

# Towards Growth-Mindset Mathematics Teaching in the Netherlands

**Greg Alpar and Marloes van Hoeve**

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# Dot card number talk

- Mathematics is open
  - visual
  - problems can be solved in many ways
  - creative
- We all see mathematics differently
  - You see the world uniquely
  - Others see the world uniquely
  - A consequence: teamwork is useful

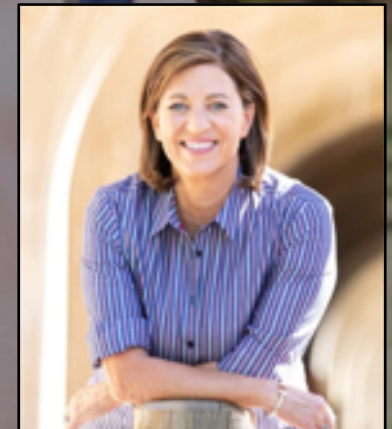
# Inspire ALL Students with Open, Creative Mindset Mathematics

TAKE A CLASS

JOIN THE REVOLUTION

38,135,360

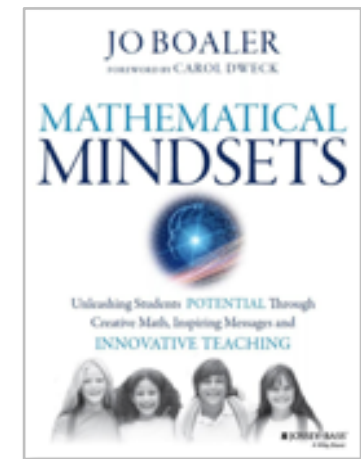
visits and counting!



Jo Boaler

# Inspiration

- Mathematical Mindsets
  - New mathematics teaching method
  - By Jo Boaler
- Our focus:
  - Secondary school
  - University





### Fixed Mindset

Intelligence and talent are fixed at birth.

### Growth Mindset

Intelligence and talent can go up or down.

## FIXED vs. GROWTH MINDSET



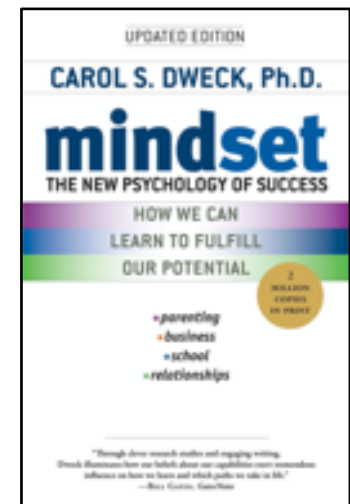


# Mindsets

- Where do your abilities come from?
- Your attitude is crucial
  - Fixed mindset (fixed intelligence, talents)
  - Growth mindset (focus on development)
- Your mindset affects
  - Learning, work, view others and yourself
- Your mindset can be changed!



Carol Dweck



# Never

discourage anyone who  
continually makes progress,  
no matter how slow.





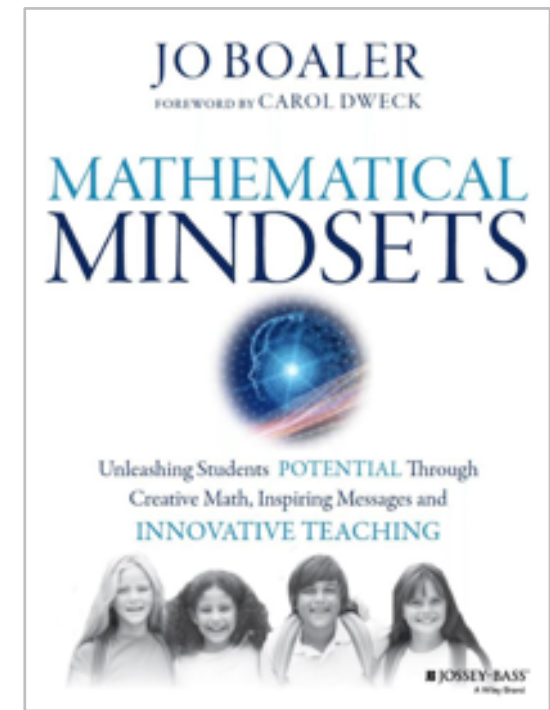
# Mathematics and growth mindset

- Mathematical Mindsets is an application and extension of Dweck's theory
- Students often have a fixed view about
  - Mathematics
  - Their own abilities within mathematics
- Our fundamental question is:

**How can we change this fixed view?**

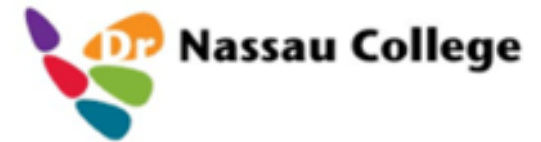
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# Research secondary schools

- 512 students
- 21 classes
- 10 schools
- 2017-2018
- Grade 7 VWO
- Grade 10 havo math A



# Four interventions

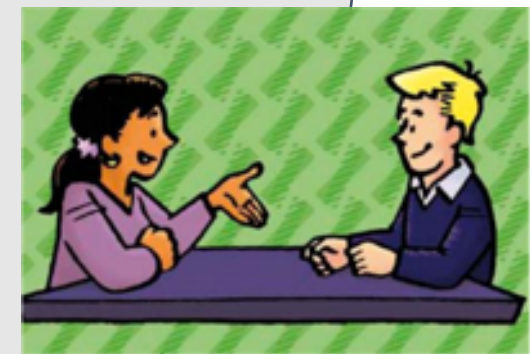
brains



Making mistakes



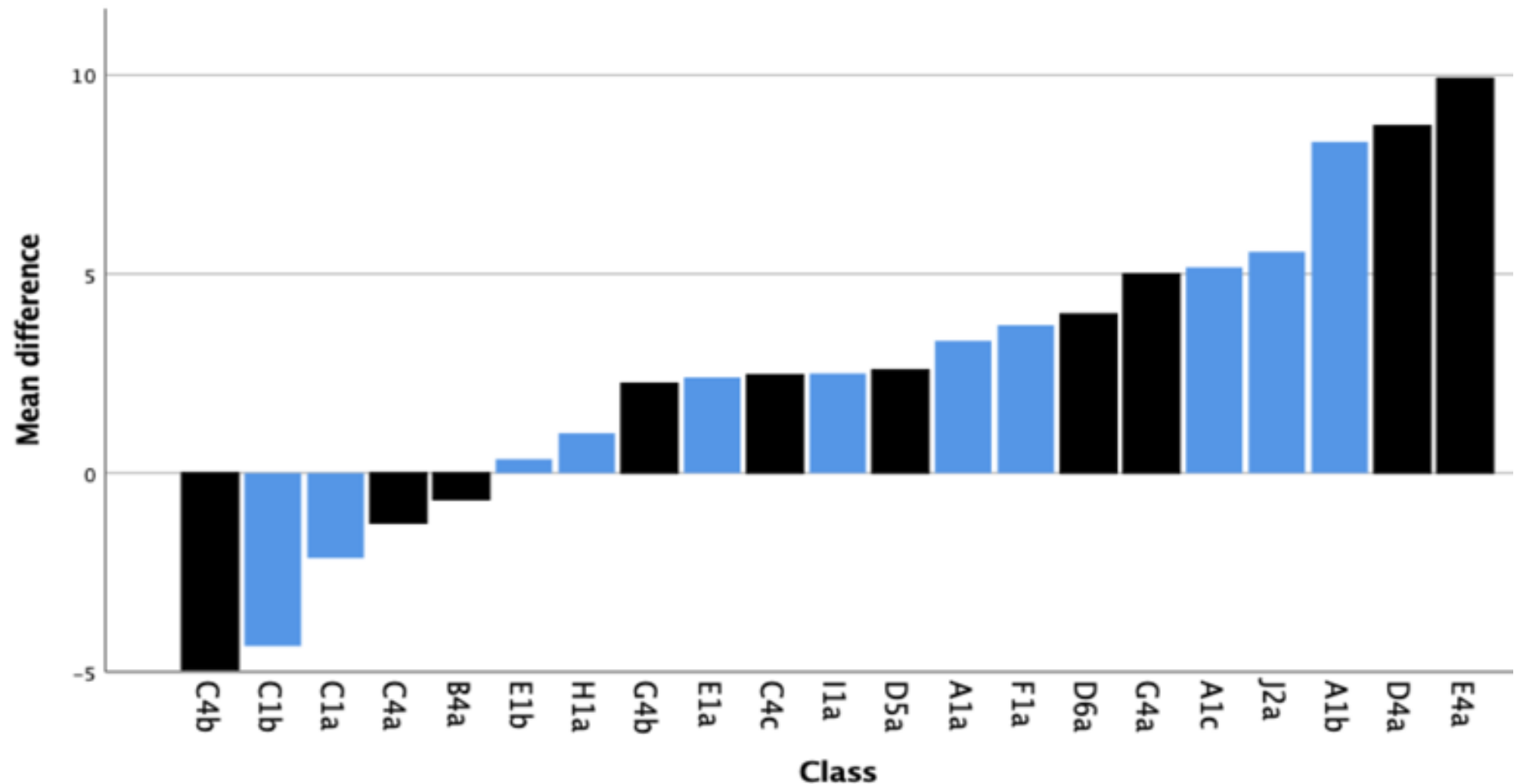
tasks



Feedback



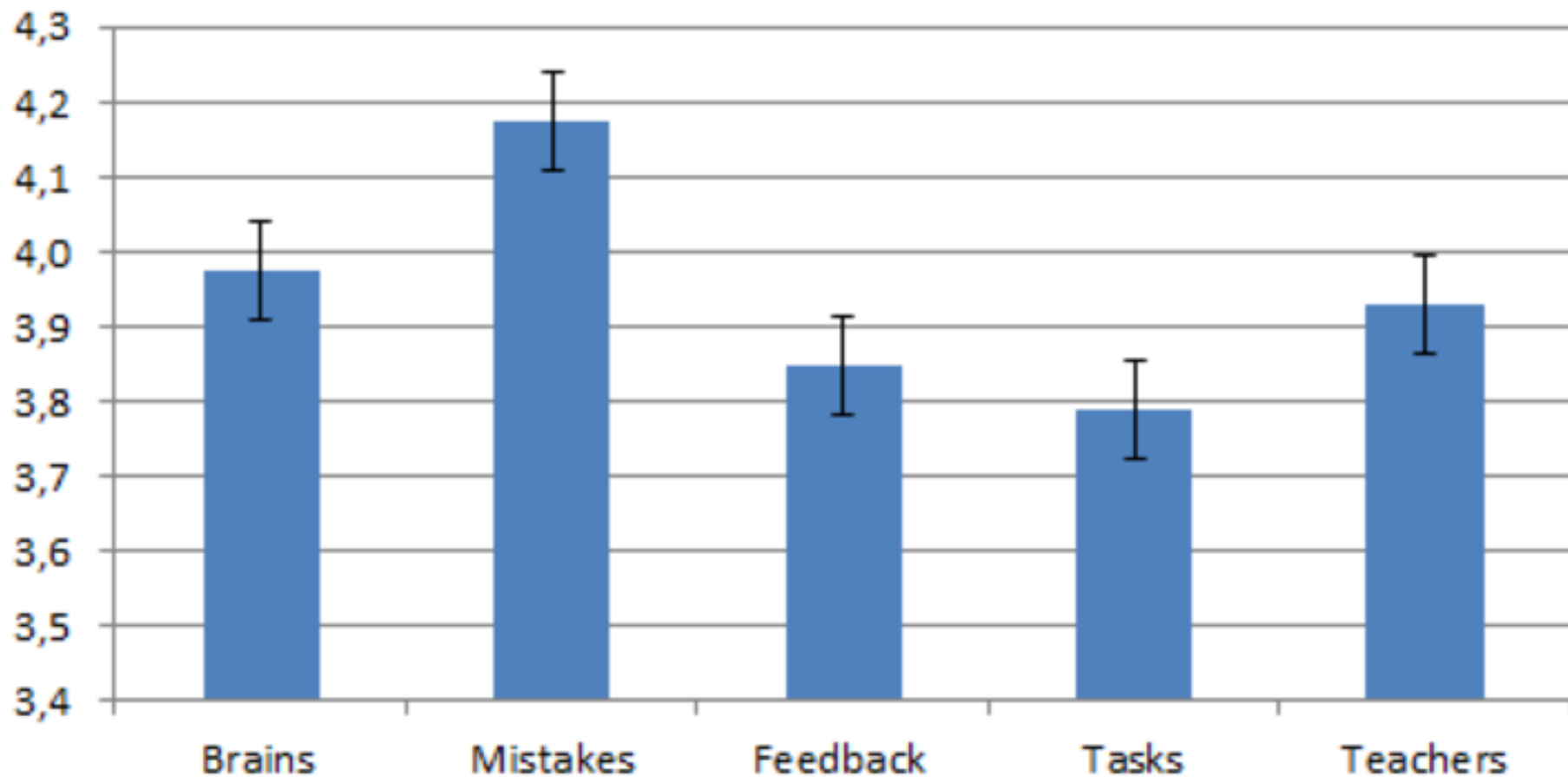
# Results mean difference mindset score before and after



# A fifth element....



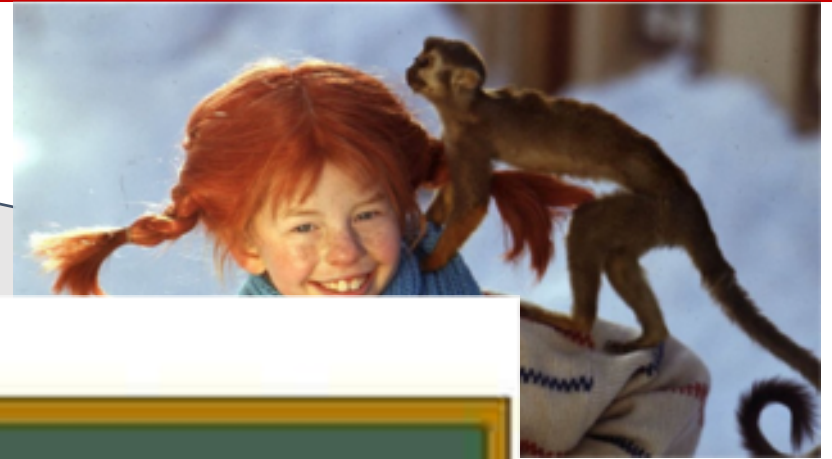
## Rating of the interventions





# FIVE interventions

brains



making mistakes



feedback



tasks



# Dweck: **mindset** revisited

- Growth mindset is not a goal in itself
- Everyone has both mindsets
- It is our challenge as teachers to investigate our own mindsets, and how we handle our fixed mindset
- In doing this we set an example for our students

**REVISITED**

# Brains..what do you belief?

- Your brain works as a muscle, the more and better you train your brain the stronger and more helpful it becomes



How you view yourself and the mistakes you make...also as an example for the students



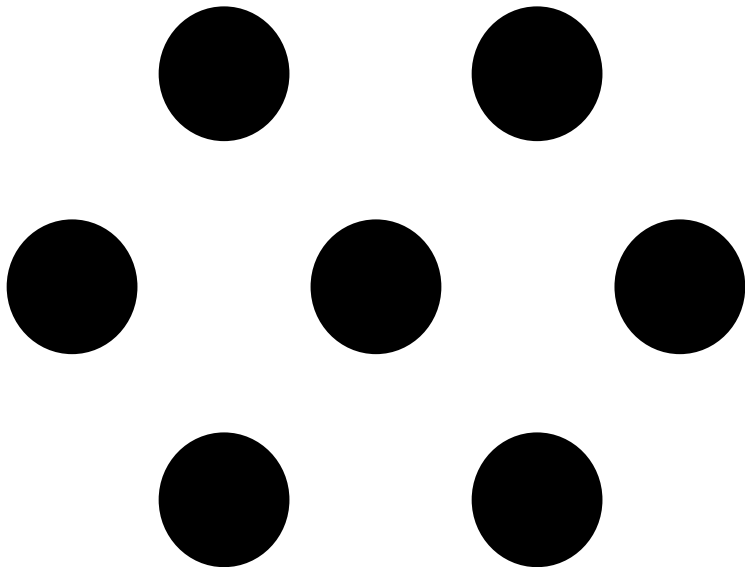
# Feedback and words

- Feedback: on process not on characteristics
- The use of words like 'but', 'never', 'actually', 'always', 'for a bit' and 'just' (nooit, maar, eigenlijk, even, gewoon).



# Tasks


**Opgave 1:** Zet de getallen 1 tot en met 9 zo in deze tabel dat er in elke rij, kolom en schuin dezelfde som komt te staan.



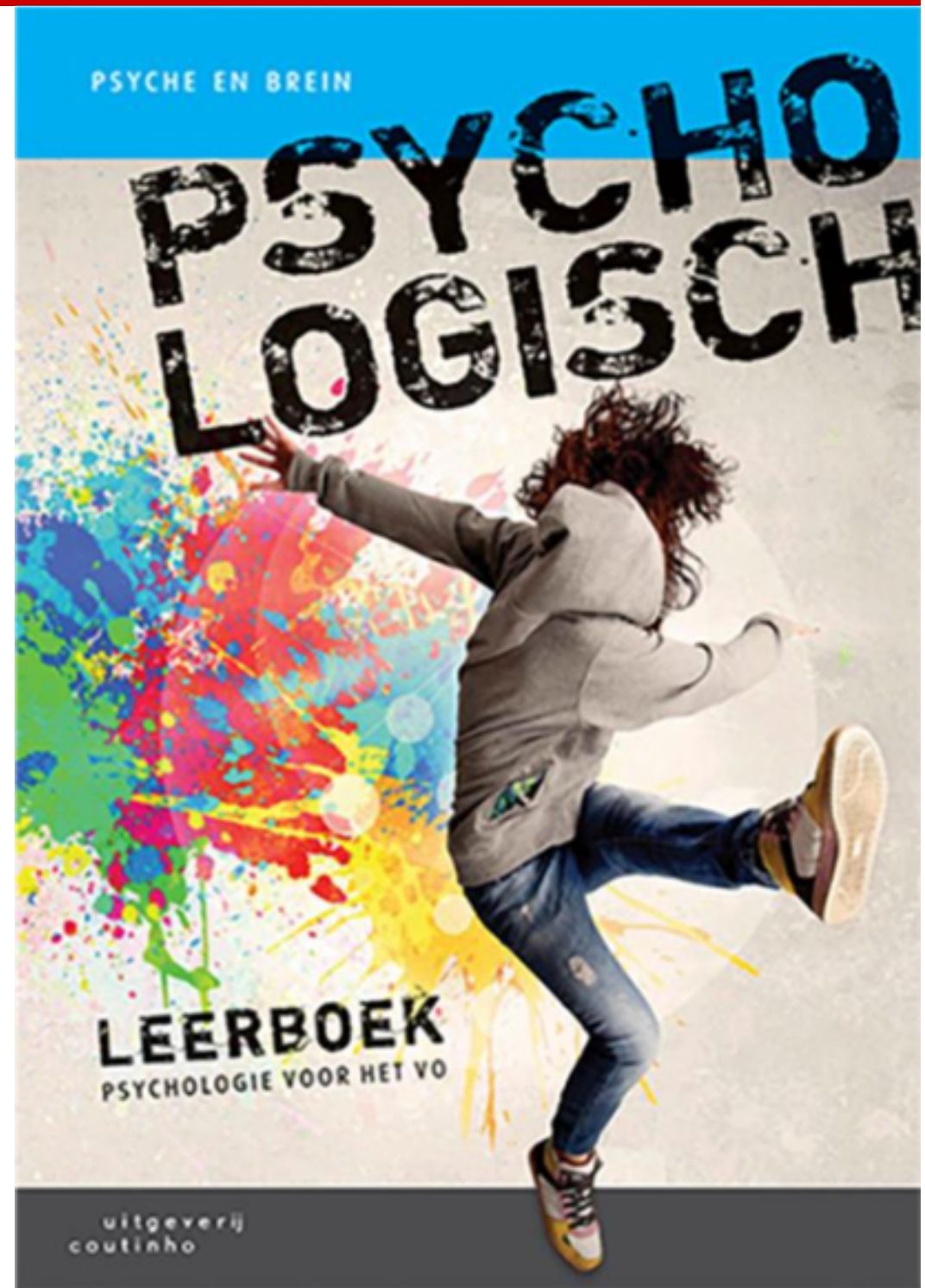
6	1	8
7	5	3
2	9	4

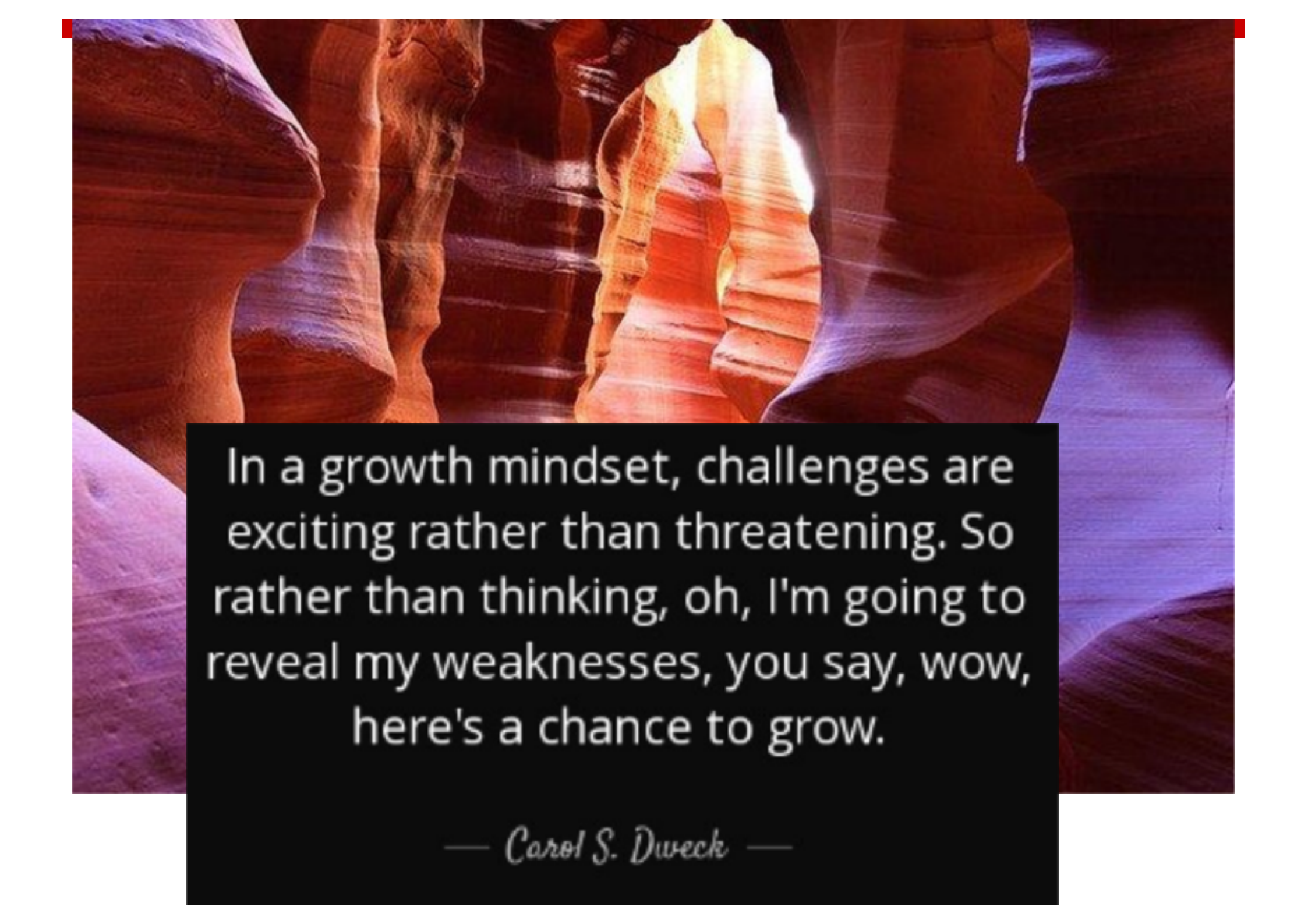


Bijzonder programma



Mindfulness in Schools Project  
[www.mindfulnessinschools.org](http://www.mindfulnessinschools.org)



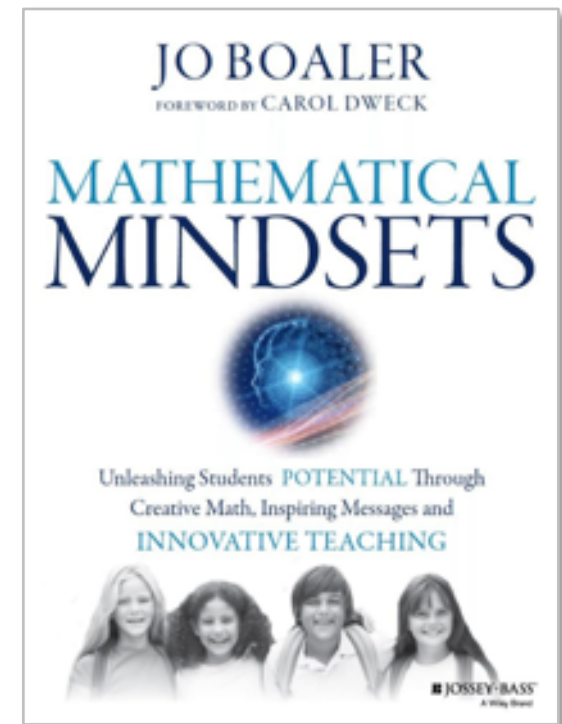


In a growth mindset, challenges are exciting rather than threatening. So rather than thinking, oh, I'm going to reveal my weaknesses, you say, wow, here's a chance to grow.

— Carol S. Dweck —

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# Research at CS departments

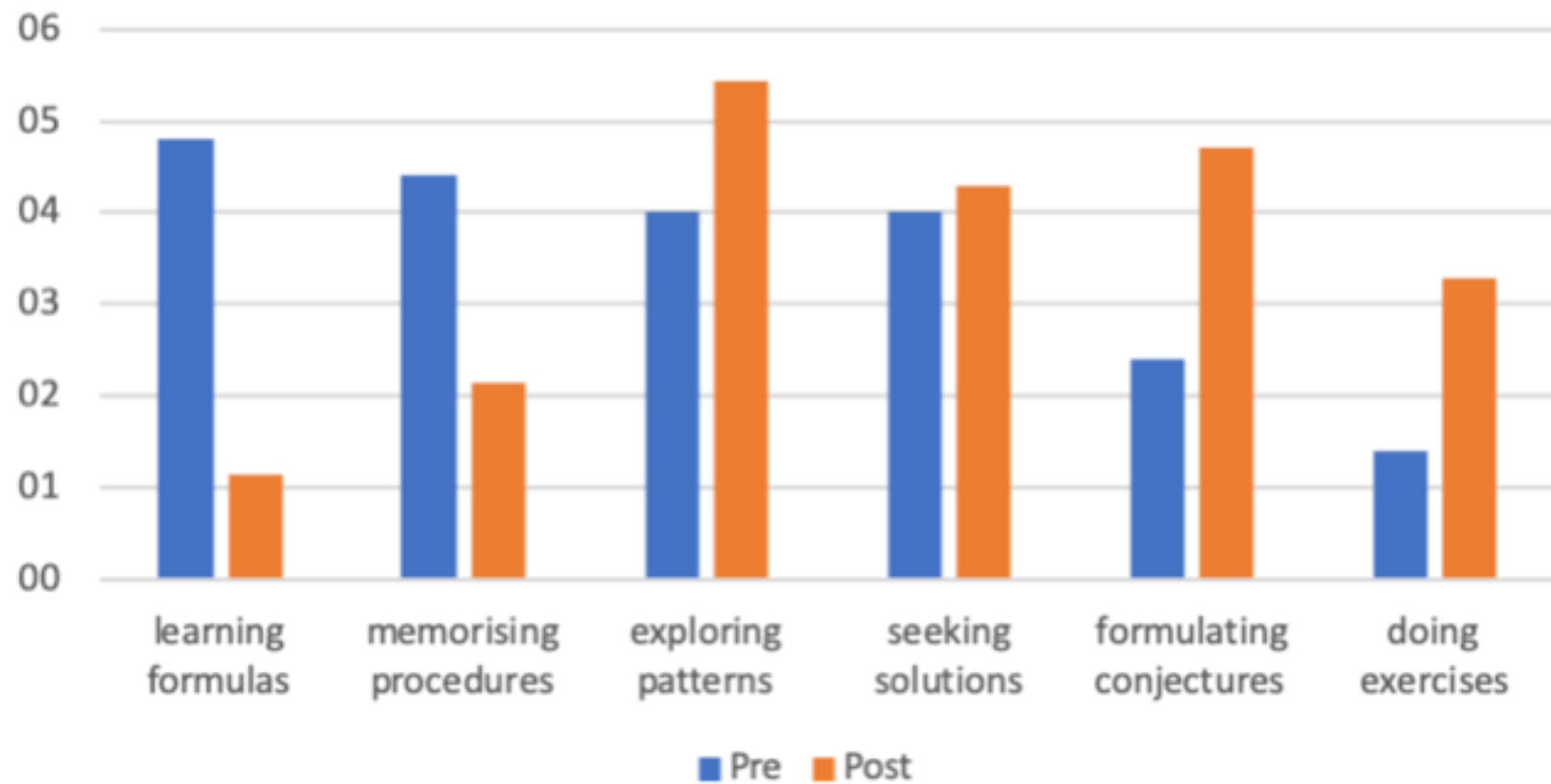
- Computer science departments
  - Radboud University – 12 students
  - Open University of the Netherlands – 12 students
- Mathematics learning intervention to
  - Change attitude
  - Build confidence



# Research about view of maths

- Seeking solutions not just memorizing procedures
- Exploring patterns not just learning formulas
- Formulating conjectures not just doing exercises

## Open Universiteit





# Results for students

- Much more positive attitude towards mathematics
- Improved self-efficacy (“I’ll be able...”)
- Appreciation of mathematical notation
- Tools to study maths (e.g., start simple, look behind formulas, role of time and practice)

# Takeaway

Mathematics (and anything!)

- ... can be learnt
  - Everybody is able to learn mathematics to high levels.
- ... can be fun
  - Everybody can enjoy exploration and understanding.
- ... can be useful
  - The world is full of mathematics – and you see it more and more.

If you ask questions without expecting a particular answer, both students and you learn the most!



Thank you!

LINQ 2019

# We're learning...

Do you have questions?

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