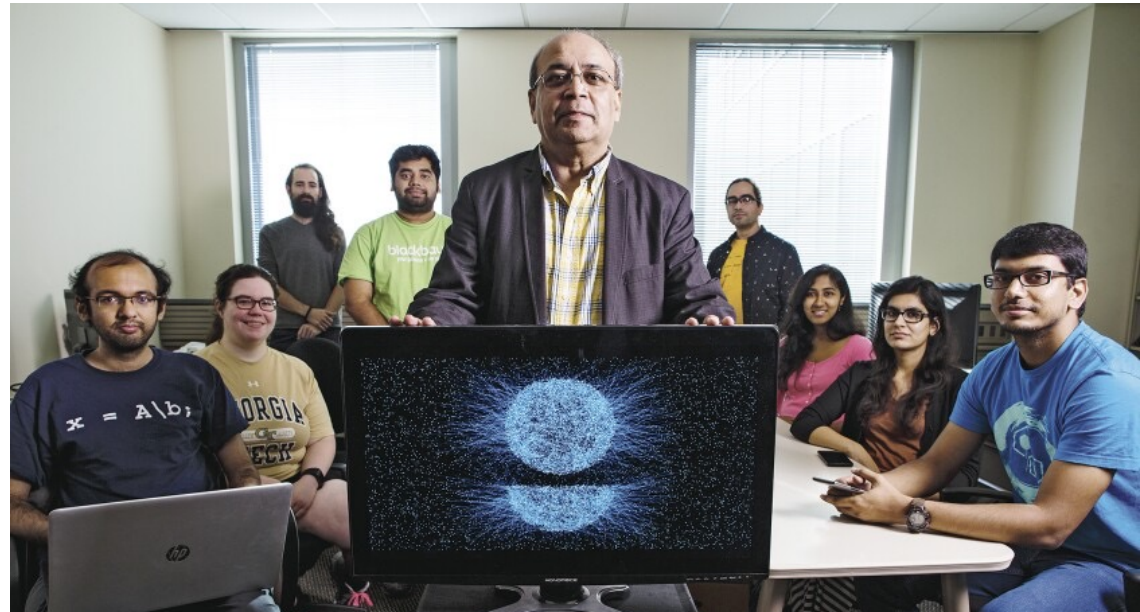
Technology Changes the Time Equation – for the STUDENT



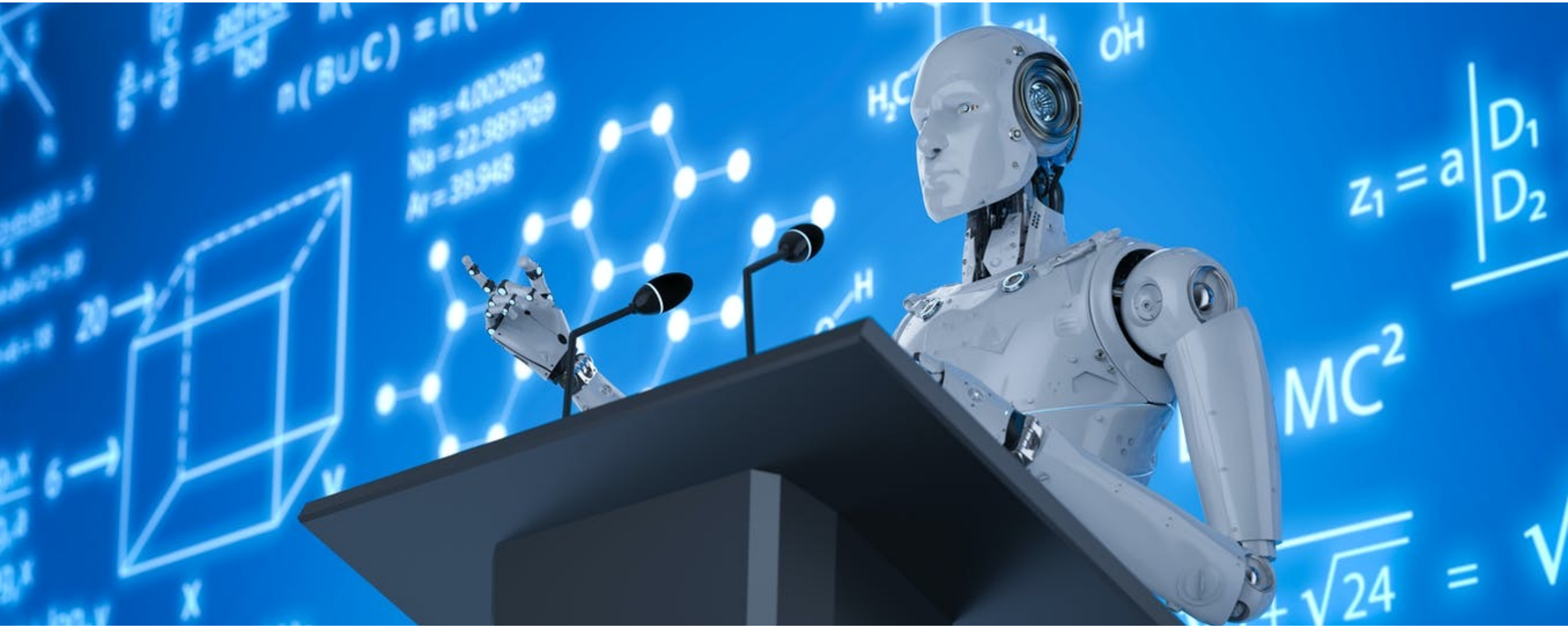
HYPOTHESES:

**New Learning Models using AI can make assessing
Quality of Digital Instruction more
equitable, efficient, effective, and transparent.**

**Technology Changes the Time
Equation – for the STUDENT and
the PROFESSOR**

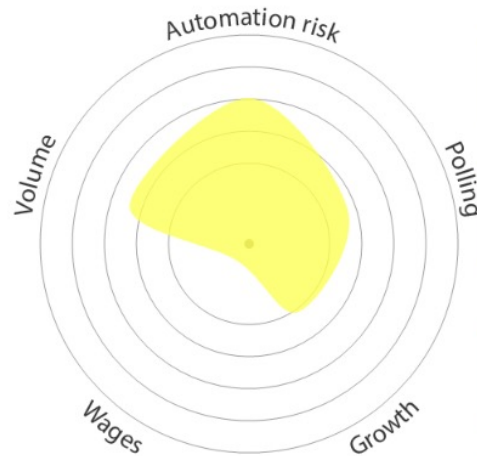


Will Robots Take Your Job?



Will Robots Take Your Job?

Teaching Assistants, Postsecondary



★4.4/10 job score ⓘ

AUTOMATION RISK

27%

risk level

POLLING

There hasn't been enough votes on this occupation yet

GROWTH

6.4%

by 2030

WAGES

\$36,250

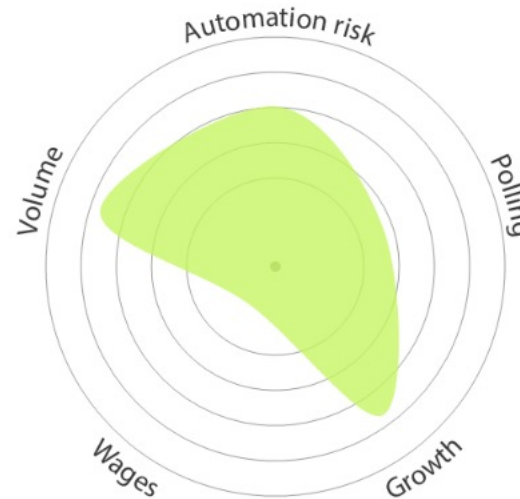
or \$17.43 hourly

VOLUME

138,740

as of 2020

Tutors



★5.8/10 job score ⓘ

AUTOMATION RISK

26%

risk level

POLLING

There hasn't been enough votes on this occupation yet

GROWTH

15.6%

by 2030

WAGES

\$40,590

or \$19.51 hourly

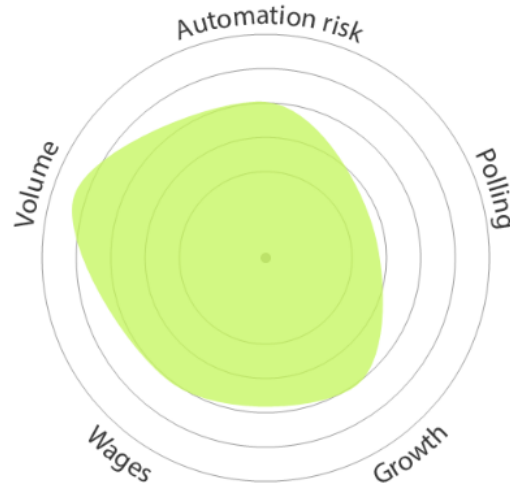
VOLUME

309,220

as of 2020

Will Robots Take Your Job?

Postsecondary Teachers



★6.7/10 job score ⓘ

AUTOMATION RISK

21%

risk level

POLLING

There hasn't been enough votes on this occupation yet

GROWTH

10.7%

by 2030

WAGES

\$76,990

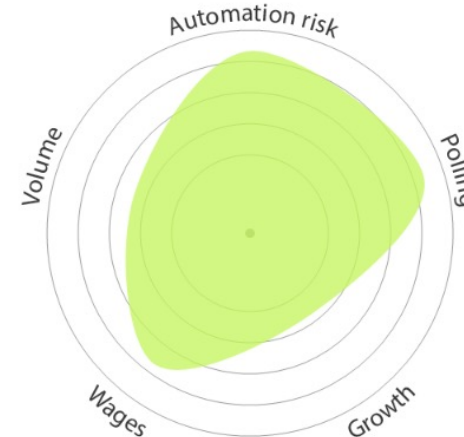
or \$37.01 hourly

VOLUME

1,369,930

as of 2020

Education Administrators, Postsecondary



★7.6/10 job score ⓘ

AUTOMATION RISK

5%

risk level

POLLING

27%

Based on 51 votes

GROWTH

7.5%

by 2030

WAGES

\$97,500

or \$46.87 hourly

VOLUME

140,880

as of 2020



**WE'RE STILL HIRING
HUMANS**

TO TEACH AT YOUR LOCAL COLLEGE

LAMAR

Myk Garn, PhD

Assistant Vice Chancellor for New Learning Models
University System of Georgia

myk.garn@usg.edu

