Tech, AI, and Learning: A Dangerous Triumvirate

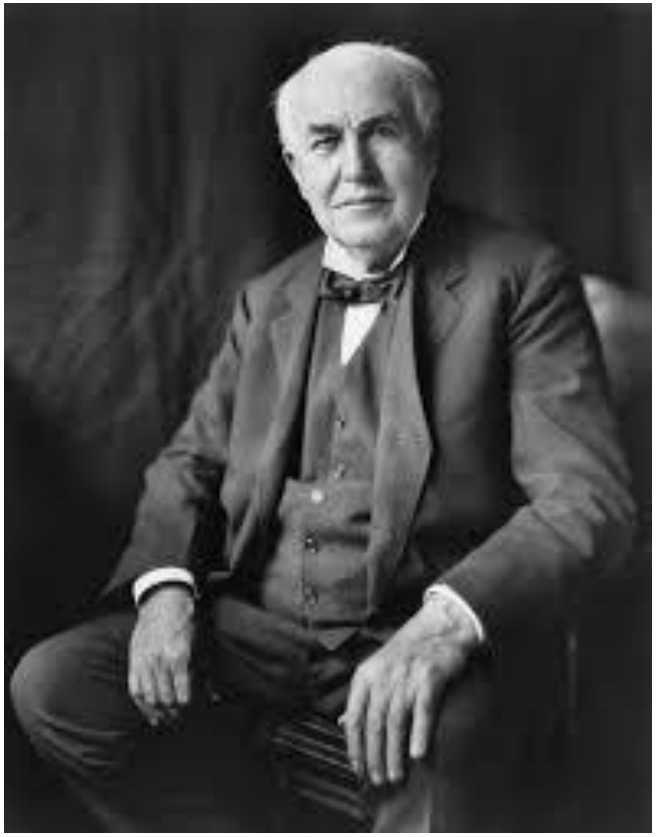
Dr. Jared Cooney Horvath

PhD, MEd, BAMF

The Future of Education

Thomas Edison
1922

"Textbooks will soon be obsolete in schools - the motion picture is destined to revolutionize education."

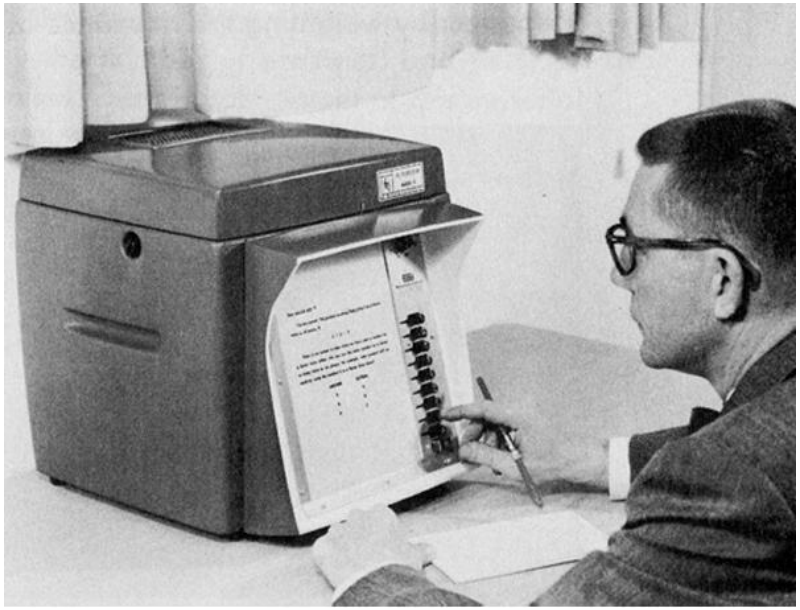


William Levinson
1945

"A portable radio receiver will be as common in classrooms as a blackboard"

Popular Science
1961

“By 1965, over half of all students will be using an Automated Schoolmarm.”



B.F. Skinner
1985

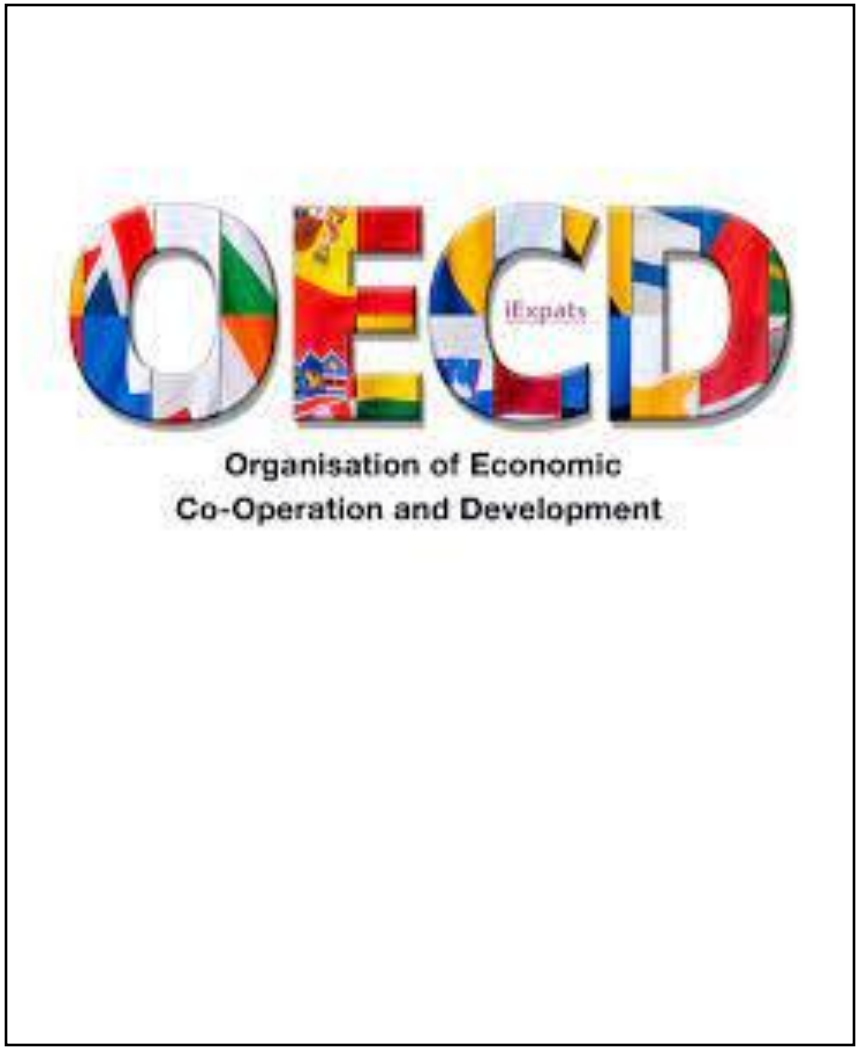
"With the help of computers, students could learn twice as much in the same time and with the same effort as in a standard classroom."

Digital is the Future

Computers

OECD

"People who use computers very frequently [to learn] do a lot worse in most learning outcomes."



Computers

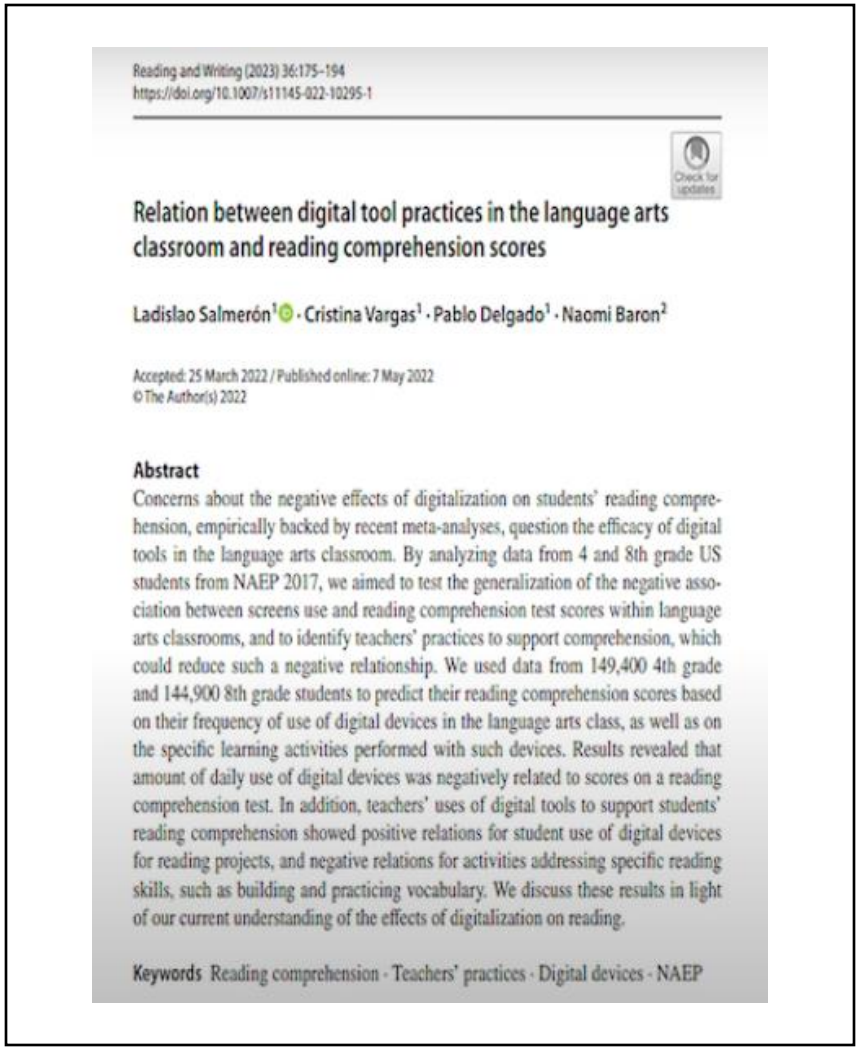
J-PAL

126 Research Studies

"Computers do not improve grades and test scores. Online courses lower academic achievement compared to in-person courses."

Computers

"Even small amounts of digital device use in classes (30min) are negatively related to scores on reading and comprehension tests."



Reading and Writing (2023) 36:175–194
https://doi.org/10.1007/s11145-022-10295-1

Check for updates

Relation between digital tool practices in the language arts classroom and reading comprehension scores

Ladislao Salmerón[1] · Cristina Vargas[1] · Pablo Delgado[1] · Naomi Baron[2]

Accepted: 25 March 2022 / Published online: 7 May 2022

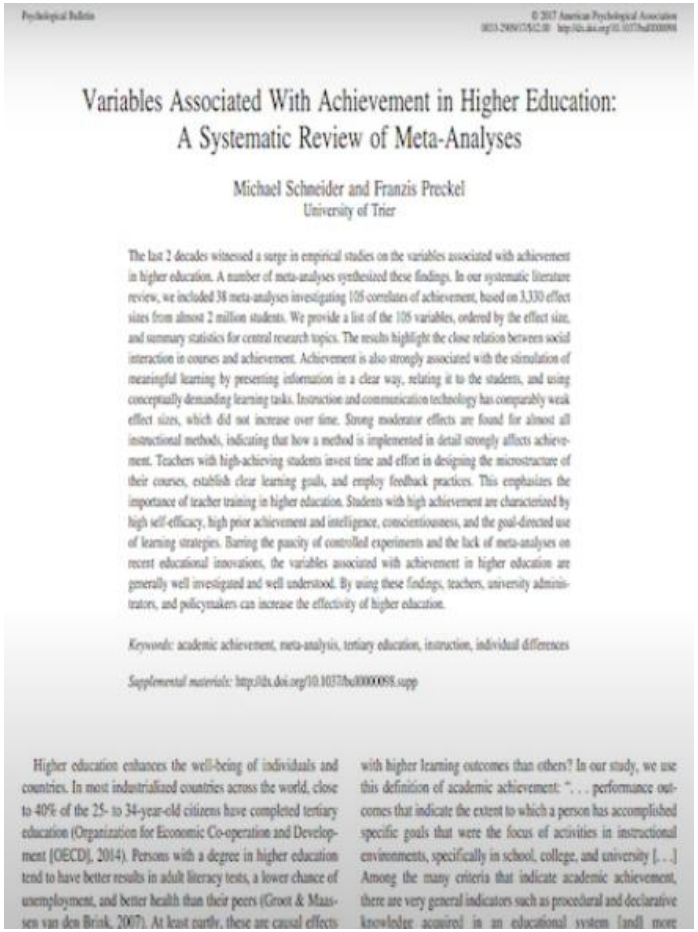
Abstract

Concerns about the negative effects of digitalization on students' reading comprehension, empirically backed by recent meta-analyses, question the efficacy of digital tools in the language arts classroom. By analyzing data from 4 and 8th grade US students from NAEP 2017, we aimed to test the generalization of the negative association between screens use and reading comprehension test scores within language arts classrooms, and to identify teachers' practices to support comprehension, which could reduce such a negative relationship. We used data from 149,400 4th grade and 144,900 8th grade students to predict their reading comprehension scores based on their frequency of use of digital devices in the language arts class, as well as on the specific learning activities performed with such devices. Results revealed that amount of daily use of digital devices was negatively related to scores on a reading comprehension test. In addition, teachers' uses of digital tools to support students' reading comprehension showed positive relations for student use of digital devices for reading projects, and negative relations for activities addressing specific reading skills, such as building and practicing vocabulary. We discuss these results in light of our current understanding of the effects of digitalization on reading.

Keywords Reading comprehension · Teachers' practices · Digital devices · NAEP

Computers

"…expanding the use of digital technologies at the expense of any other form of instruction is likely to have detrimental effects of achievement."



Psychological Bulletin

0033-2909/17/$12.00 http://dx.doi.org/10.1037/bul0000098

Variables Associated With Achievement in Higher Education: A Systematic Review of Meta-Analyses

Michael Schneider and Franzis Preckel
University of Trier

The last 2 decades witnessed a surge in empirical studies on the variables associated with achievement in higher education. A number of meta-analyses synthesized these findings. In our systematic literature review, we included 38 meta-analyses investigating 105 correlates of achievement, based on 3,330 effect sizes from almost 2 million students. We provide a list of the 105 variables, ordered by the effect size, and summary statistics for central research topics. The results highlight the close relation between social interaction in courses and achievement. Achievement is also strongly associated with the stimulation of meaningful learning by presenting information in a clear way, relating it to the students, and using conceptually demanding learning tasks. Instruction and communication technology has comparably weak effect sizes, which did not increase over time. Strong moderator effects are found for almost all instructional methods, indicating that how a method is implemented in detail strongly affects achievement. Teachers with high-achieving students invest time and effort in designing the microstructure of their courses, establish clear learning goals, and employ feedback practices. This emphasizes the importance of teacher training in higher education. Students with high achievement are characterized by high self-efficacy, high prior achievement and intelligence, conscientiousness, and the goal-directed use of learning strategies. Barring the paucity of controlled experiments and the lack of meta-analyses on recent educational innovations, the variables associated with achievement in higher education are generally well investigated and well understood. By using these findings, teachers, university administrators, and policymakers can increase the effectivity of higher education.

Keywords: academic achievement, meta-analysis, tertiary education, instruction, individual differences

Supplemental materials: http://dx.doi.org/10.1037/bul0000098.supp

Higher education enhances the well-being of individuals and countries. In most industrialized countries across the world, close to 40% of the 25- to 34-year-old citizens have completed tertiary education (Organization for Economic Co-operation and Development [OECD], 2014). Persons with a degree in higher education tend to have better results in adult literacy tests, a lower chance of unemployment, and better health than their peers (Groot & Maassen van den Brink, 2007). At least partly, these are causal effects

with higher learning outcomes than others? In our study, we use this definition of academic achievement: ". . . performance outcomes that indicate the extent to which a person has accomplished specific goals that were the focus of activities in instructional environments, specifically in school, college, and university [. . .] Among the many criteria that indicate academic achievement, there are very general indicators such as procedural and declarative knowledge acquired in an educational system [and] more

Computers

AC = 0.21

1-to-1 = 0.16

SYNTHESIZING THE EFFECT OF BUILDING CONDITION QUALITY ON ACADEMIC PERFORMANCE

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Abstract
Since the late 1970s, researchers have examined the relationship between school building condition and student performance. Though many literature reviews have claimed that a relationship exists, no meta-analysis has quantitatively examined this literature. The purpose of this review was to synthesize the existing literature on the relationship between building condition and student performance. Means for the semi-partial (r_{sp} = 0.10) and bivariate (r = 0.12) correlations were rela-

Review of Educational Research
December 2016, Vol. 86, No. 4, pp. 1052–1084
DOI: 10.3102/0034654316628645

Learning in One-to-One Laptop Environments: A Meta-Analysis and Research Synthesis

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Michigan State University

Mark Warschauer
University of California, Irvine

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Michigan State University

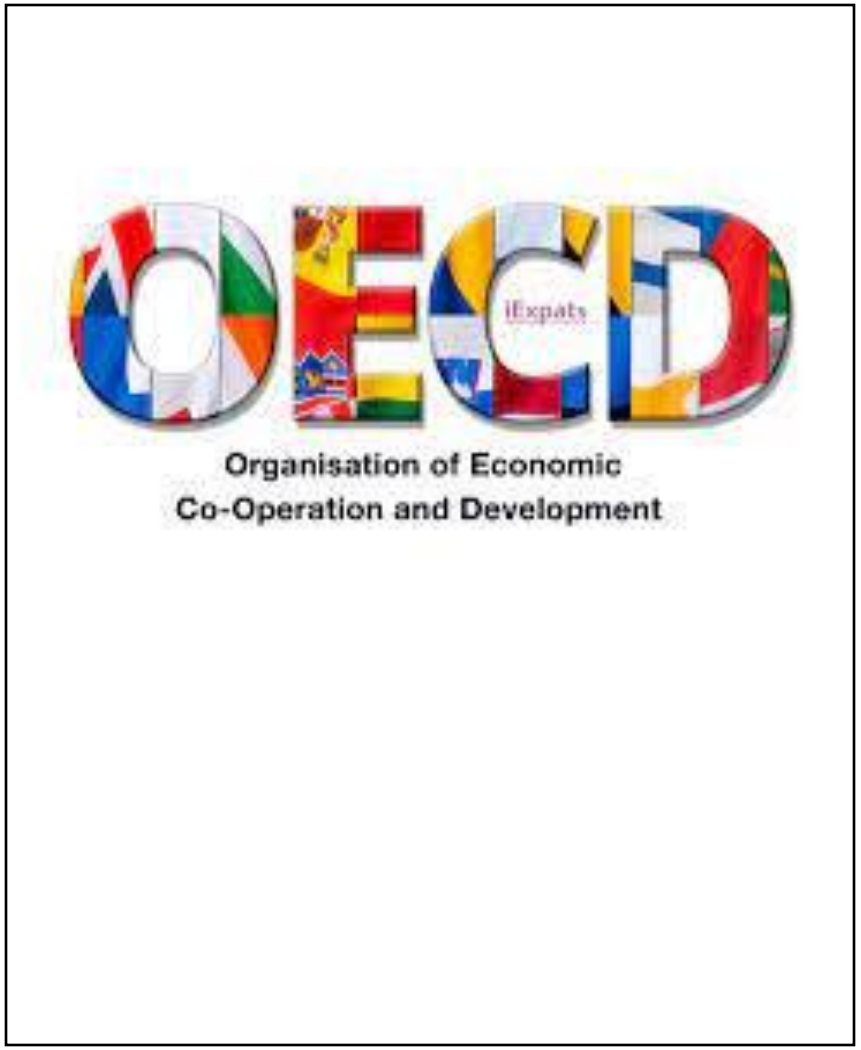
Over the past decade, the number of one-to-one laptop programs in schools has steadily increased. Despite the growth of such programs, there is little consensus about whether they contribute to improved educational outcomes. This article reviews 65 journal articles and 31 doctoral dissertations published from January 2001 to May 2015 to examine the effect of one-to-one laptop programs on teaching and learning in K–12 schools. A meta-analysis of 10 studies examines the impact of laptop programs on students' academic achievement, finding significantly positive average effect sizes in English, writing, mathematics, and science. In addition, the article summarizes the impact of laptop programs on more general teaching and learning processes and perceptions as reported in these studies, again noting generally positive findings.

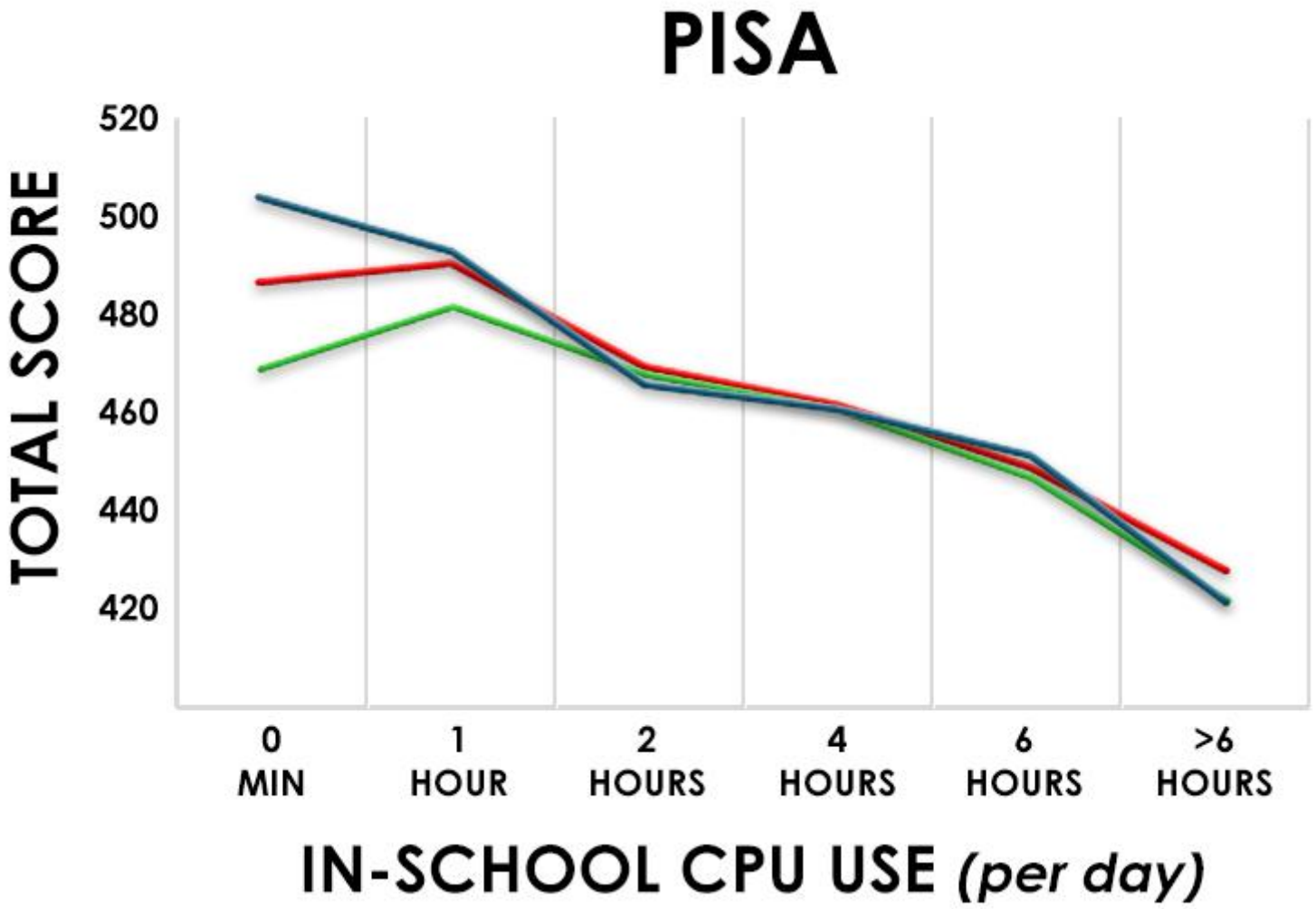
KEYWORDS: 21st century skills, academic achievement, meta-analysis, one-to-one laptop program, processes and perceptions

Computers

OECD

"People who use computers very frequently at school do <u>a lot</u> worse in most learning outcomes."



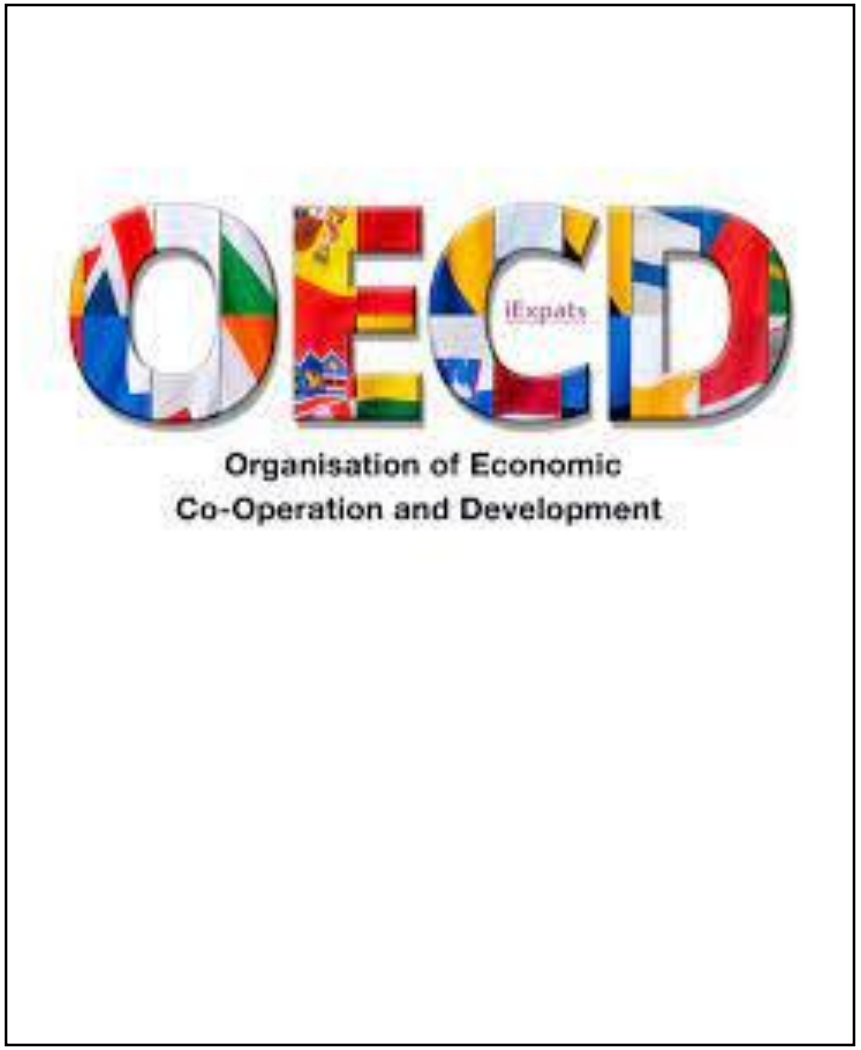

PISA
TOTAL SCORE
520
500
480
460
440
420
0 MIN
1 HOUR
2 HOURS
4 HOURS
6 HOURS
>6 HOURS
IN-SCHOOL CPU USE (per day)

Computers

OECD

*"…*countries that have invested ***less*** in introducing computers into school have ***improved faster***, on average, than countries that have invested more.

Results are similar across **reading, mathematics,** and **science**."



Effect Sizes

General Learning = 0.29

Distance = 0.23

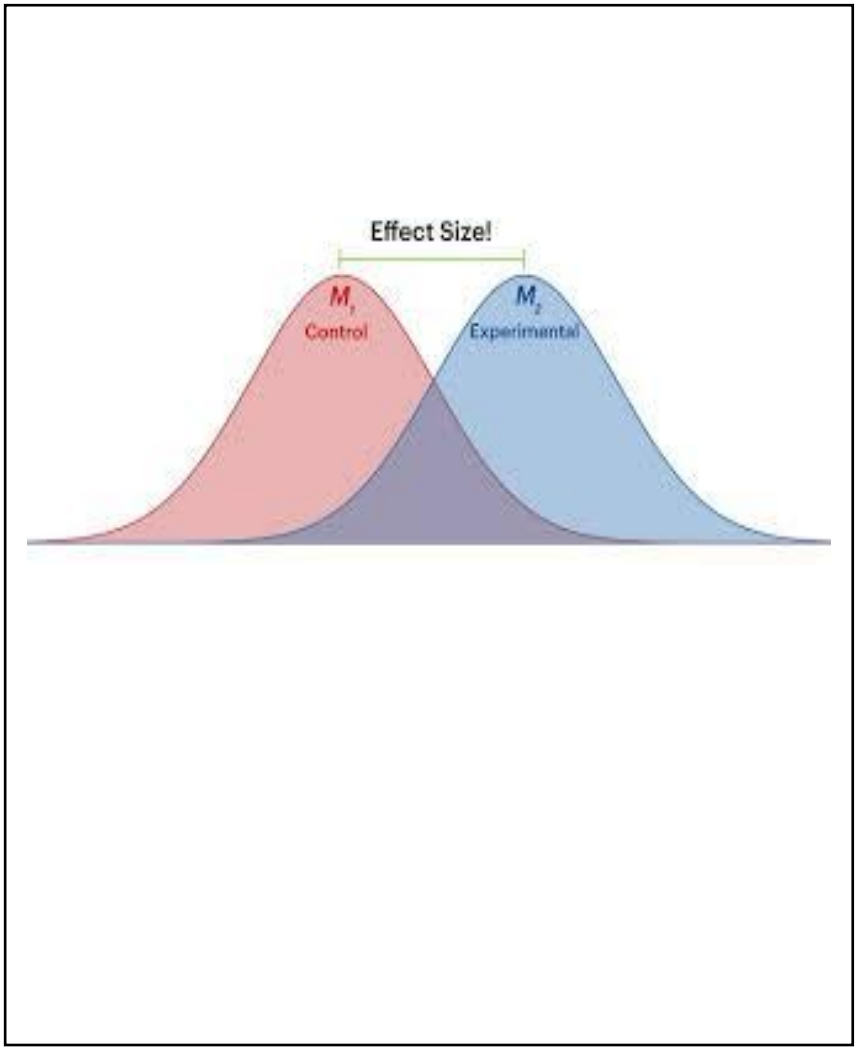
1-to-1 = 0.16

Disadvantaged = 0.18

Literacy = 0.33

Mathematics = 0.33

Science = 0.24

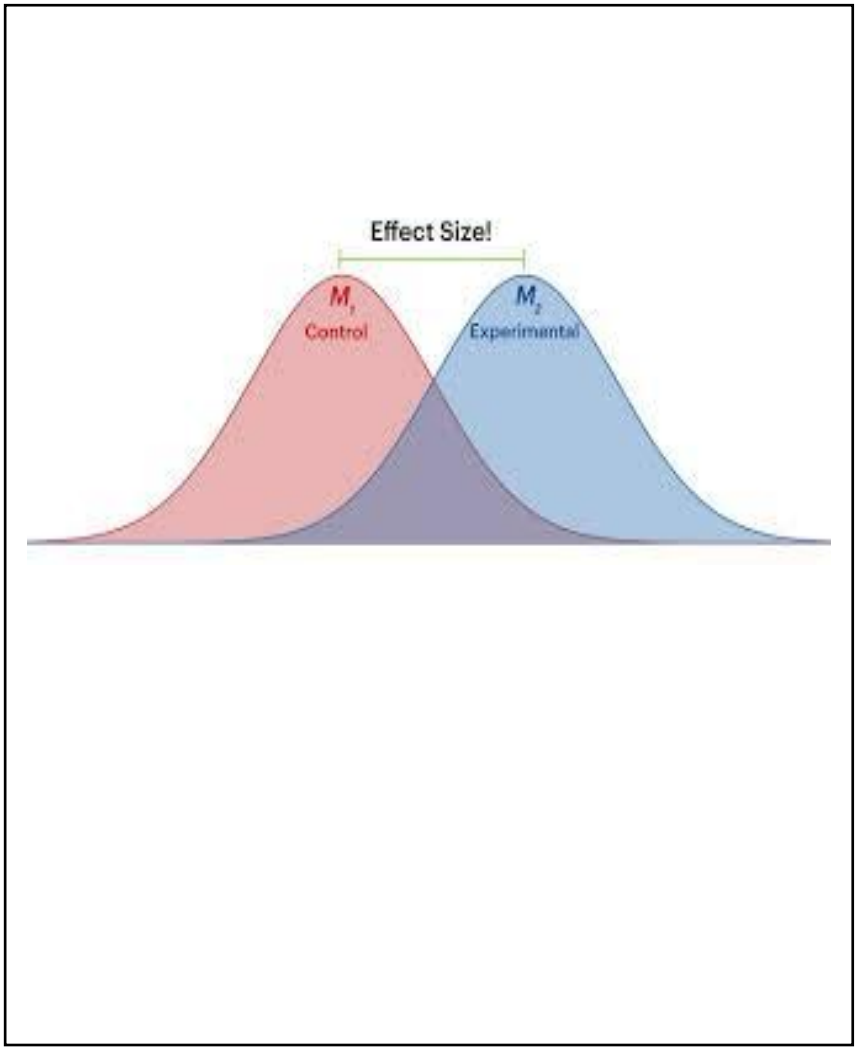


Effect Sizes

1) 0.42

2) 0.44

3) 0.50



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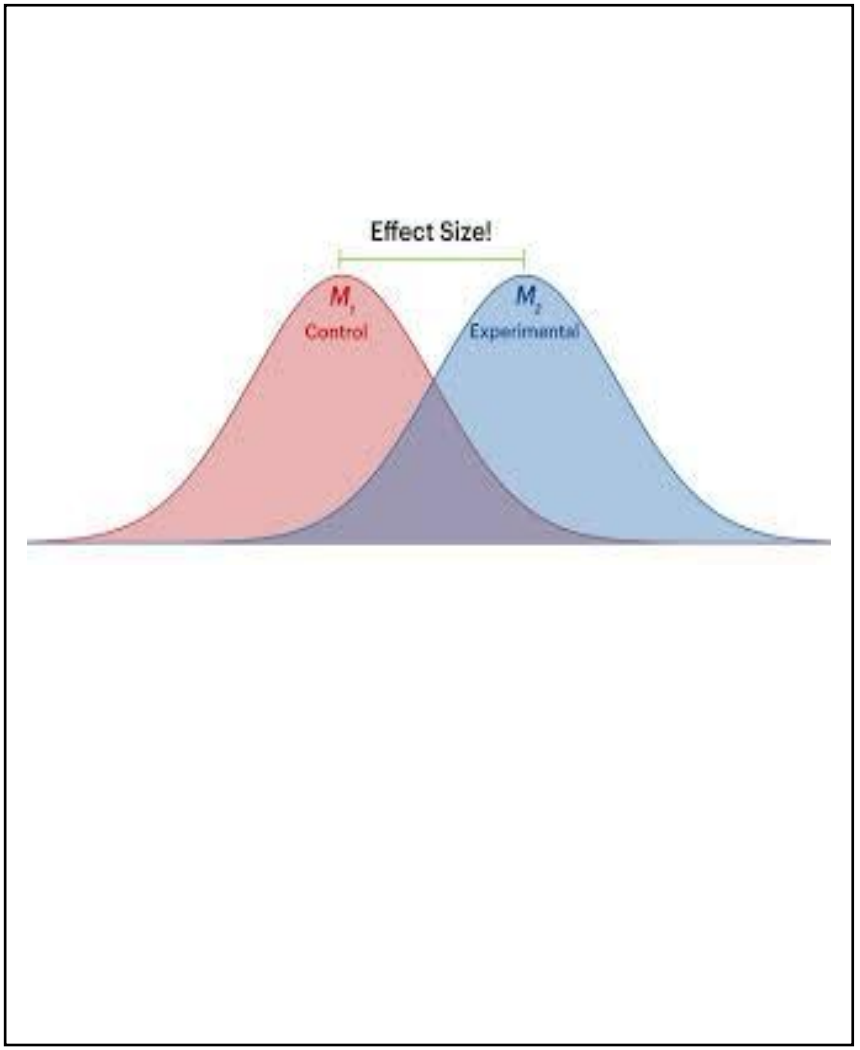
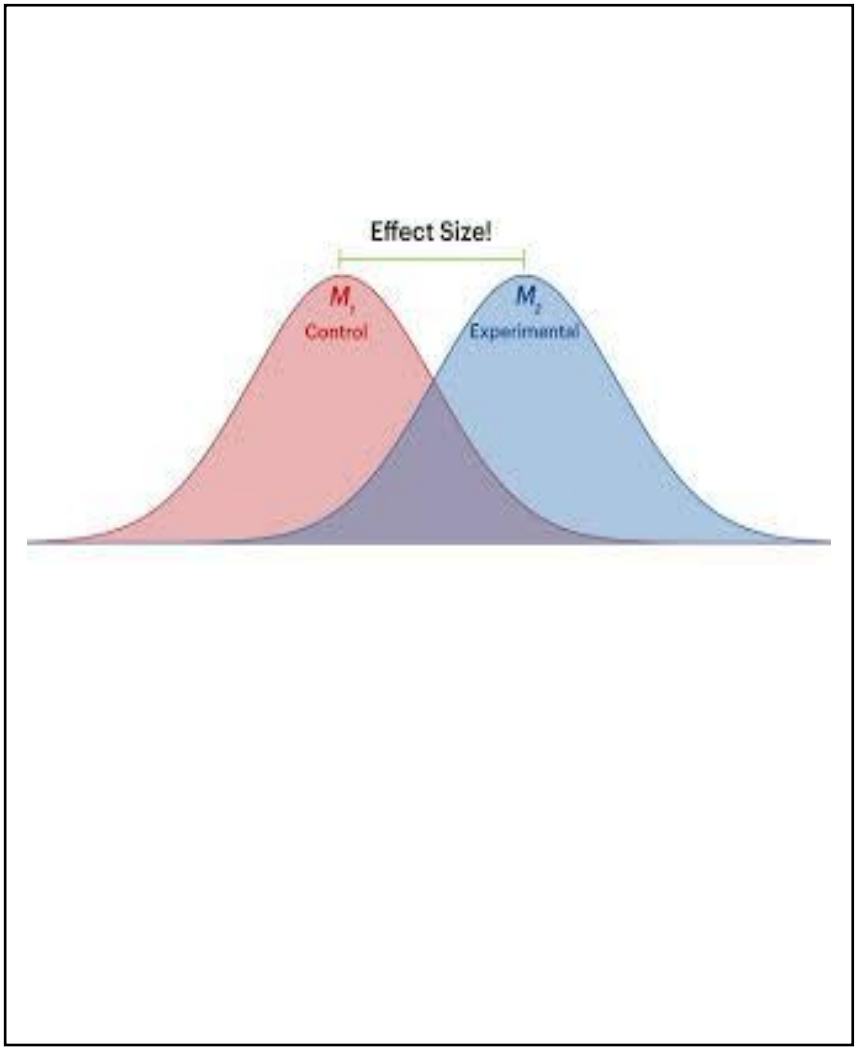


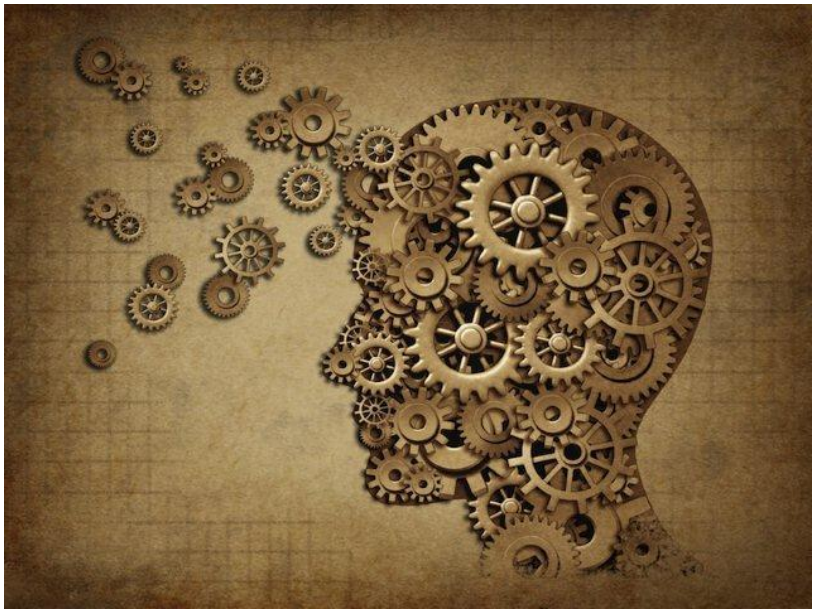
Effect Sizes

General Learning = 0.29

398 ma / 21,155 es



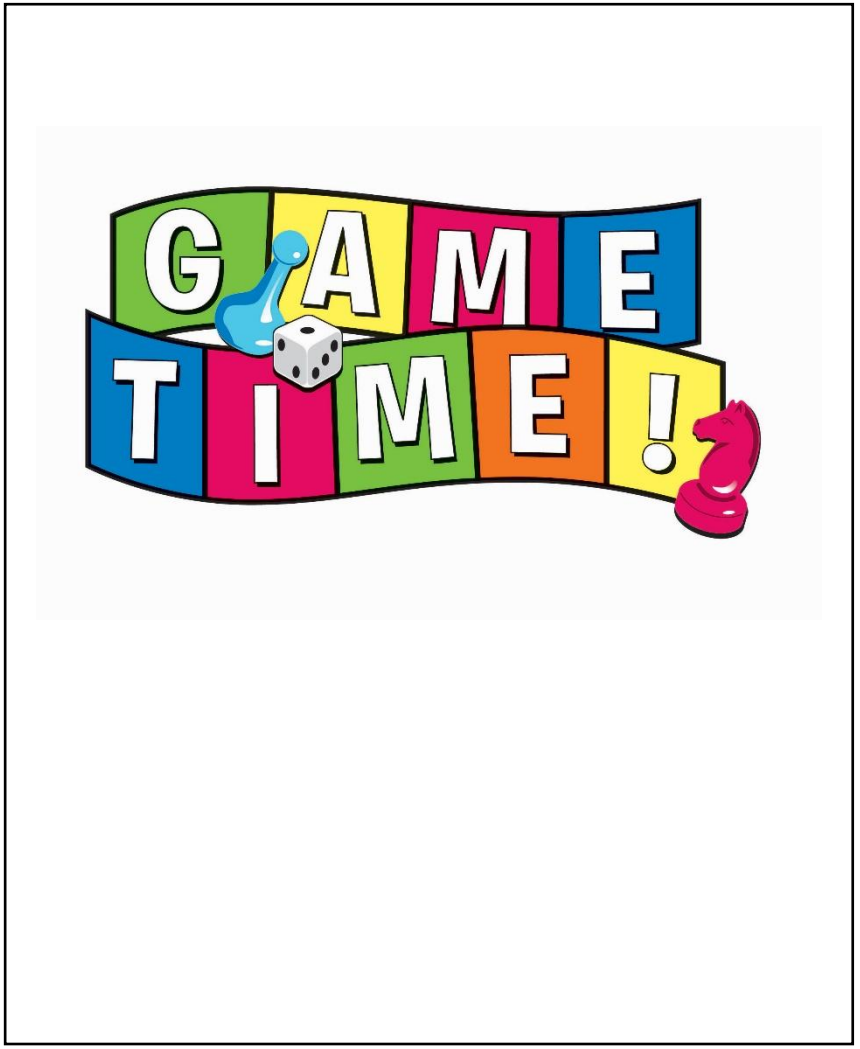
Three Intractable Mechanisms



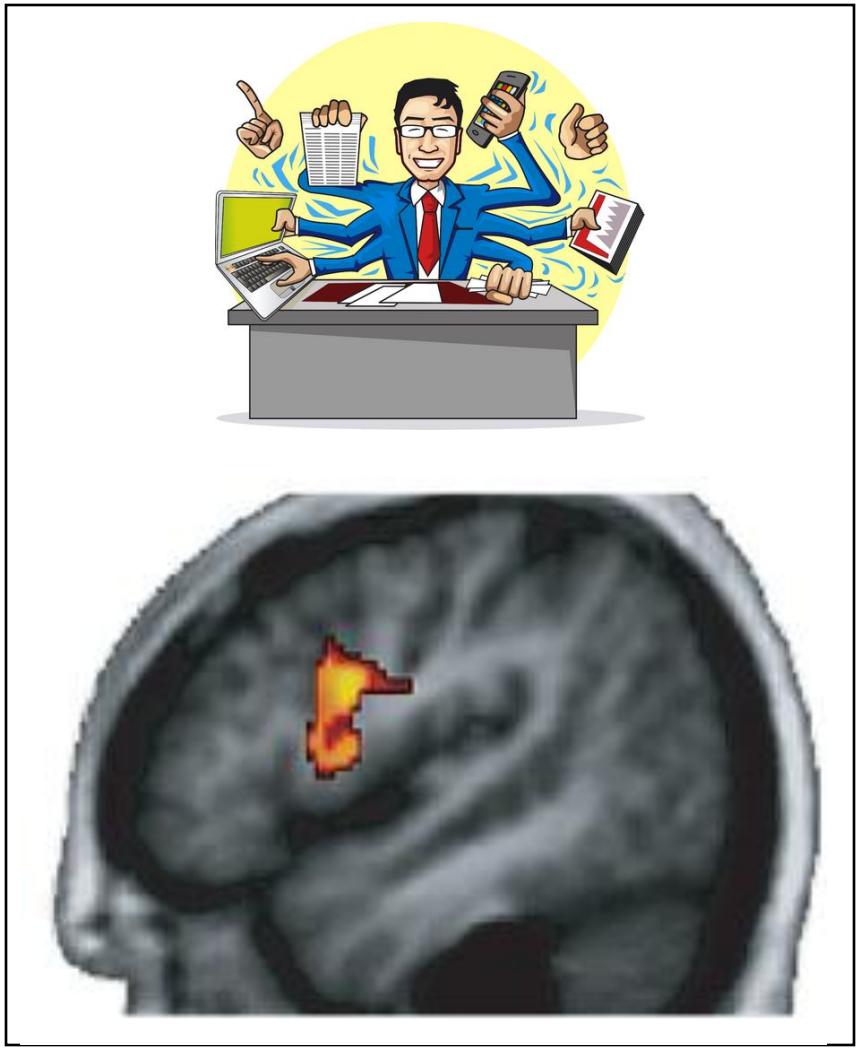
#1
Primary Function

Primary Function

A Game



Multitasking



Multitasking

The Single Worst Thing for Learning & Memory

Primary Function

Breakdown (*per week*)

Internet + Social Media – 13hrs

TV / Videos– 11.75hrs

Video Games – 11.25hrs

In-Class Work – 9hrs

Music – 7.5hrs

Homework – 3.5hrs

Video Chatting – 2hrs

Reading + Writing – 1.5hrs

Creating Content – 1hr

Breakdown
(*per year*)

Learning

~450hrs

Passive Consumption of Rapidly Switching Media Content

>2,500hrs

Breakdown
(*per year*)

Learning

~450hrs

MULTITASKING

>2,500

Digital Learning

~6min study

~15min live-lesson

(~2min)

38min per hour

Why Intractable?

Entertainment

Vs

Education

#2
Relationships

ELIZA


E.L.I.Z.A. Talking
Welcome to
EEEEEE LL IIII ZZZZZZZ AAAAA
EE LL II ZZ AA AA
EEEEE LL II ZZZ AAAAAAA
EE LL II ZZ AA AA
EEEEEE LLLLLL IIII ZZZZZZZ AA AA
ELIZA is a mock (Rogerian) psychotherapist.
The original program was described by Joseph Weizenbaum in 1966.
This implementation ('elizabot.js') by Norbert Landsteiner 2005.
Graphics and real-time text to speech integration added in 2013.
Note: Try Google Chrome to enjoy the true thrills of speech recognition.
VOICE SETUP
Please choose an accent to be used by ELIZA (speech output):
[1] English - US
[2] English - EN
VOX
digital VT100
digivox

Today

Depression – 3x

Anxiety – 5x

Student Teacher Relationship

Effect Size =

0.57

Student Teacher Relationship

Genuineness = 0.28

Adaptability = 0.41

Encouragement = 0.48

Empathy = 0.68

Biological Synchrony

Heart Rate

Breathing

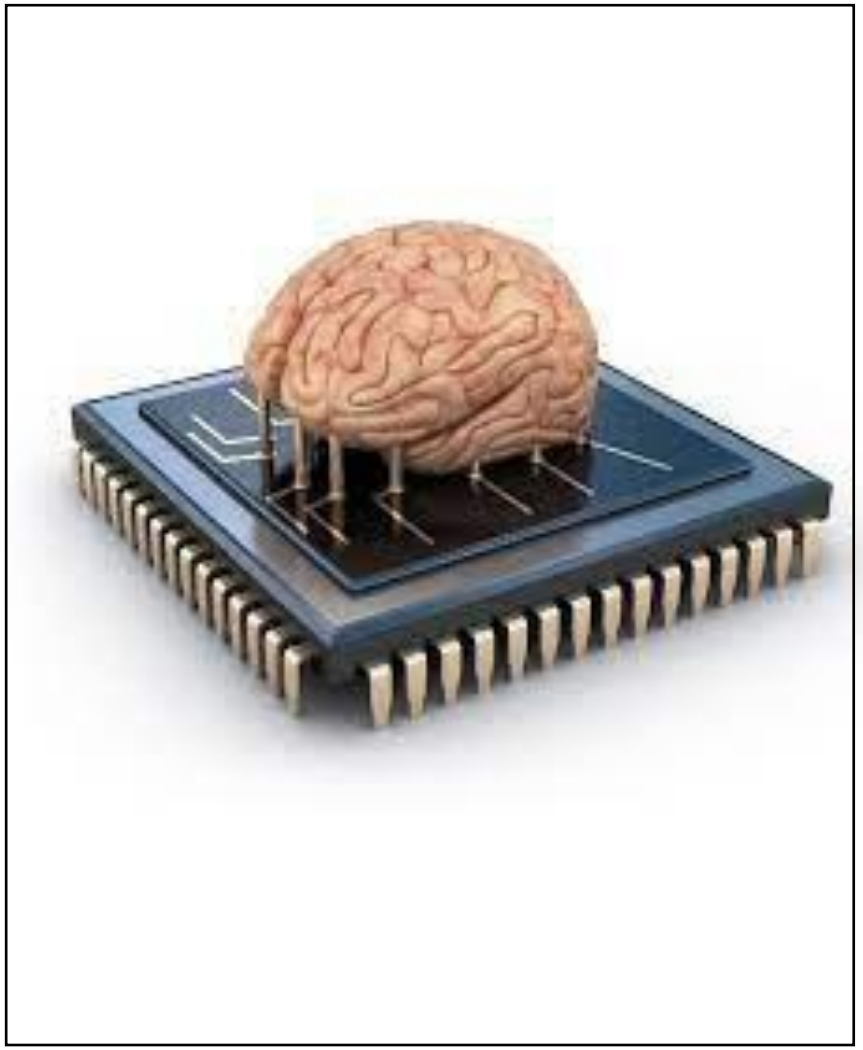
Blink Rate

Neural Patterns

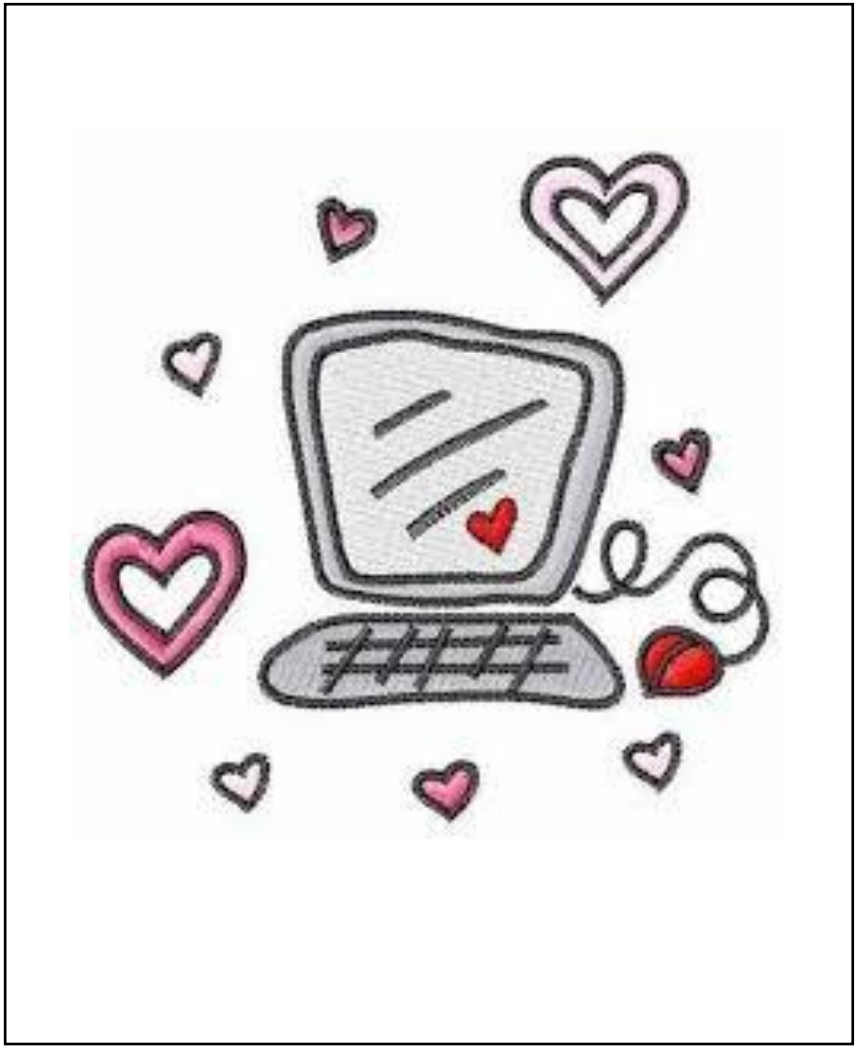
Biological Synchrony

Understanding & Motivation

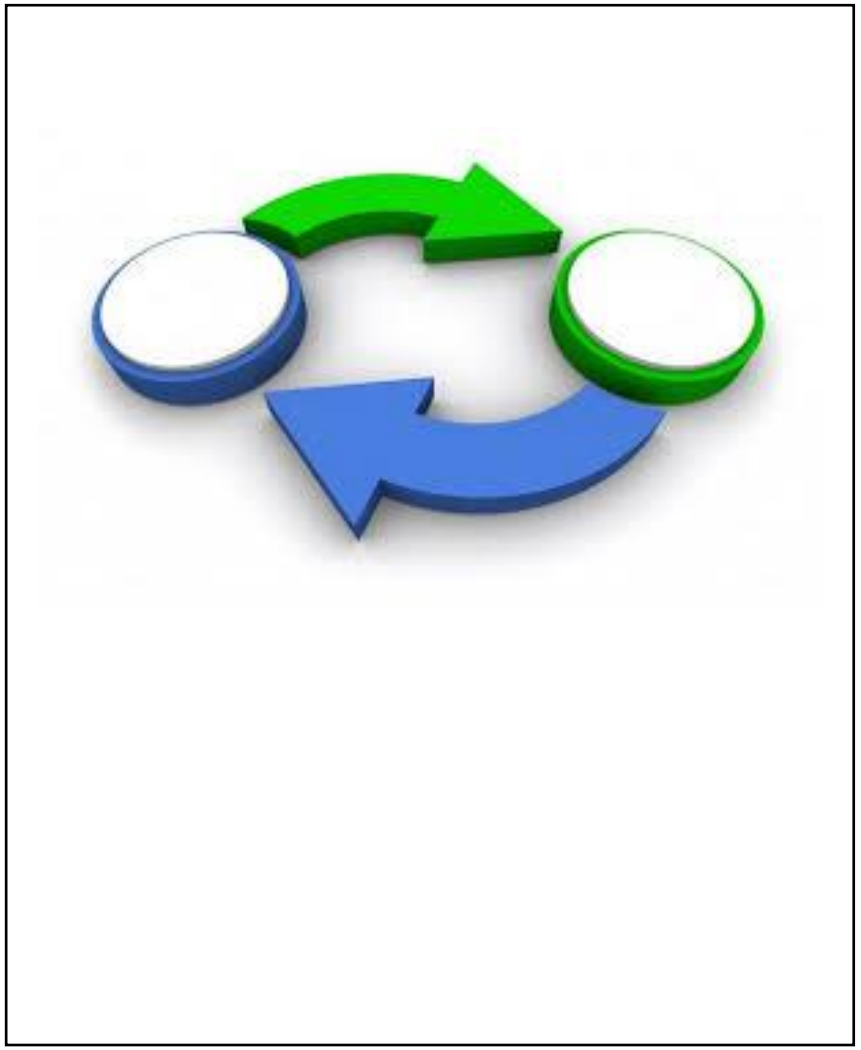
Why Intractable?



But I Feel It…



#3
Transfer

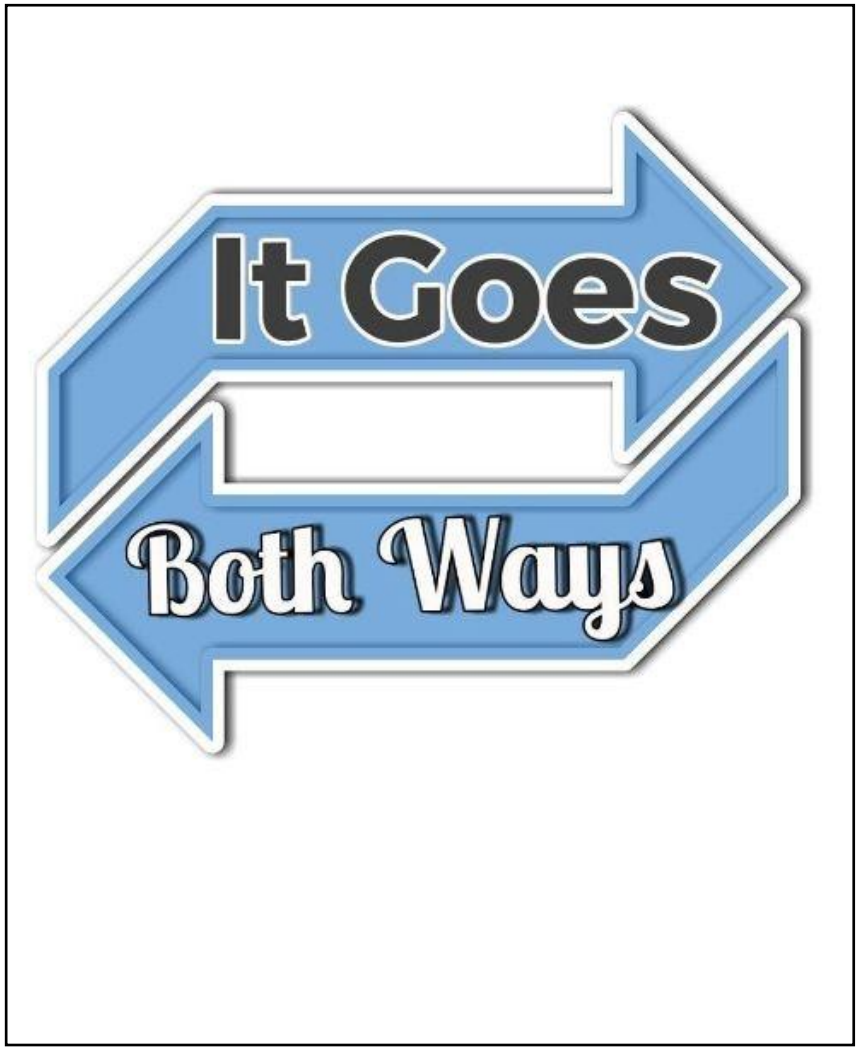


Transfer is Contextual

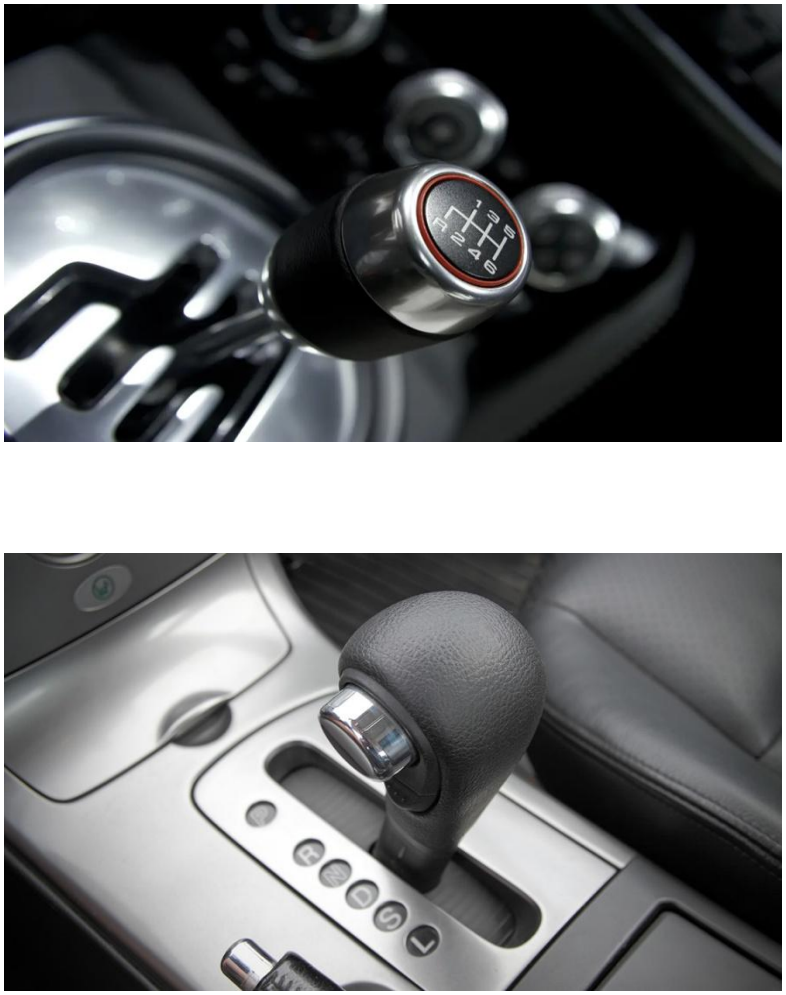
Computers are Narrow

Screen to Real-World?

Wait a Second…



Additive vs Subtractive

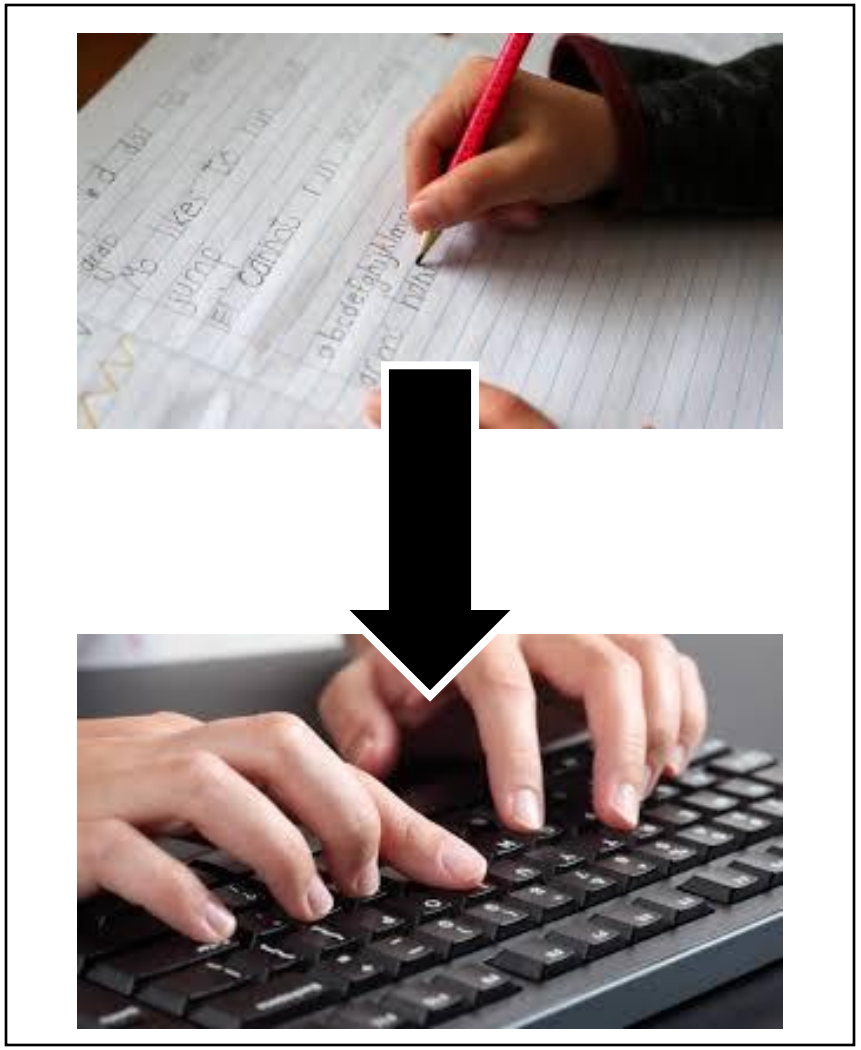


Computers are Easy

Fluency

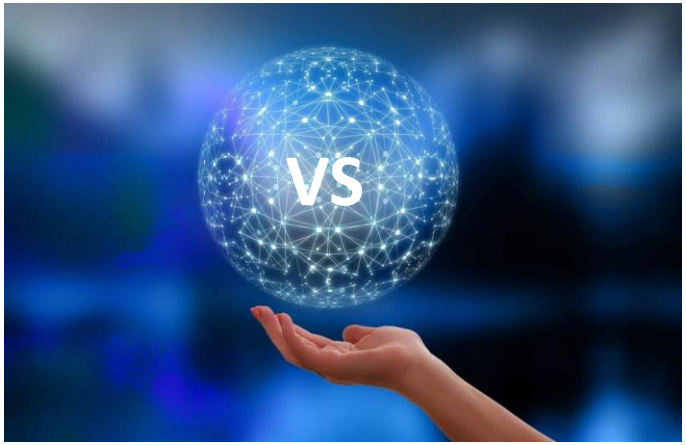
Writing to Typing

Typing to Writing



Why Intractable?

PRODUCTION



LEARNING

When Do They Work?

Something is
Better than Nothing

Something is Better than Nothing

Specific Learning Disabilities

Something is Better than Nothing

Specific Learning Disabilities

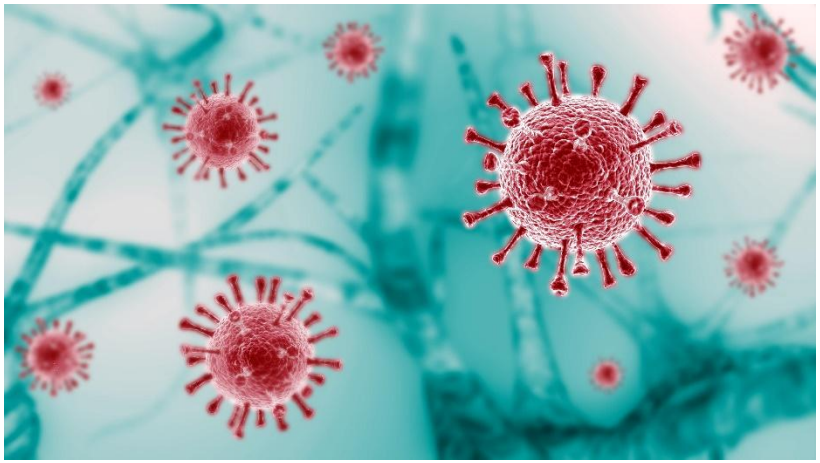
Procedural Simulations

Something is Better than Nothing

Specific Learning Disabilities

Procedural Simulations

Global Pandemic



Something is Better than Nothing

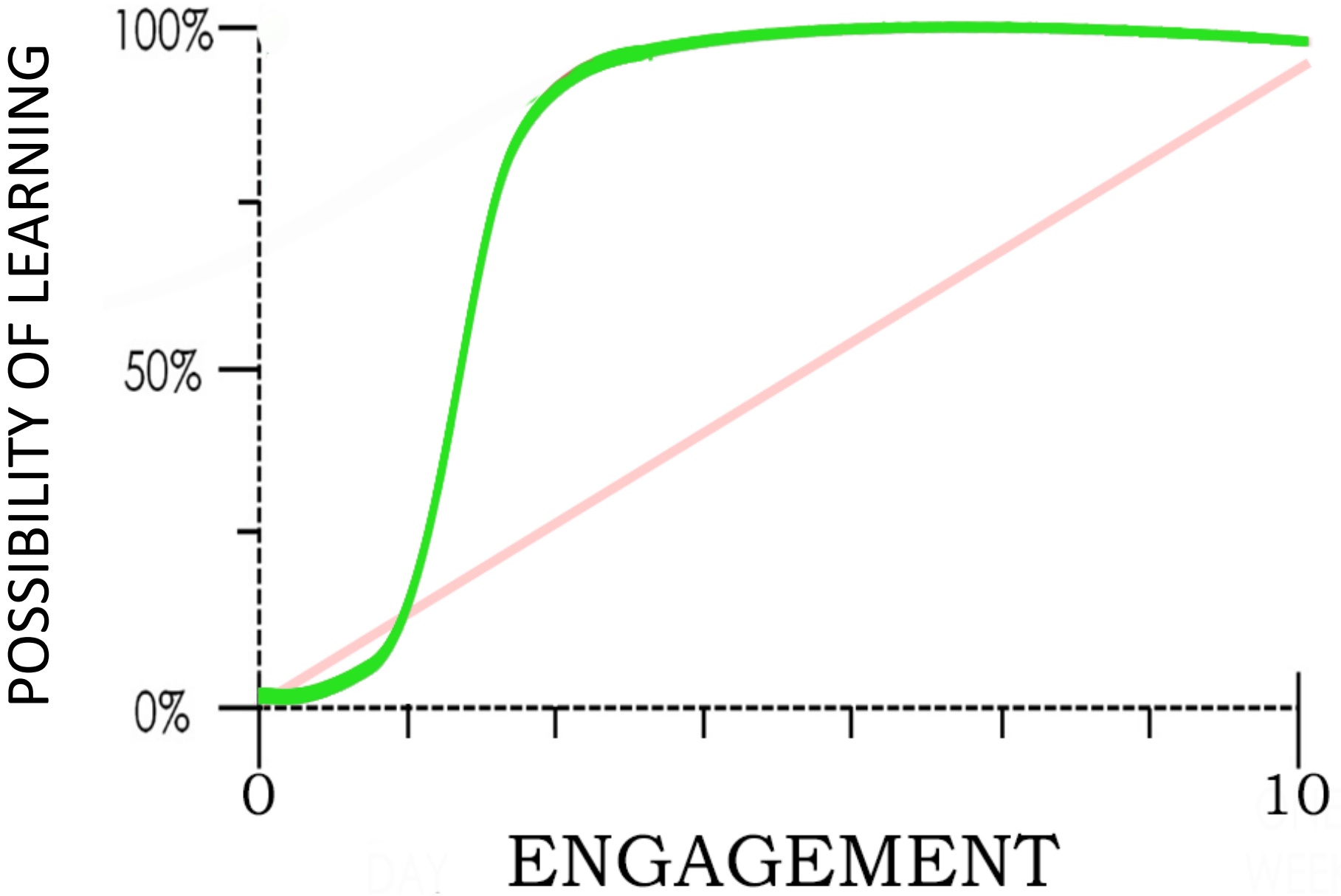
Specific Learning Disabilities

Procedural Simulations

Global Pandemic

Locked Systems

Engagement


POSSIBILITY OF LEARNING
100%
50%
0%
0
10
ENGAGEMENT

Memory is the Residue of Thought


So Now Then