

AIMMS workshop

Active Learning



 Amsterdam Institute
for Molecules,
Medicines and Systems



May 2nd 2019

Jacqueline E van Muijlwijk - Koezen

AIMMS workshop

Active Learning



Ki Hadjar Dewantara

May 2nd 2019

Indonesian National Day of Education

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Medicines and Systems



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Jacqueline E van Muijlwijk - Koezen



Anneke
Danny
Elsa
Ilse
Jacqueline
Jorick
Koen
Maikel
Oscar
Ria
Stefan
Tineke
Ton
Wout

AIMMS workshop

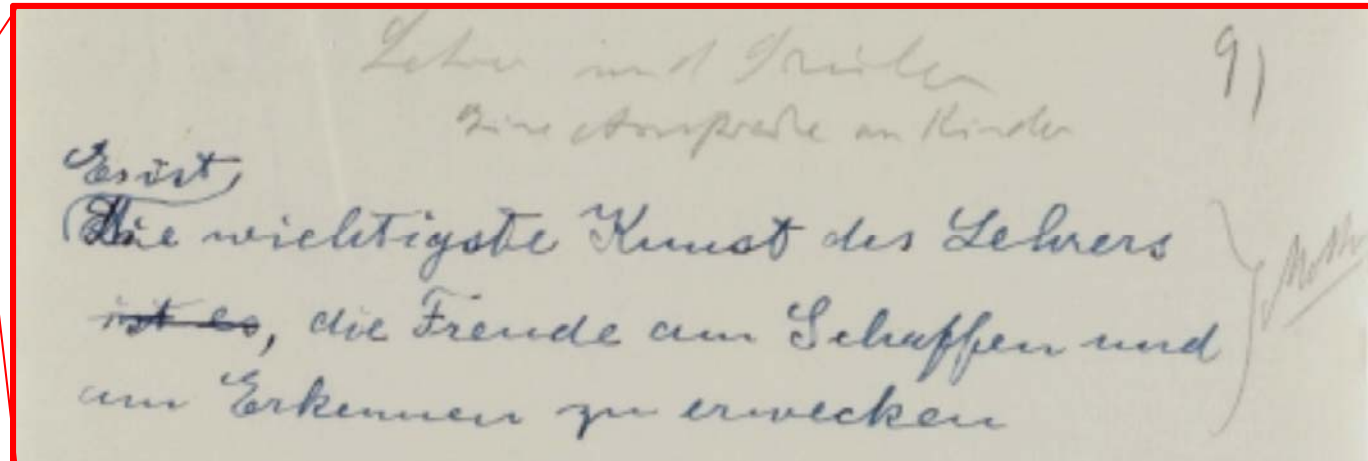
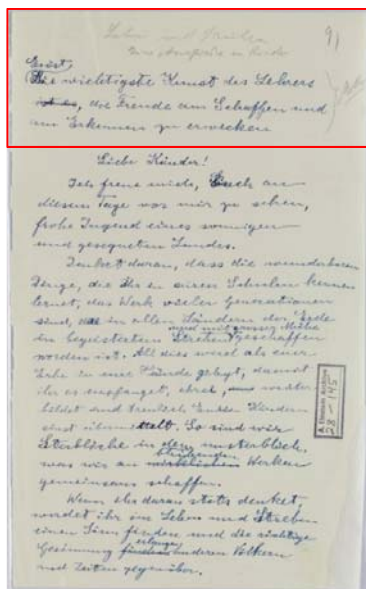
Active Learning

- Science education
- Research in teaching & learning
- Nature of Science -> education
- Role of academic teacher





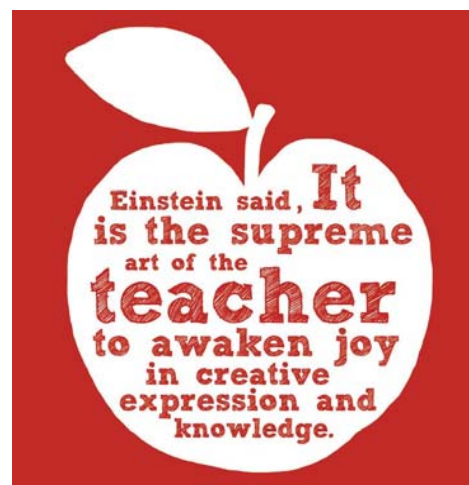
Science education

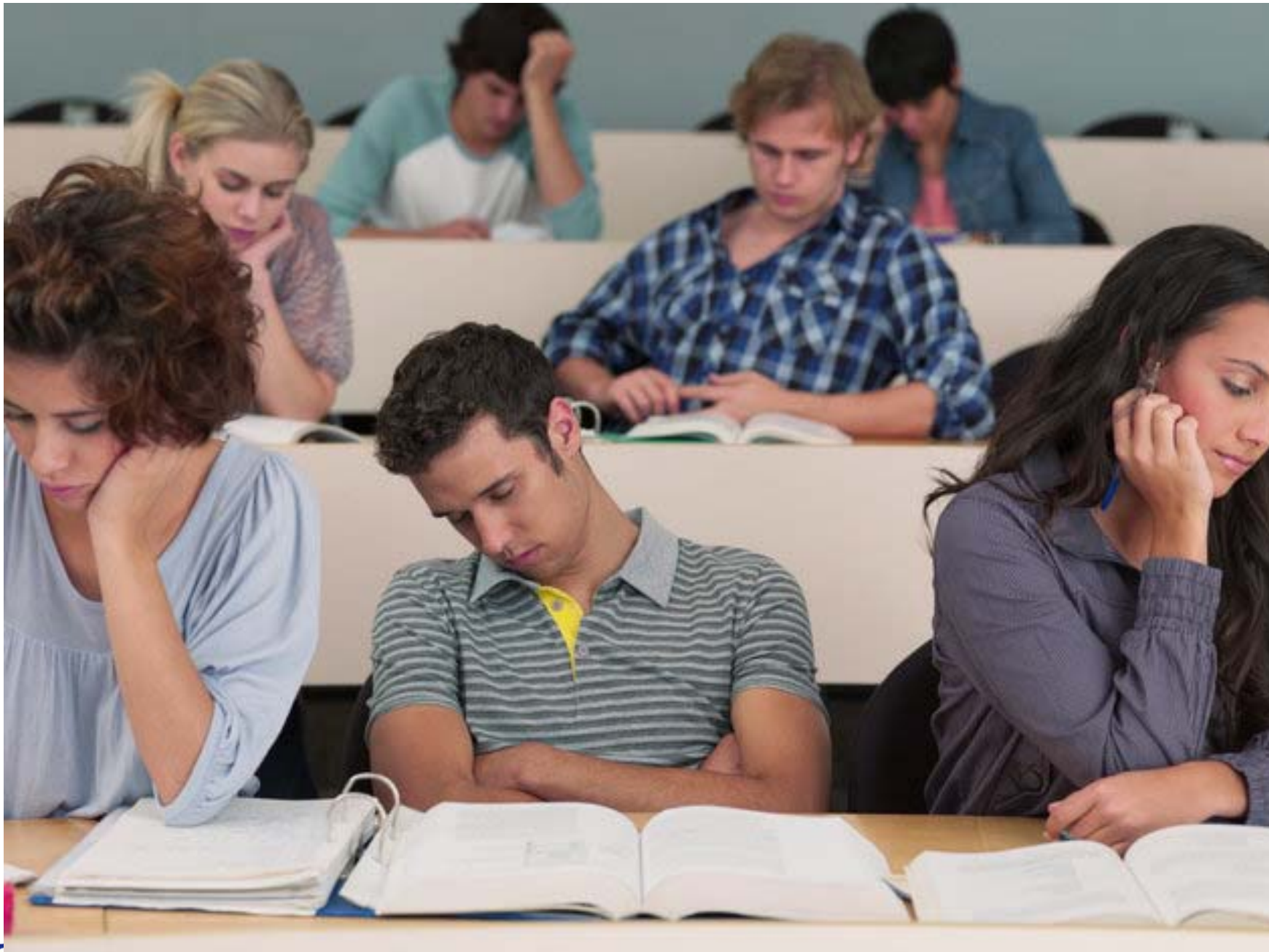


***“Es ist die wichtigste Kunst des Lehrers,
die Freude am Schaffen und am Erkennen zu wecken”***

Albert Einstein, Feb. 26, 1931

Copyright: Hebrew University of Jerusalem





Traditional lecture – teacher works (hard) / students passive



Science education - didactics

Opposite: Active learning

=

any instructional method that engages students in the learning process

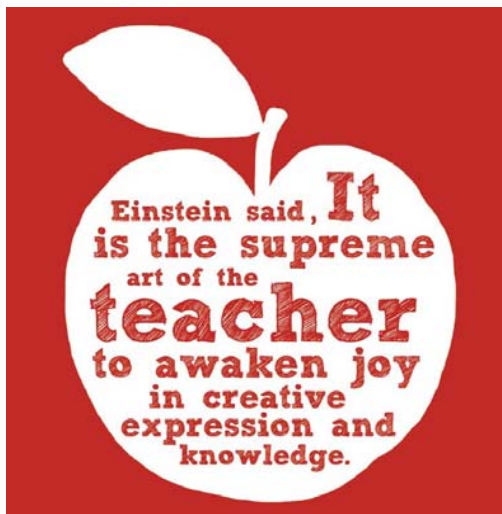
requires students to

- do meaningful learning activities
- think about what they are doing

classroom / homework / simulations /
group project / practical course



not by definition



motivation **×** active learning **=** engagement

Elizabeth Barkley, *Student Engagement Techniques: A Handbook for College Faculty*, 2009





THE SCIENCE OF TEACHING SCIENCE

Active problem-solving confers a deeper understanding of science than does a standard lecture. But some university lecturers are reluctant to change tack.

BY M. MITCHELL WALDROP

FEATURE NEWS

of their own education. “They are framing the questions themselves.”

The same is true for active learning in first-year courses, in which the teachers often do supply the questions — but frame them in a way that asks for more than a rote recitation of facts. It is the difference between

“AT THIS POINT IT IS UNETHICAL TO TEACH ANY OTHER WAY.”

Waldrop MM. *Nature* 2015; 523:272



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Innovation = improvement?

- Active learning
- Inquiry based learning
- Problem based learning
- Perspective based learning

Evidence based !



M. Meeter, 2017

Education

- Reference ?
- More variables
- Testing
-



research in teaching & learning
Qualitative & Quantitative

AIMMS workshop

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- Science education
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- **Nature of Science -> education**
- **Role of academic teacher**



NoS – Science education

Study (life) sciences:

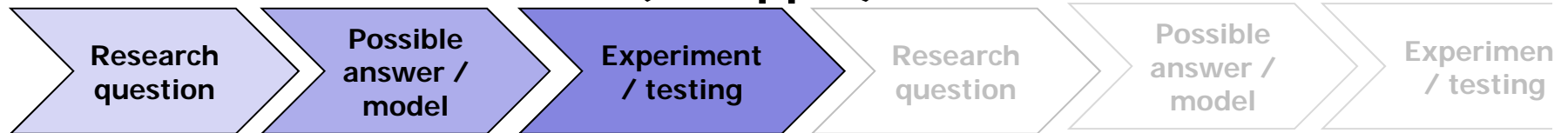
Not just knowledge about research

Also familiar with research methods

*“I dreamt of one day founding a school in which young people could learn without boredom, and would be stimulated to pose problems and discuss them; a school in which **no unwanted answers to unasked questions** would have to be listened to; in which one did not study for the sake of passing examinations”*

Popper, 1976

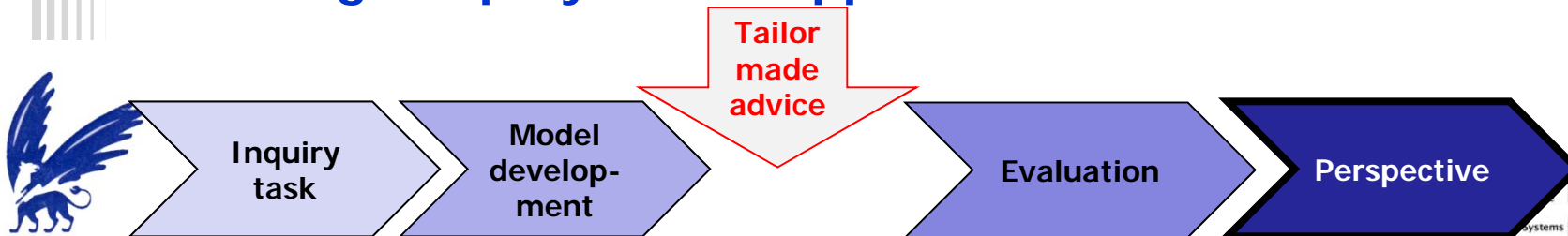
Science: research method (K Popper)



Teaching: general approach (JF Herbart)



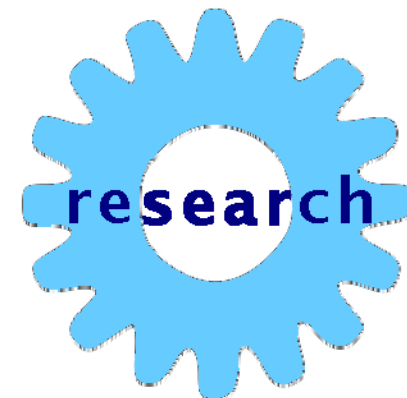
Teaching: ‘inquiry based’ approach



Academia: education - research



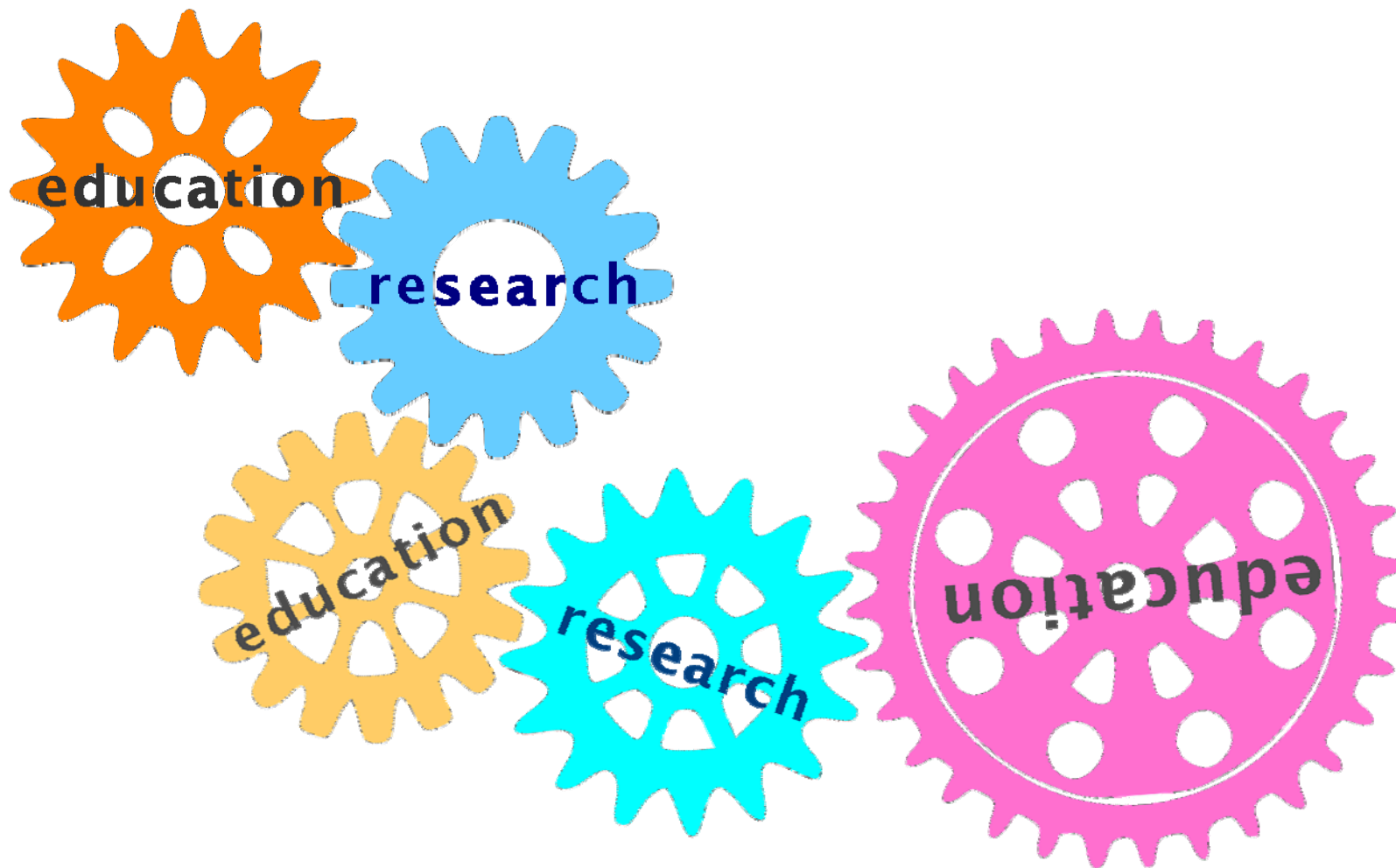
How?



In general: examples, practice



Academia: education - research



More effective: integration



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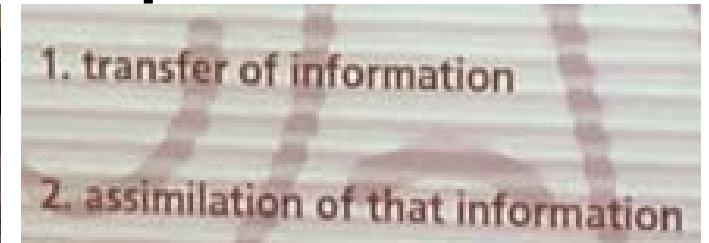
- Science education
- Research in teaching & learning
- Nature of Science -> education
- **Role of academic teacher**



VU Education Day Feb 11

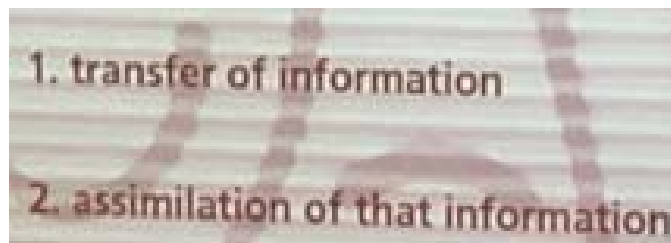
VU BETA – Innovations in H2LS

- Eric Mazur (Harvard): longtime inspiration



Role of the academic teacher

- Eric Mazur (Harvard)



- Some take-home messages

– **If teaching would just be transfer of information then:**

- All this could simply be moved online and we would lose our job
- Students would be missing: knowledge build up, assimilation of information, interaction with teacher important for this (Eric calls it the hardest step)

– **Discussion amongst students crucial**



- Recent meta-analysis confirms:

"For online and classroom instruction, the empirical evidence indicates that they are most effective when they are combined"

Psychological Bulletin 2017, 143, 565



Programme

Active learning in a theoretical course

- Introduction
- Blended learning
- Flipping the classroom
- How to blend or flip + *discussion*

Break

- Software tools for active learning + *discussion*
- 3D reasoning, VR + *discussion*

Active learning in a practical course

- Tools – Electronic labjournal + *discussion*
- Understanding – labbuddy + *discussion*
- How to – support



Drinks



Programme

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Drinks

How to change your course?

- Dare, Try
- Start with small changes
- Contact iH2LS members / mail / WN KB238
 - Discuss
 - Advice
 - Assistance with digital tools
- KnowVU Danny Scholten / Lothar Kuiper
- NT&L Thilo Kielmann
- PLC! Hanna Westbroek / Jacqueline van Muijlwijk

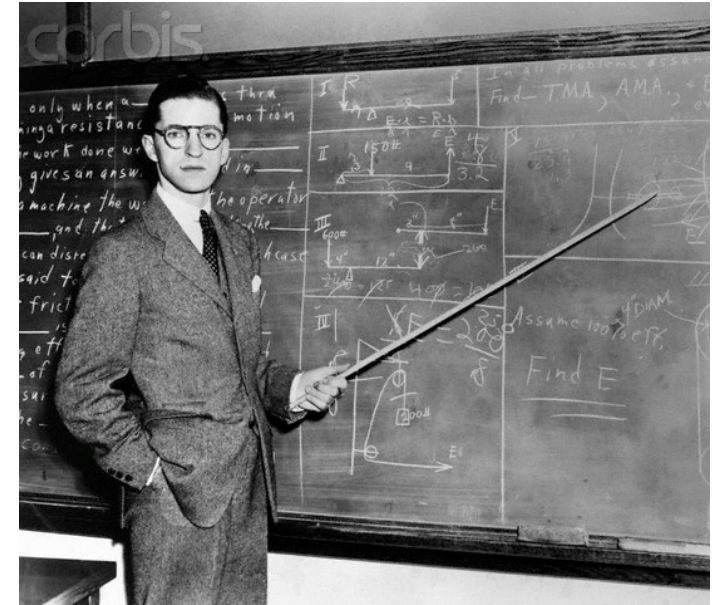


Implementation of innovations



Proven innovation

why?



Not adapted

Conclusion research at high school: connect **teacher's core goals** with lesson goal demands of the proposed innovation

Westbroek et al. *Res. in Sc. Edu*, 2016, 1-21.

Faculty?
Tasks in

- Research
- Teaching
- Management

NWO / CPS department Aspasia

'small changes huge effect'

Professional Learning Community



Implementation of innovations

Join the PLC 'Small changes huge effect'

h.b.westbroek@vu.nl



- **3 sessions 2.5 – 3 hrs**
 - direct application in your course
 - share experiences
- **1 interview – goal system**

Faculty?

Tasks in

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 / CPS department Aspasia

'small changes huge effect'

Professional Learning Community



What do you think of today's workshop?



- Go to: menti.com
- Code: 3033

