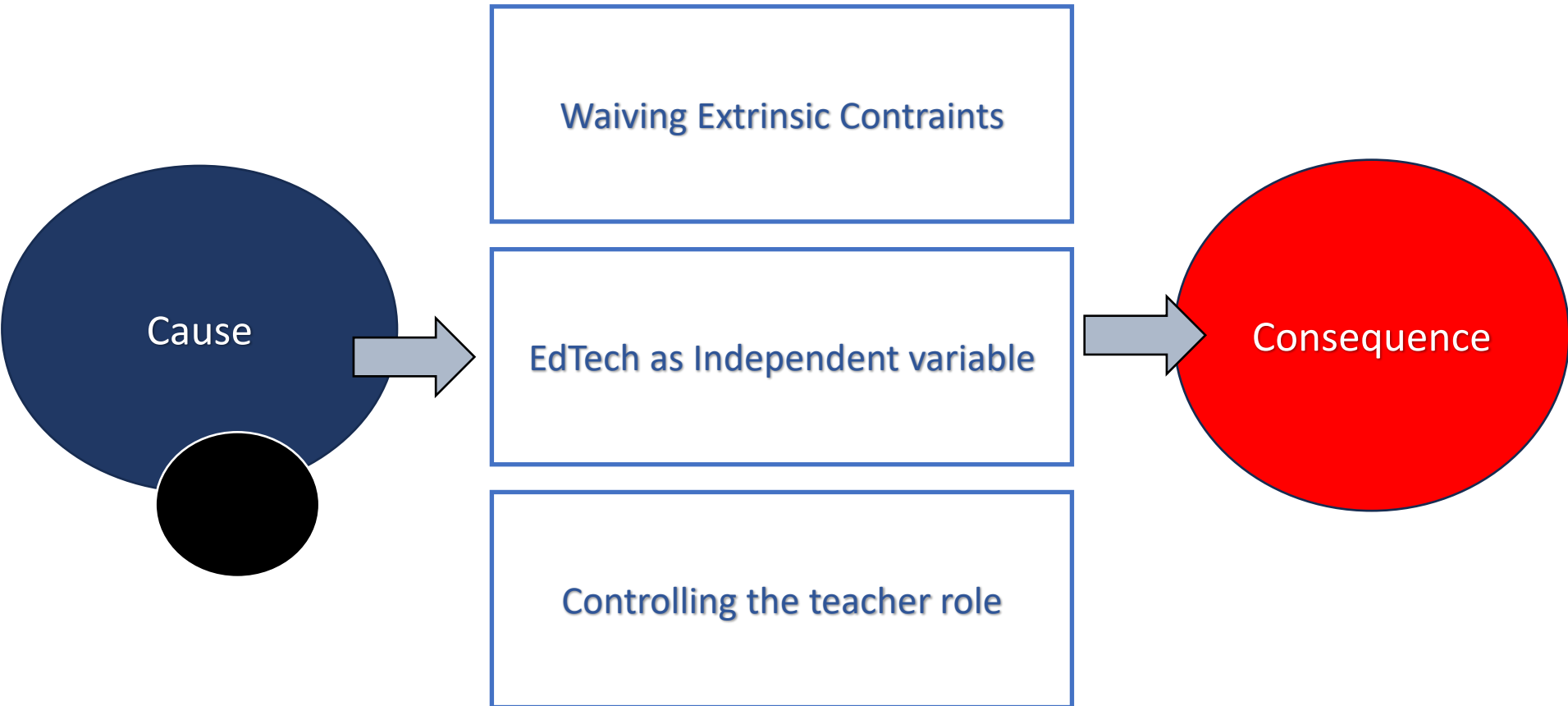


# Why RCT evidence often failed to predict classroom successes ?

Prof. P. Dillenbourg **EPFL**

Associate Vice-President for Education

# Research methods Pitfalls





Logistics assistants (warehouse employees)





KOSMOS 200  
KOSMOS 200  
KOSMOS 200  
KOSMOS 200  
KOSMOS 200  
KOSMOS 200  
KOSMOS 200

KOSMOS 500  
KOSMOS 500  
KOSMOS 500  
KOSMOS 500  
KOSMOS 500  
KOSMOS 500

KOSMOS 200  
KOSMOS 200  
KOSMOS 200  
KOSMOS 200  
KOSMOS 200  
KOSMOS 200  
KOSMOS 200

KOSMOS 500  
KOSMOS 500  
KOSMOS 500  
KOSMOS 500

KOSMOS KAEEFER  
ART. NR.  
INHALT  
MADE IN

KOSMOS KAEEFER  
ART. NR.  
INHALT  
MADE IN

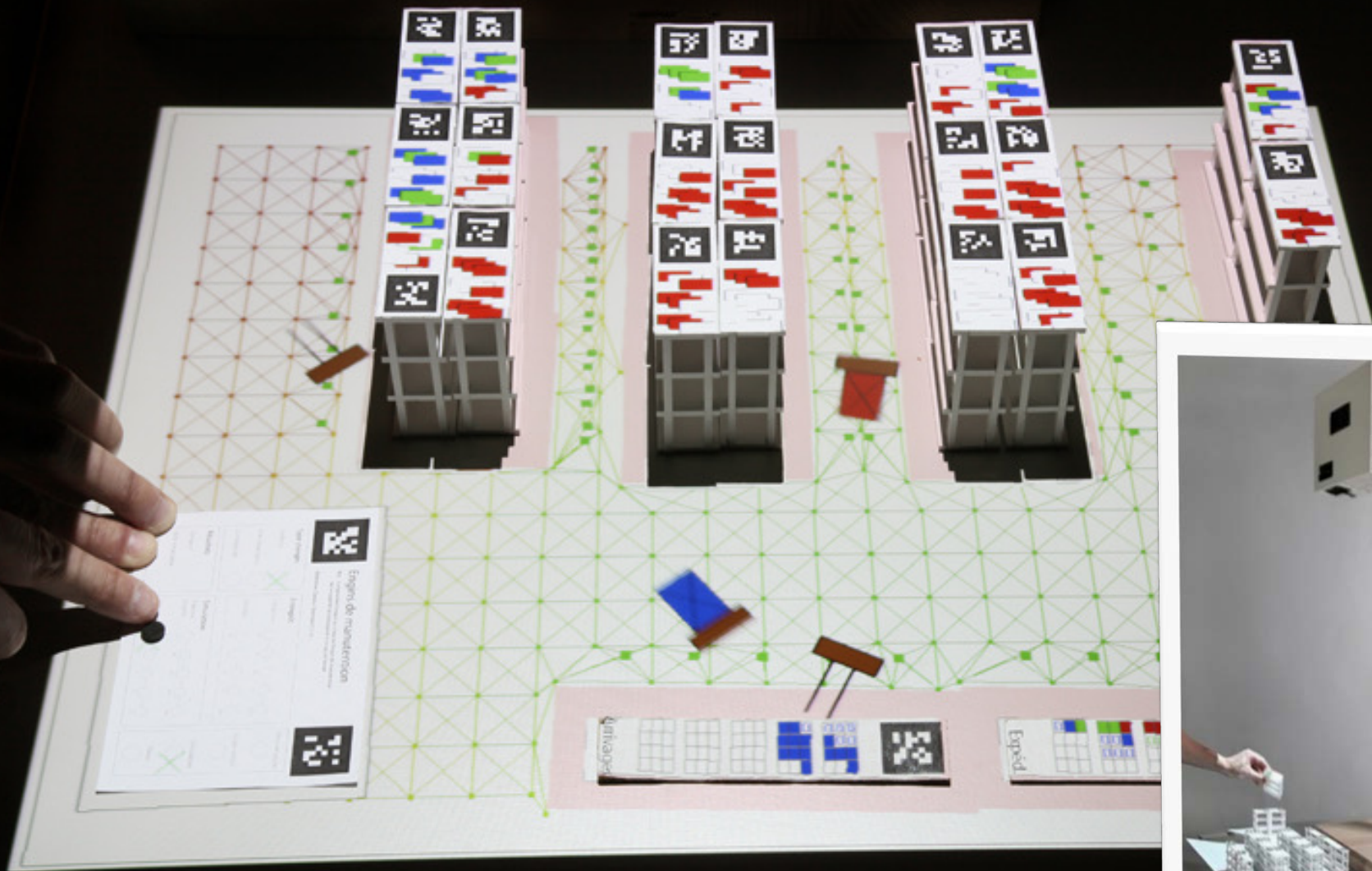
KOSMOS KAEEFER-ROBOTER  
ART. NR. 658014  
INHALT: 5 STK.  
MADE IN CHINA

Geheim-Paratopp  
Geheim-Paratopp  
Geheim-Paratopp  
Geheim-Paratopp  
Geheim-Paratopp

KOSMOS  
GEHEIM-PERISKOPE  
ART. NR. 658618  
INHALT: 5 STK.  
MADE IN CHINA

Elektro-Kosmos



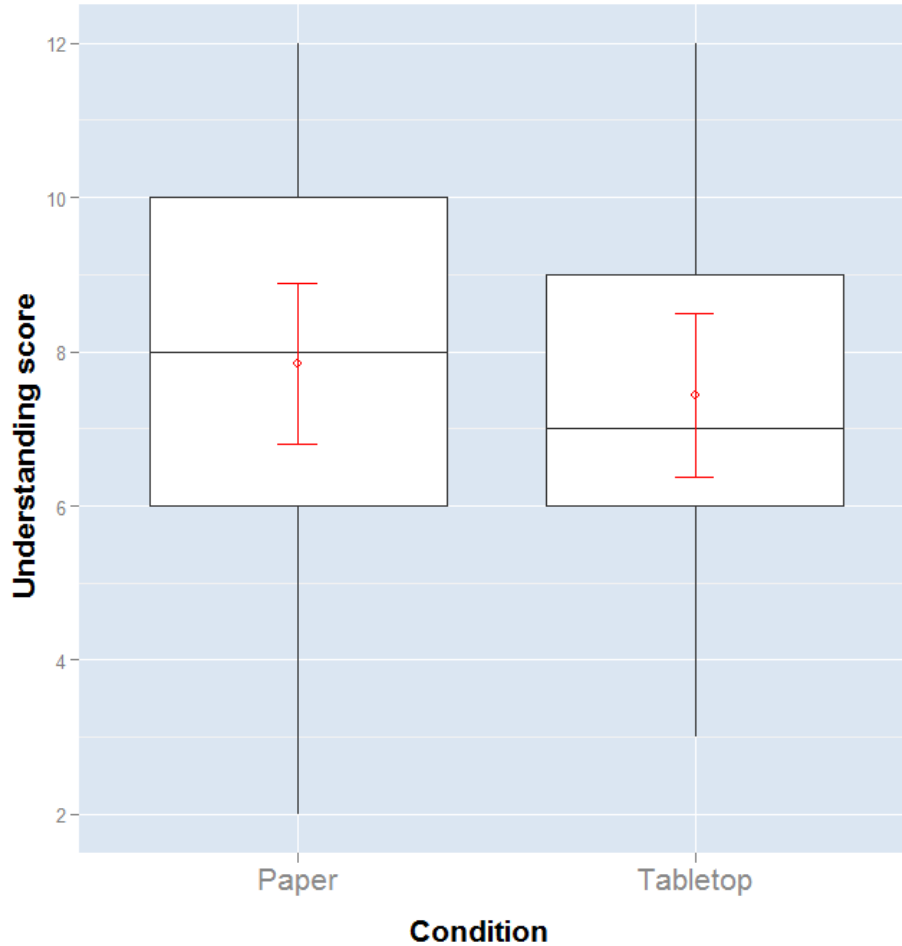


Tinker

The logo for Simpliquity features a stylized circular icon on the left, composed of two concentric rings in shades of green and grey. To the right of the icon, the word "Simpliquity" is written in a clean, grey, sans-serif typeface.

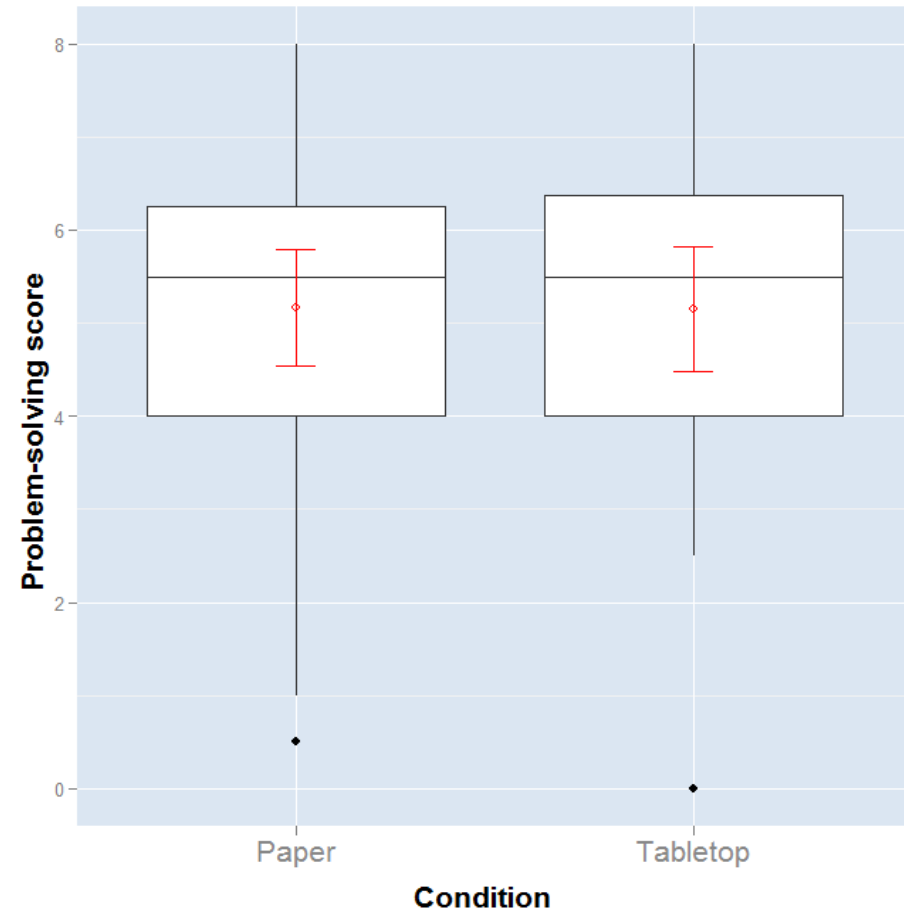
Simpliquity

No sign. effect in  
understanding

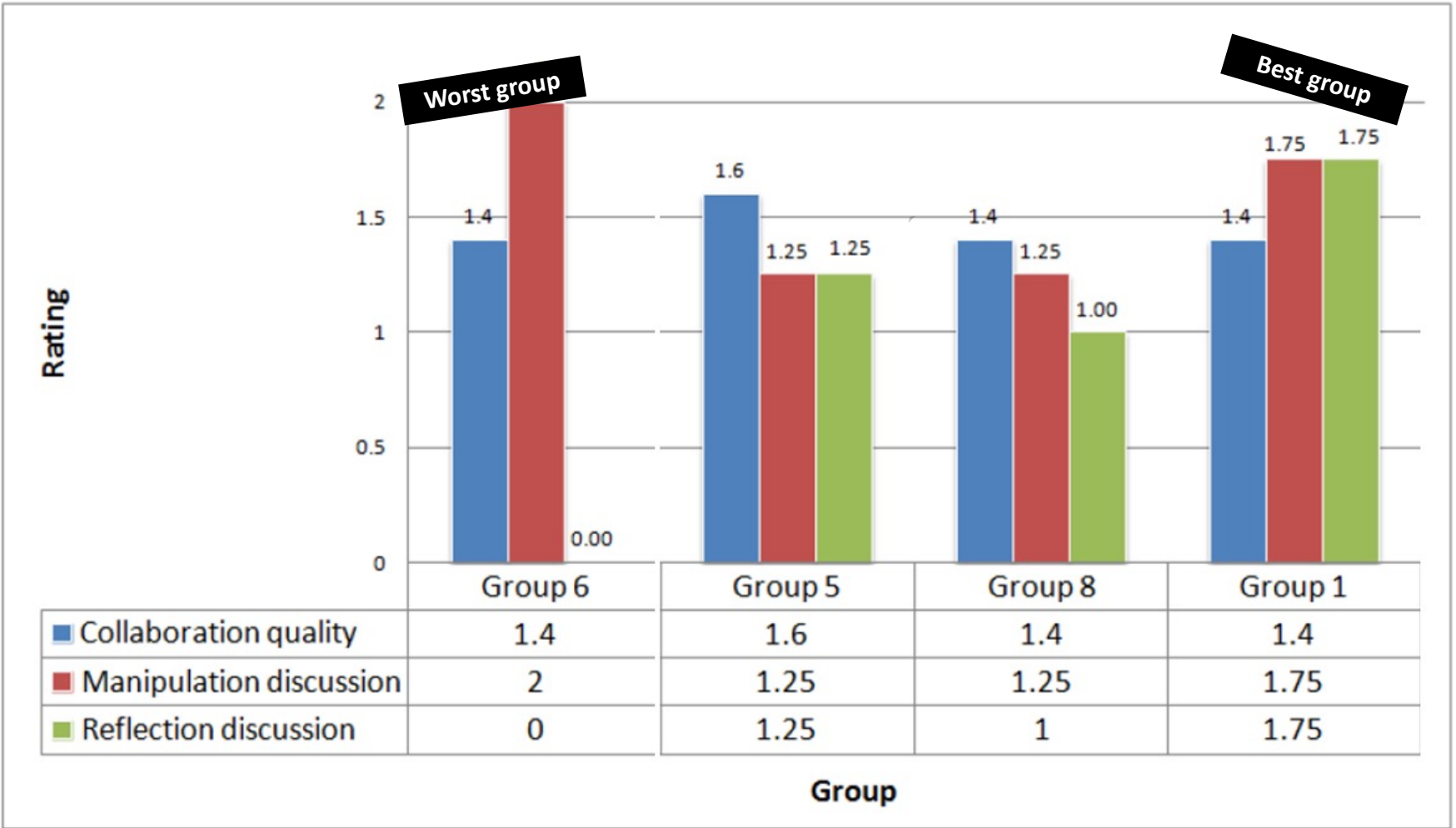


mean = 7.84 vs. mean = 7.43  
 $F(1,14) = .25; p > .05$

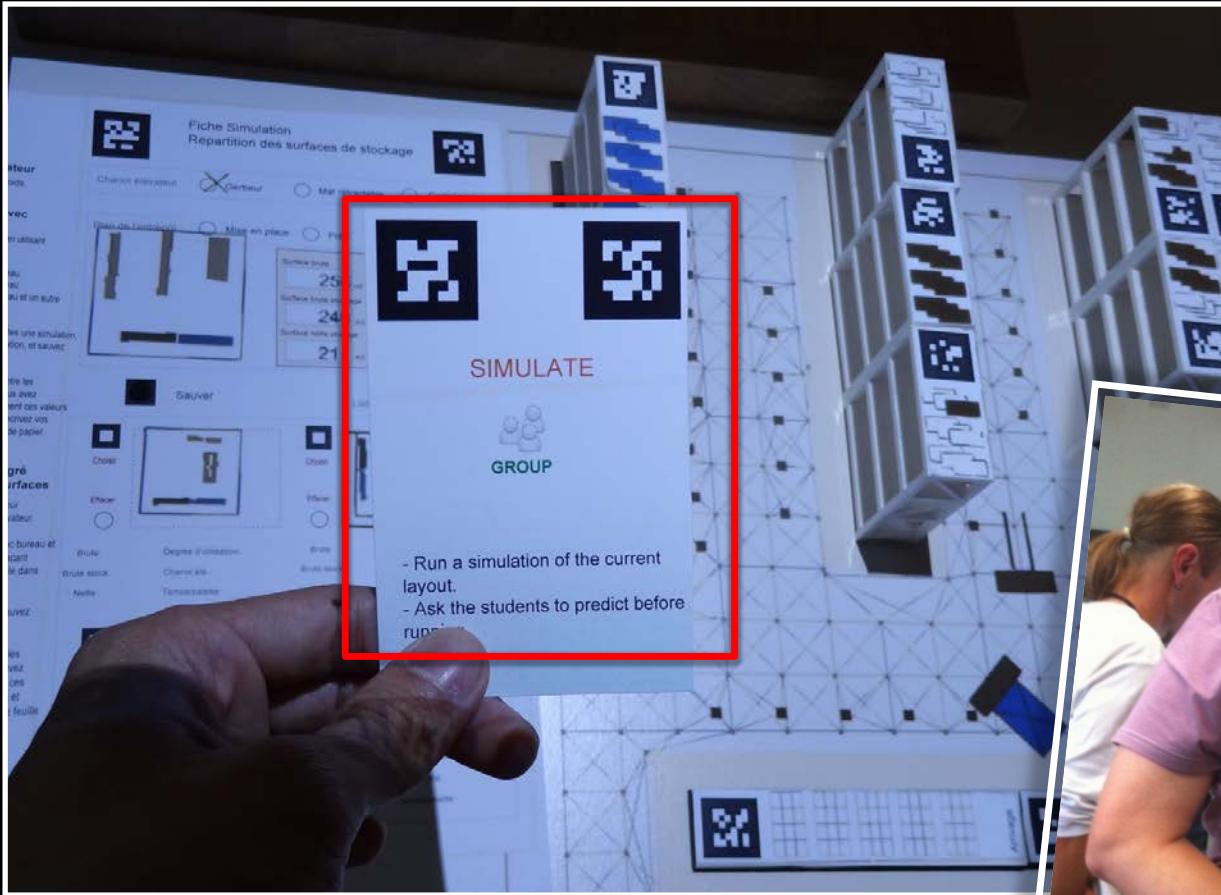
No sign. effect in  
problem-solving

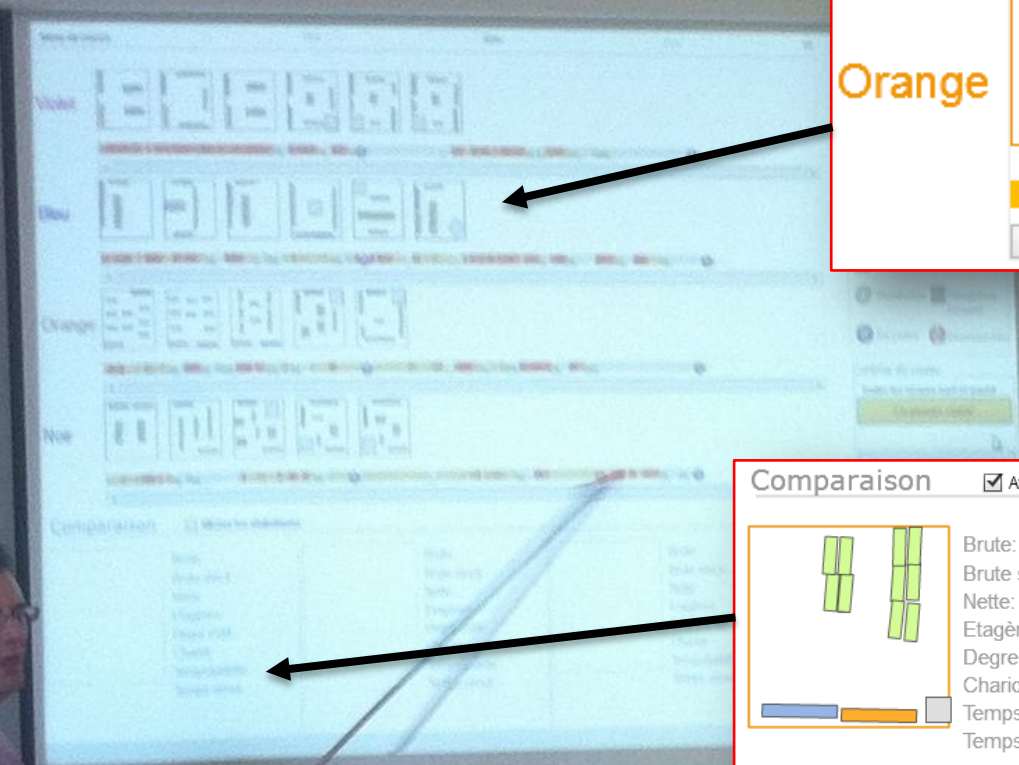


mean = 5.16 vs. mean = 5.15  
 $F(1,14) = .06, p > .05$





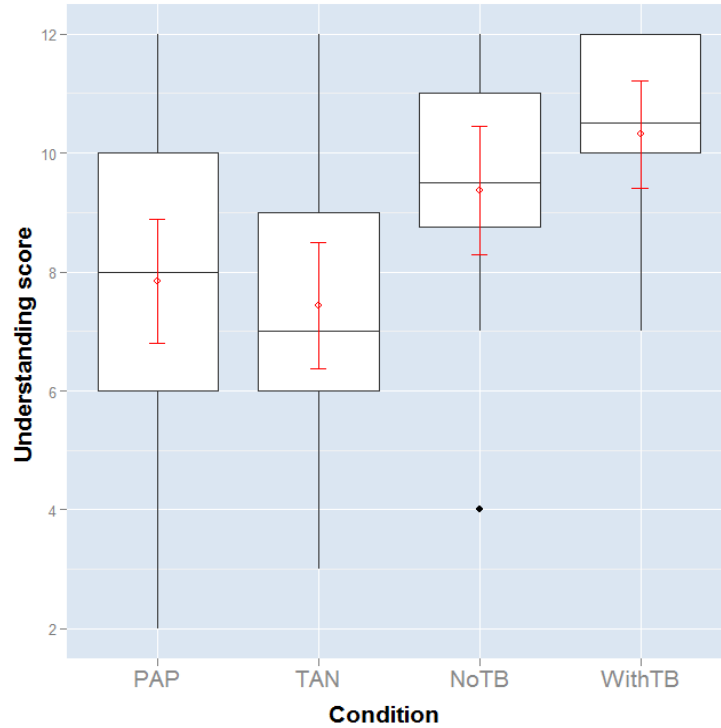




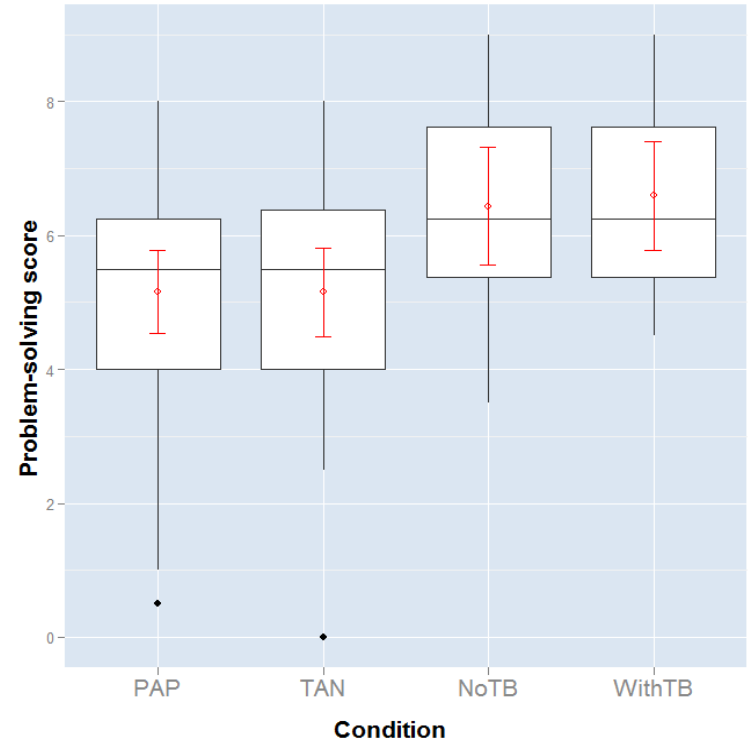
Comparaison  Afficher les statistiques

Layout	Brute:	Brute stock.:	Nette:	Etagères:	Degré d'util.:	Chariot:	Temps/palette:	Temps simul.:
	256m2	236m2	30m2	12	12.6%	gerbeur	115s	0:13:49
	256m2	220m2	36m2	12	16.4%	gerbeur	130s	0:23:40

## Significant effect in understanding



## Significant effect in problem-solving

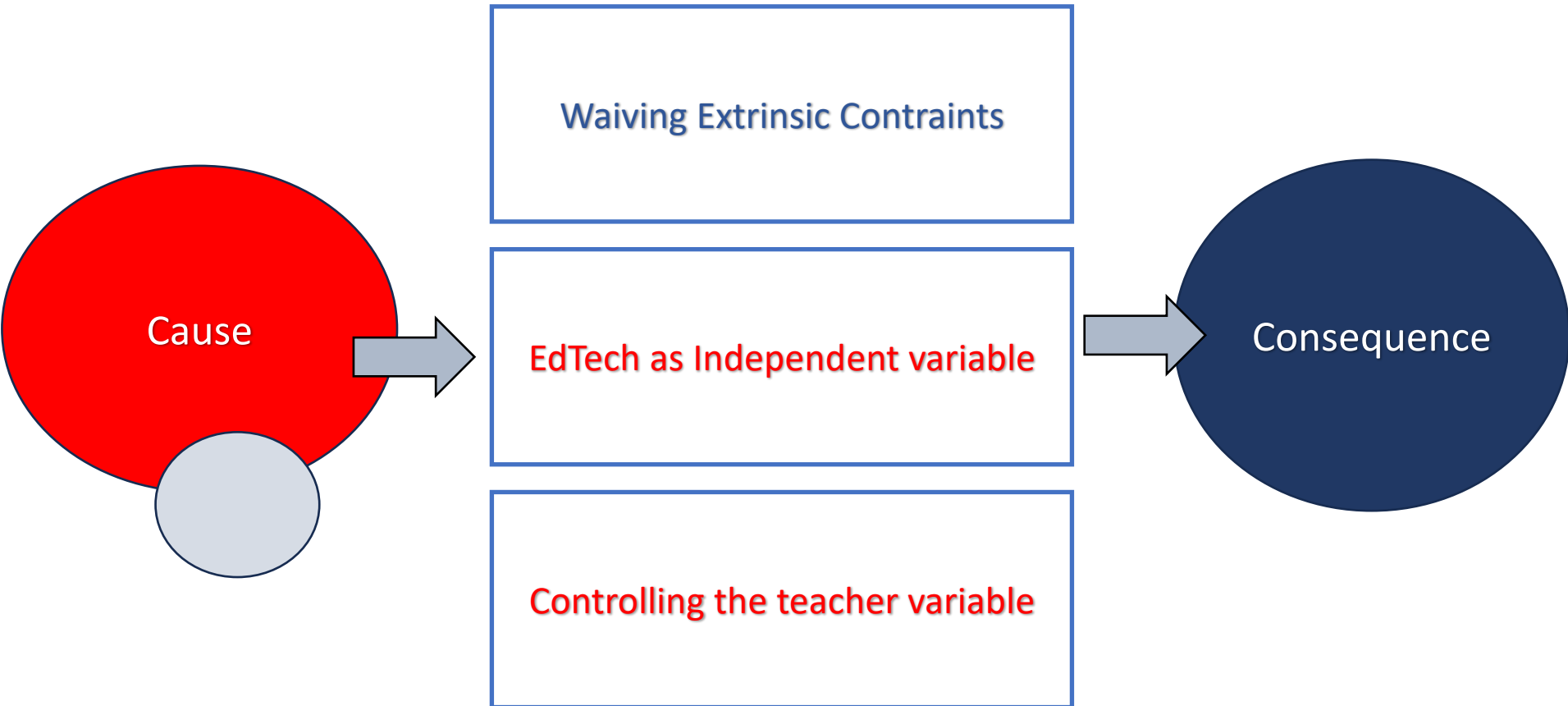


Measures	Warehouse study's conditions		Evaluation of TinkerLamp 2.0 conditions	
	Paper/pen	TinkerLamp 1.0	TinkerLamp 2.0 WithTinkerBoard	TinkerLamp 2.0 NoTinkerBoard
<i>Understanding score</i>	7.84(2.85)	7.43(2.82)	9.38(2.03)	10.31(1.70)
<i>Problem-solving score</i>	5.16(1.70)	5.15(1.78)	6.44(1.65)	6.59(1.53)

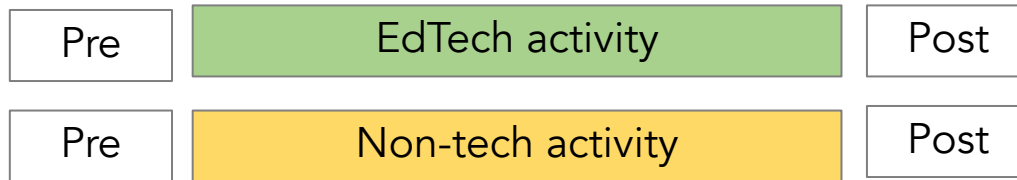
Tool-A , Teacher-Role X < Tool-A , Teacher-Role Y



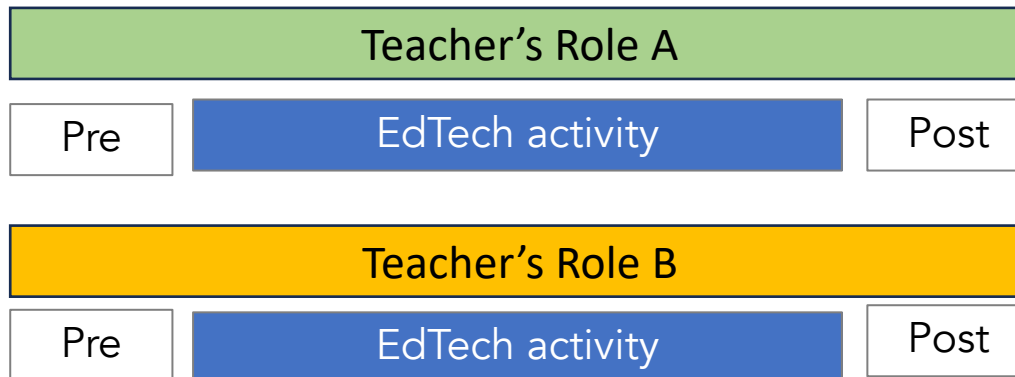
# Research methods Pitfalls



## EdTech as Independent variable



## Teacher role as Independent variable



Does the teacher has a role  
in your edTech solution?

~~From a sage on the stage~~  
~~To a guide on the side~~



25%

K12 children have difficulties

10 months

Average waiting time





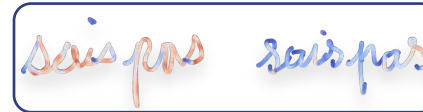
Static



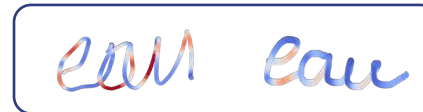
Kinematic



Pressure



Tilt

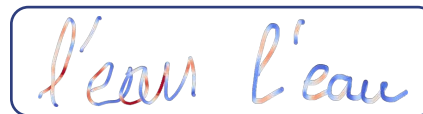


EPFL

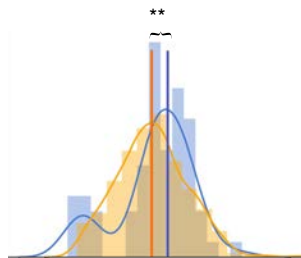
Static



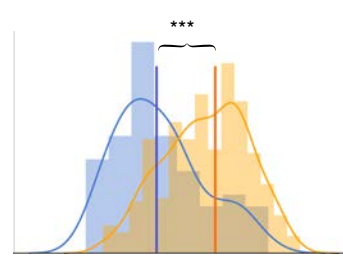
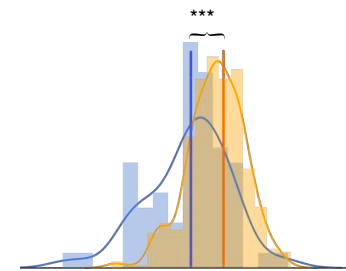
Kinematic



Pressure

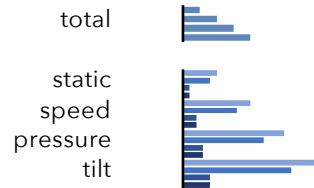
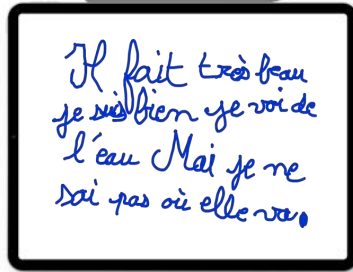


moment of handwriting

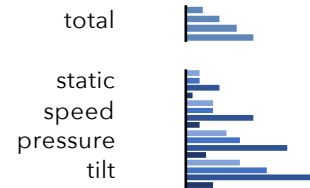
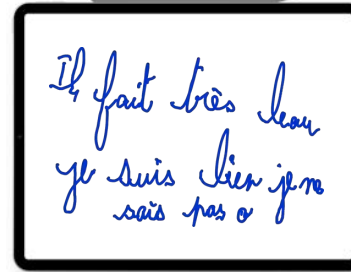
median of power spectral  
of speed frequenciesmedian of power spectral  
of speed of pressure  
change frequencies

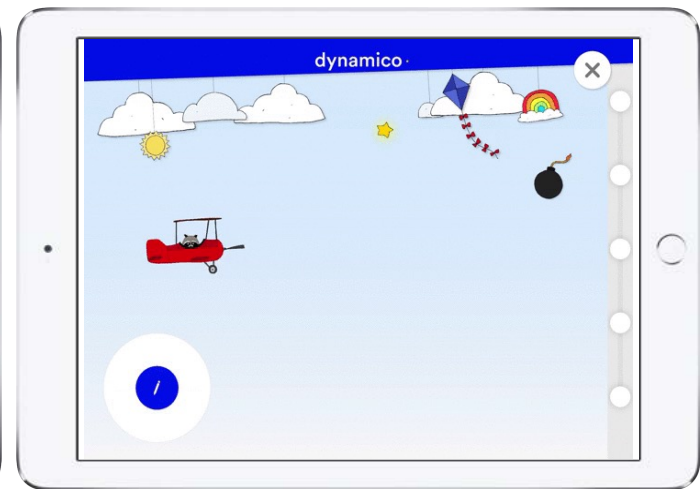
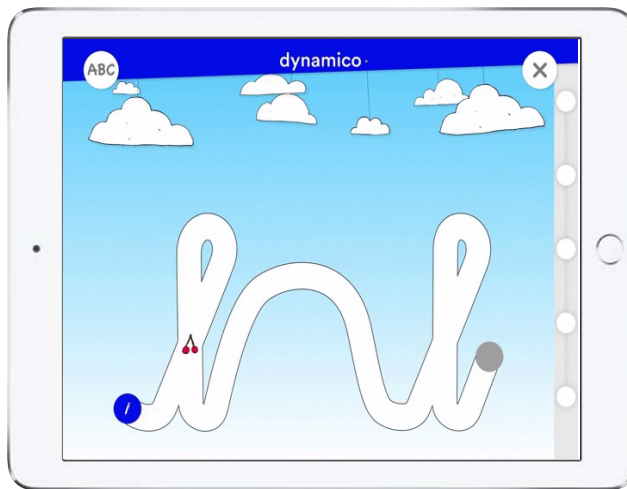
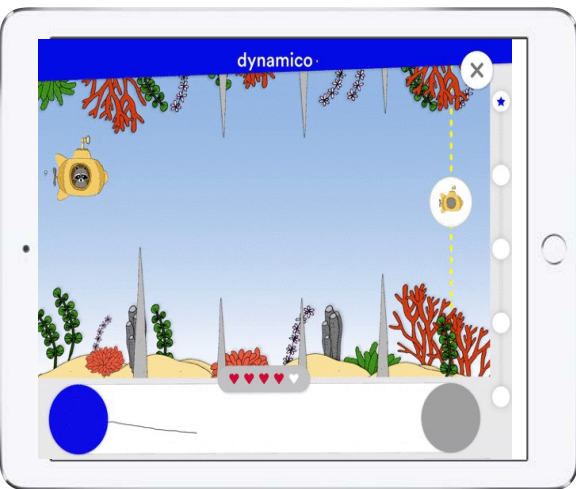


Patrick  
5 years old



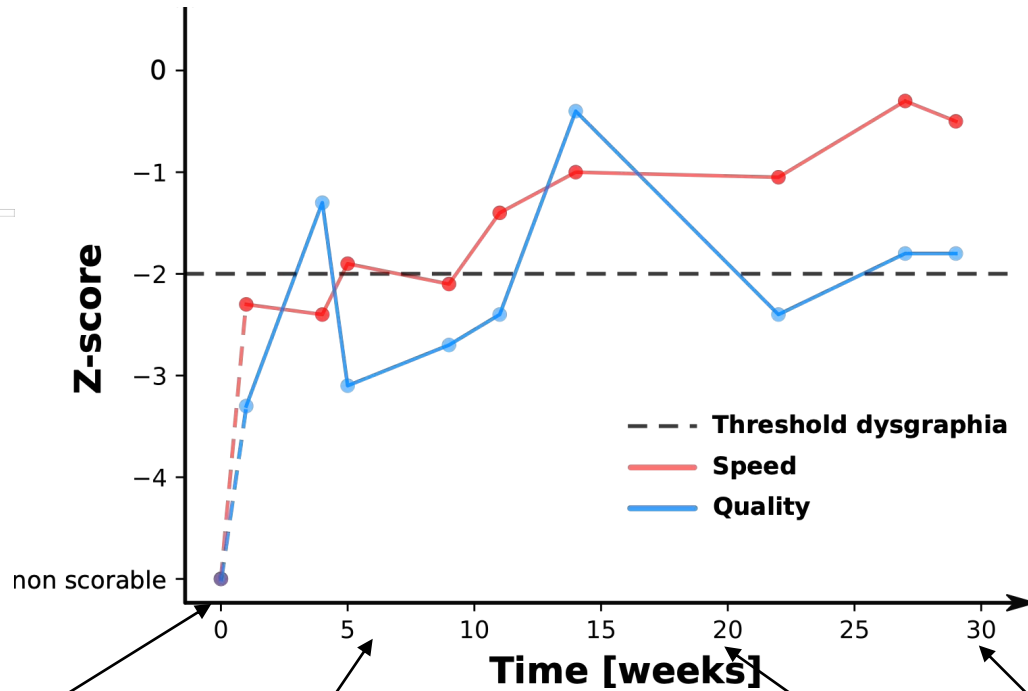
Julie  
6 years old





Personalized handwriting improvement games





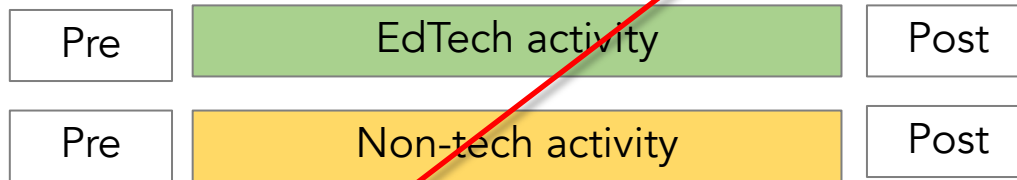
il fait très beau  
 je suis bien  
 mais j'en sais pas  
 où elle va

il fait très beau  
 je suis bien  
 je vois de l'eau  
 mais je ne sais pas  
 où elle va  
 l'eau venait sur  
 les côtés

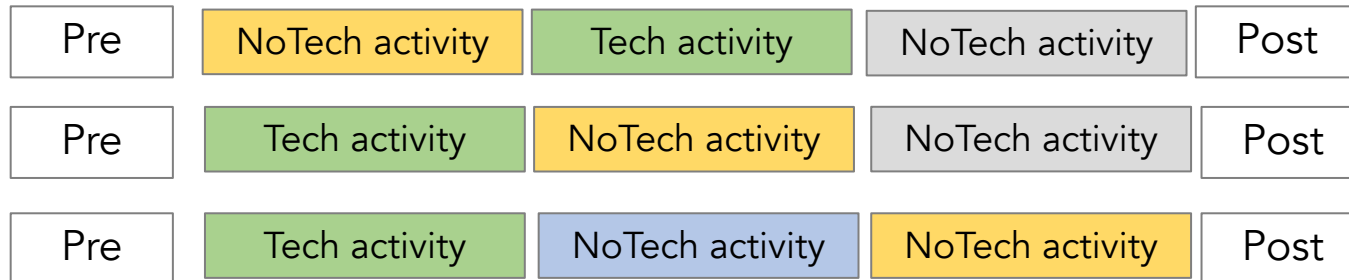
il fait très beau  
 je suis bien  
 je vois de l'eau  
 mais je ne sais pas  
 où elle va  
 l'eau venait sur les côtés, une grande  
 fontaine. Des enfants étaient près

il fait très beau  
 je suis bien  
 je vois de l'eau  
 mais je ne sais pas  
 où elle va  
 l'eau venait sur les côtés, avec une grande  
 fontaine. Des enfants étaient près de moi. Le plus  
 petit, bien

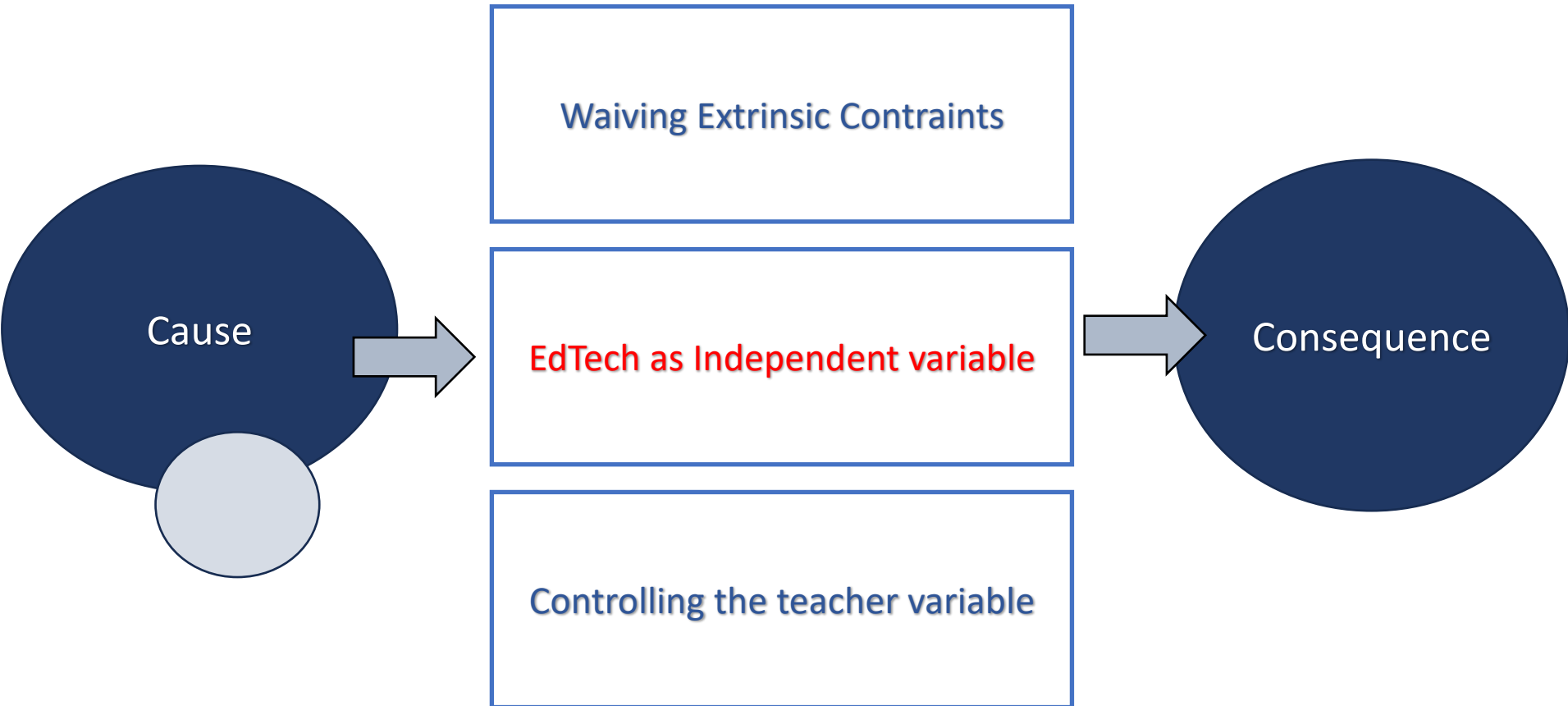
Can you prove it is effective ?



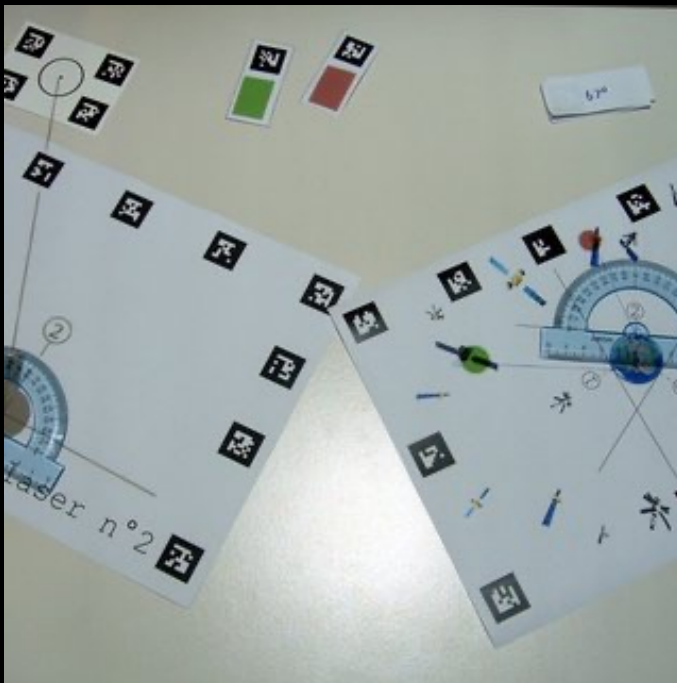
*Learning activities*    *Technology*



# Research methods Pitfalls



# Does your edTech solution integrate non-tech activities ?



Je m'appelle

Jojo, le sous-marin



Lily, la tortue



Les algues



Coco, l'hélicoptère



Attention



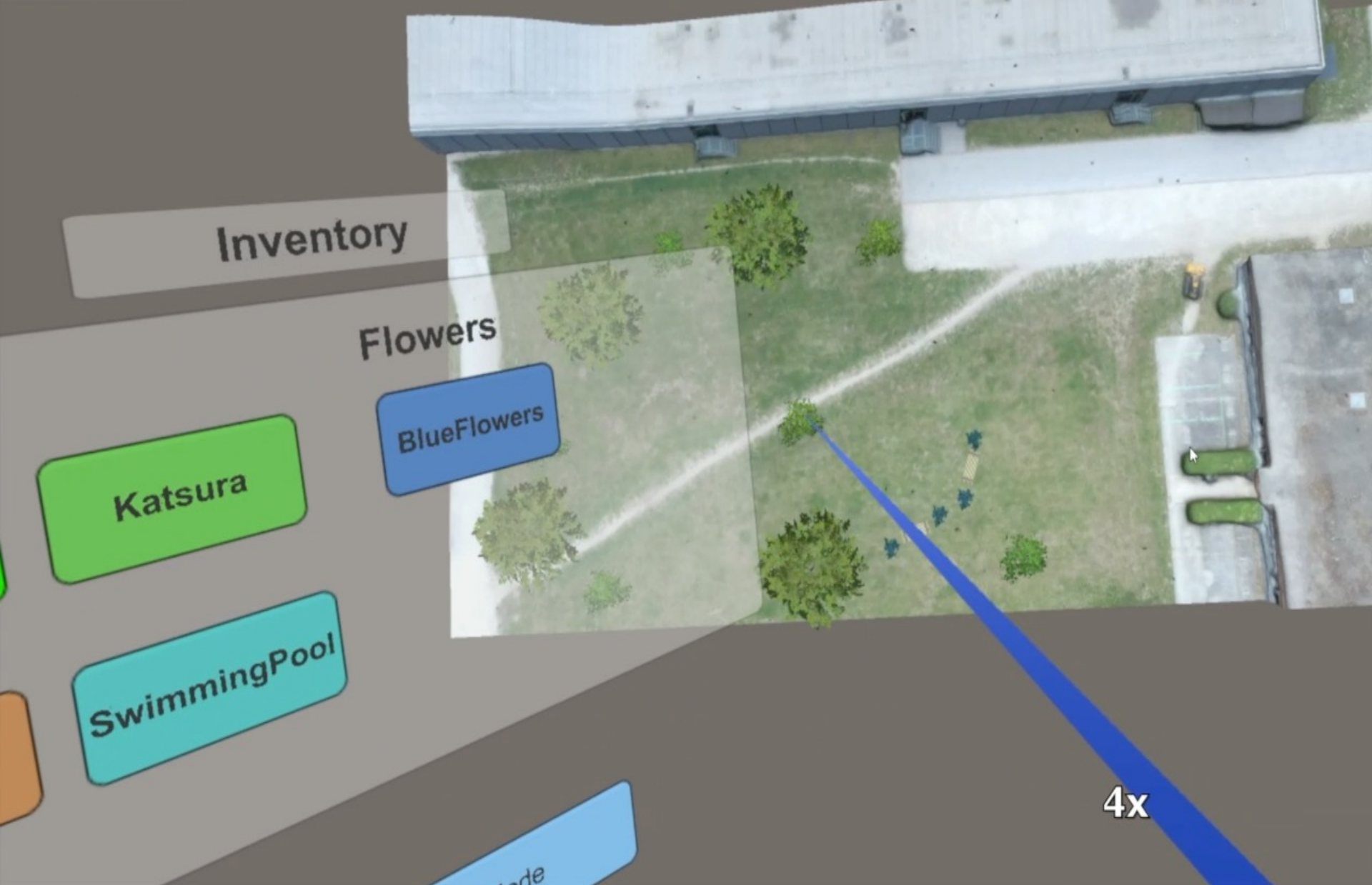
Bonus: barre l'image qui n'était pas dans le jeu

D'autres feuilles sont disponibles sur <https://dynamilis.com/>



# Training gardeners





Inventory

Flowers

Katsura

SwimmingPool

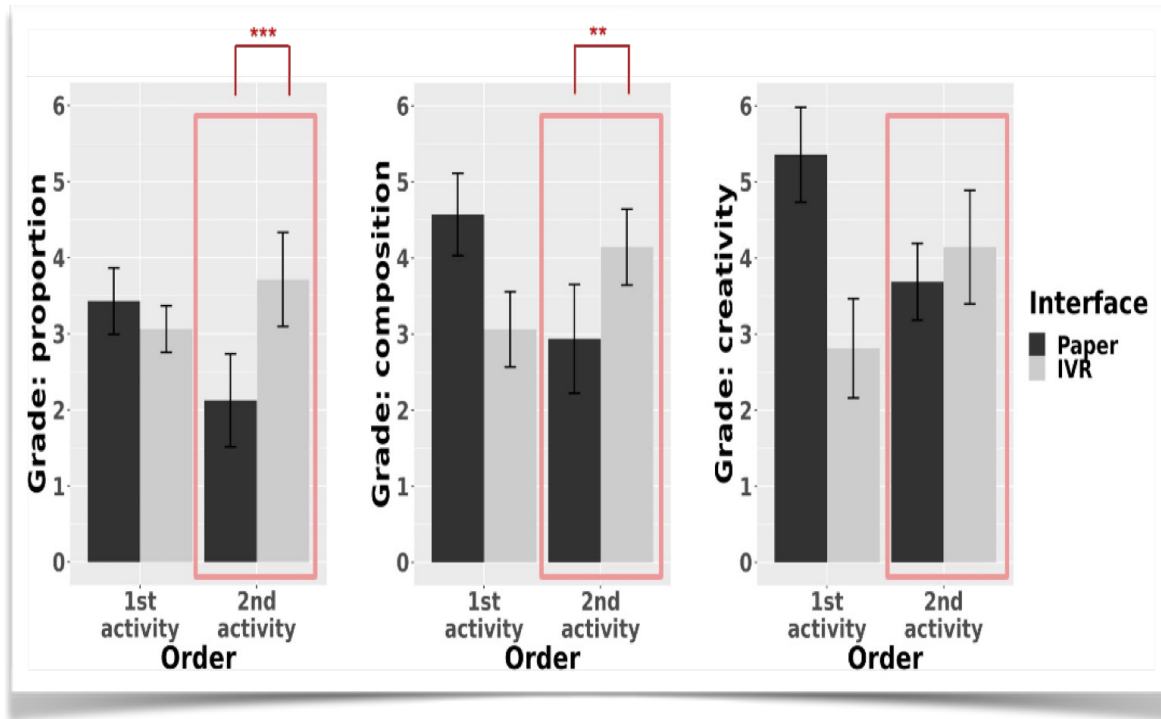
BlueFlowers

4x

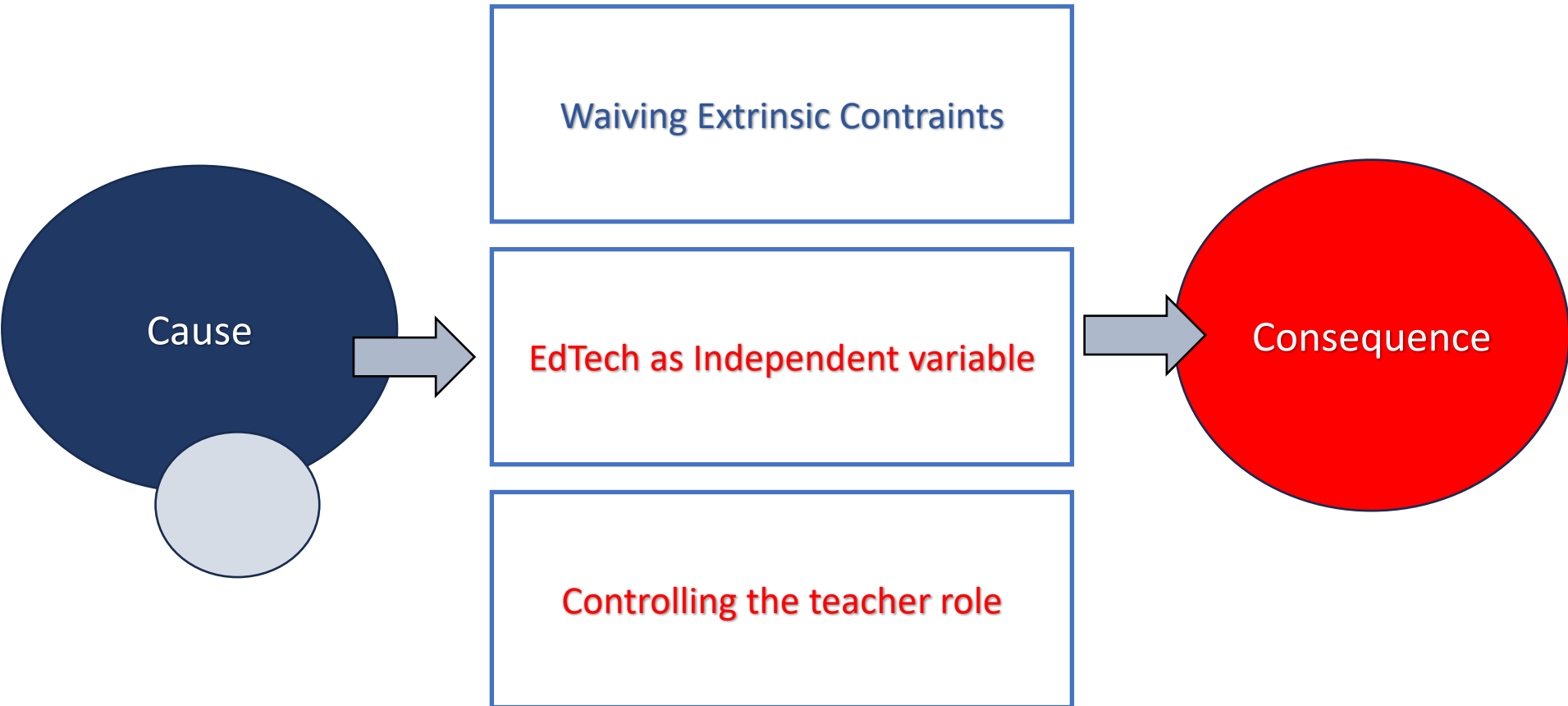




$\{a_1(\text{GardenVR}), a_2(\text{paper})\} \prec \{a_1(\text{paper}), a_2(\text{gardenVR})\}$



# Research methods Pitfalls





# Physics 101

assistant

works



waits



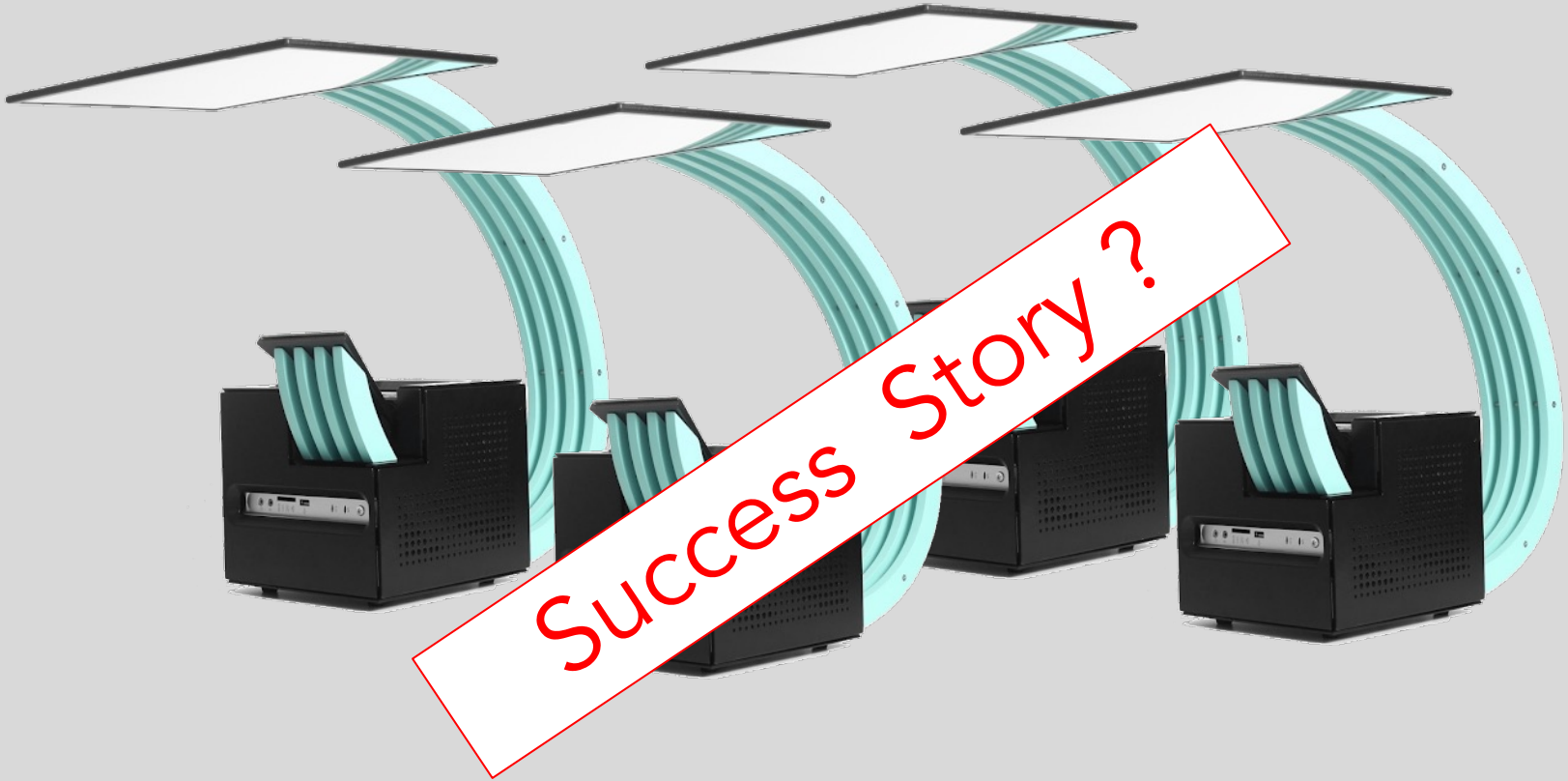




Success Story ?

"While Waiting Productivity" LOSS : 62% → 6%





# Our experiments often waive extrinsic (micro) constraints

## Intrinsic constraints:

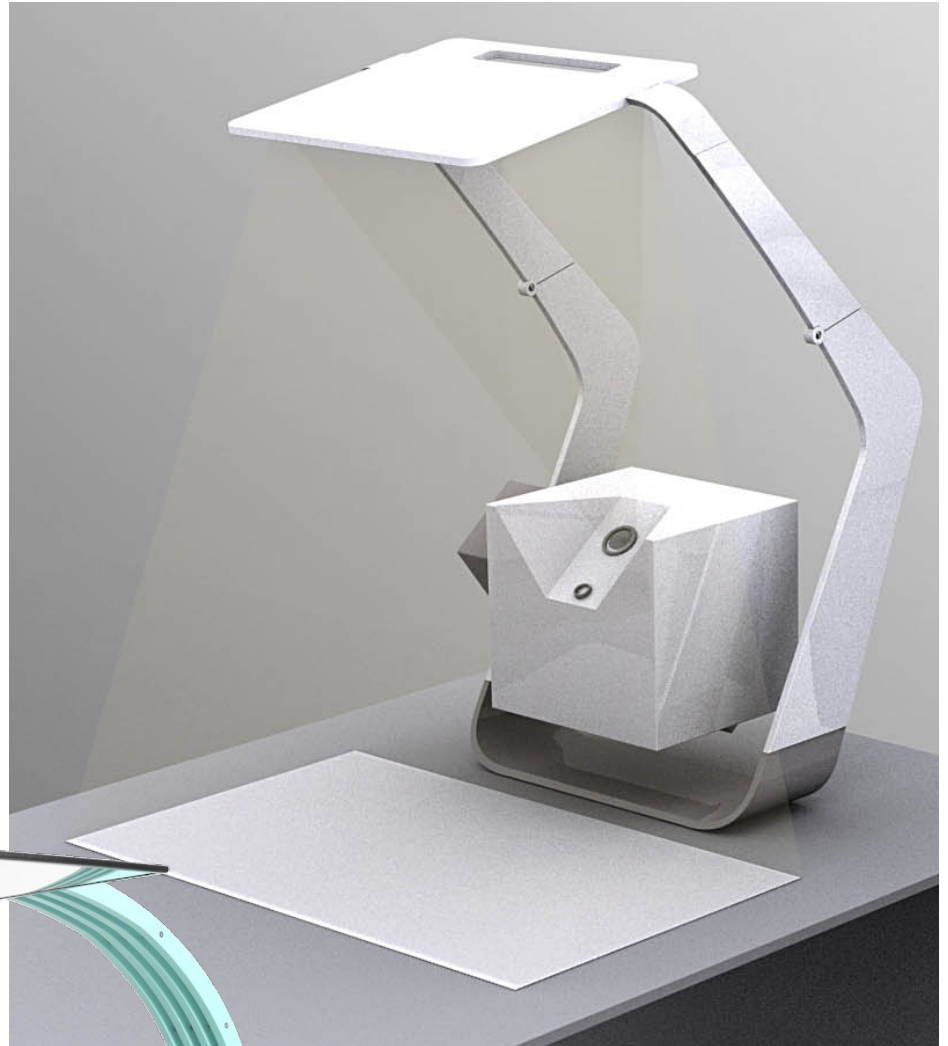
- Who
- What
- How

## Extrinsic constraints:

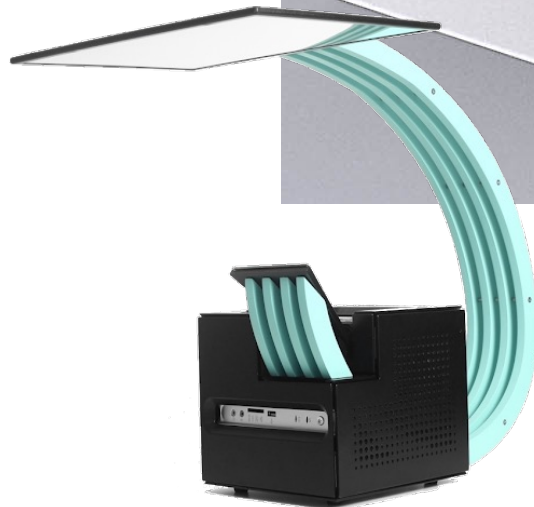
- Teacher's time
- Learners' time
- Motivation
- Grades
- Disciplines
- Absences
- ...



D'Esposito & Gaillard



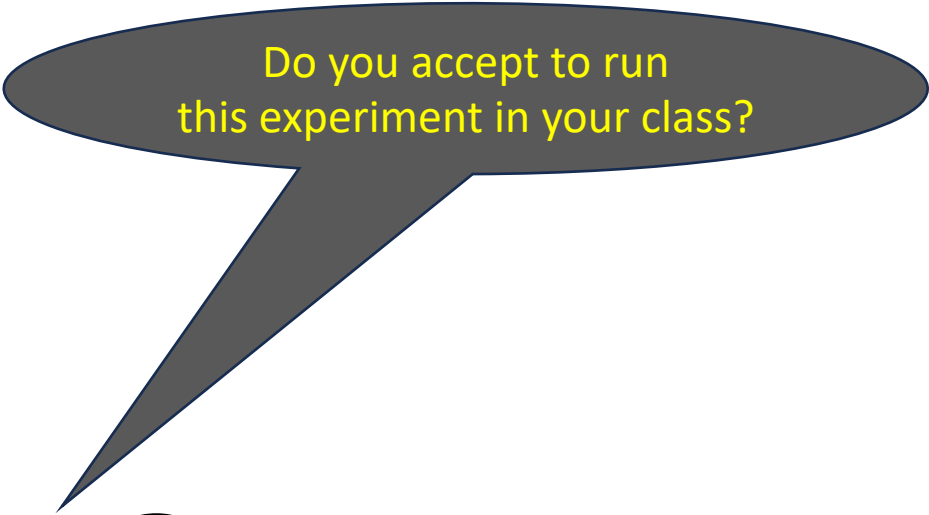
Y. Guibinelli





Does your EdTech solution  
consider extrinsic-constraints?

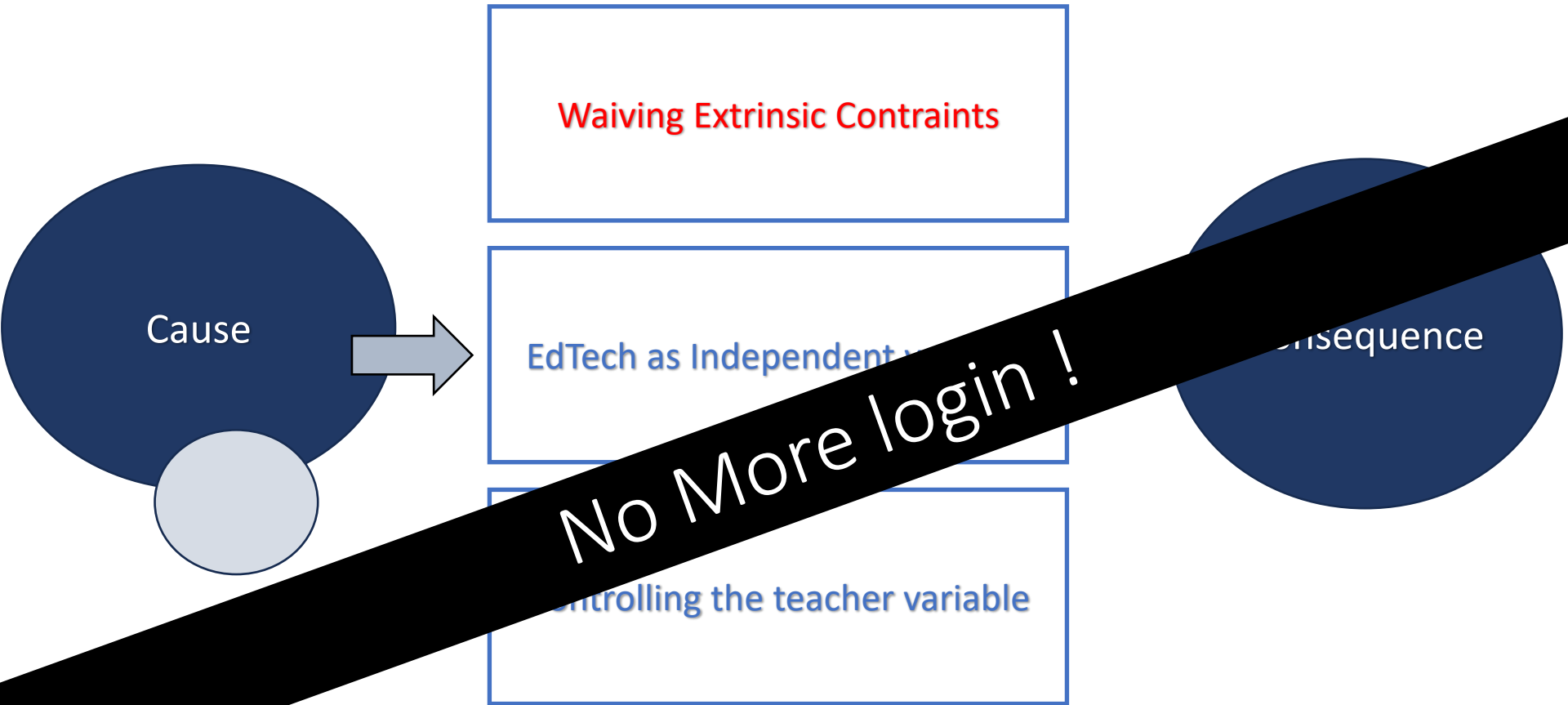
- Keeping control
- Producing grades
- Leaving traces
- Handling late comers
- ...



Do you accept to run  
this experiment in your class?

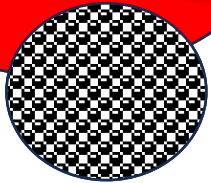
**R**CT

# Research methods Pitfalls



# Research methods Pitfalls

The myth of intrinsic  
technology effects

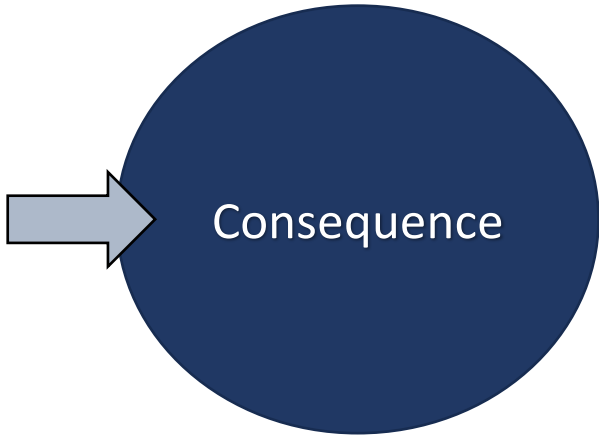


Classroom-ignorant Design

Waiving Extrinsic Constraints

EdTech as Independent variable

Controlling the teacher variable



# The 'Context'

