Activating students with IT tools

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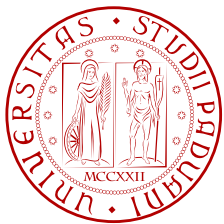
Vem är jag?


BOTTOMARINA


UNIVERSITAS STUDII PADUANI
MCCXXII


KTH
VETENSKAP
OCH KONST

Meanwhile, in Chioggia...

Roadmap, first version

- reflections on the title
- writing on slides
- registering videos
- flipped classrooms
- active learning strategies
- personal ideas, tricks and visions about teaching

Activating students with IT tools

Activating students with IT tools

what does "active students" mean?

Activating students with IT tools

what does "*passive* students" mean?

Activating students with IT tools

what does "passive *teachers*" mean?

Activating students with IT tools

can "*passive teachers*" make "*active students*"?

Activating students with IT tools

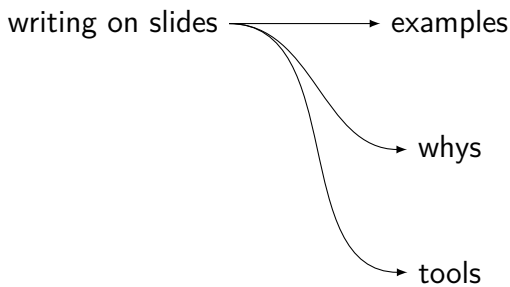
can "*passive teachers*" become "*active teachers*"?

Roadmap, rephrased

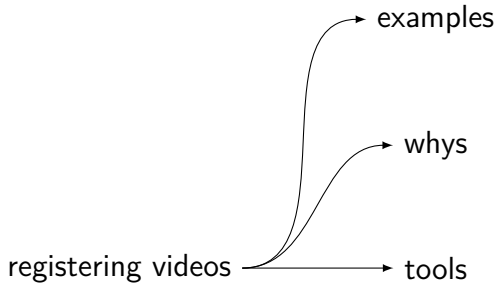
- IT tools for us
- strategies for more active students
- a call to arms

part I: IT tools for us

IT tools for us



IT tools for us



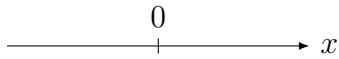
An example of the powerfulness of writing on slides

An example of the powerfulness of writing on slides

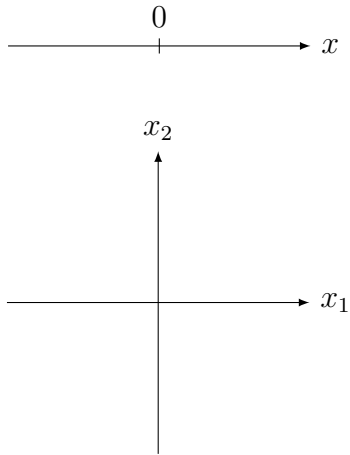
Roadmap:

- vectors and matrices
- matrix times vector operations
- geometrical intuitions

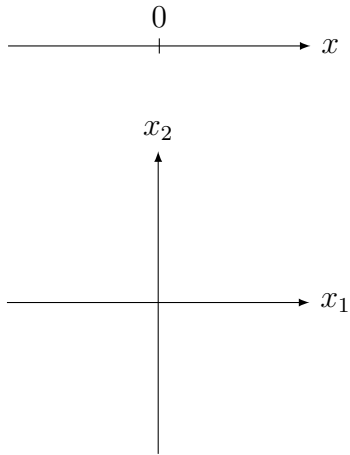
From scalars to vectors



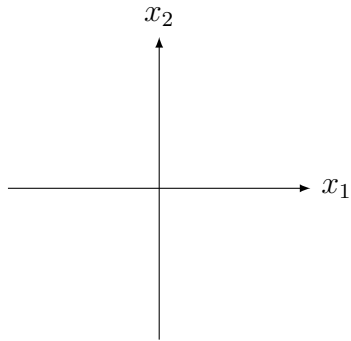
From scalars to vectors



Vector times scalar operations



From vectors to matrices



Matrix times scalar operations

$$\alpha \begin{bmatrix} | & | & | \\ \boldsymbol{v}_1 & \boldsymbol{v}_2 & \boldsymbol{v}_3 \\ | & | & | \end{bmatrix}$$

Matrix times vector operations

$$\begin{bmatrix} | & | & | \\ \boldsymbol{v}_1 & \boldsymbol{v}_2 & \boldsymbol{v}_3 \\ | & | & | \end{bmatrix} \begin{bmatrix} | \\ \boldsymbol{x} \\ | \end{bmatrix}$$

Matrix times vector operations

$$\begin{bmatrix} | & | & | \\ \boldsymbol{v}_1 & \boldsymbol{v}_2 & \boldsymbol{v}_3 \\ | & | & | \end{bmatrix} \begin{bmatrix} | \\ \boldsymbol{x} \\ | \end{bmatrix} = \begin{bmatrix} | & | & | \\ \boldsymbol{v}_1 & \boldsymbol{v}_2 & \boldsymbol{v}_3 \\ | & | & | \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$

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Matrix times vector operations

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Question 1

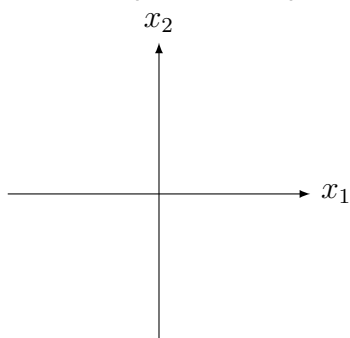
When is this operation well defined?

1. *only when # columns of V = # elements of $\boldsymbol{x}$*
2. *only when # rows of V = # elements of $\boldsymbol{x}$*
3. *only when # columns of V = # rows of V*
4. *I don't know*

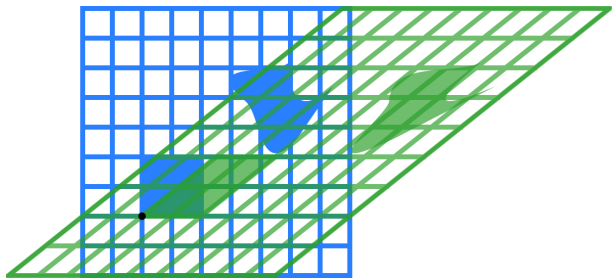
Matrix times vector operations

$$\begin{bmatrix} | & | & | \\ \boldsymbol{v}_1 & \boldsymbol{v}_2 & \boldsymbol{v}_3 \\ | & | & | \end{bmatrix} \begin{bmatrix} | \\ \boldsymbol{x} \\ | \end{bmatrix} = \begin{bmatrix} | & | & | \\ \boldsymbol{v}_1 & \boldsymbol{v}_2 & \boldsymbol{v}_3 \\ | & | & | \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \boldsymbol{v}_1 x_1 + \boldsymbol{v}_2 x_2 + \boldsymbol{v}_3 x_3$$

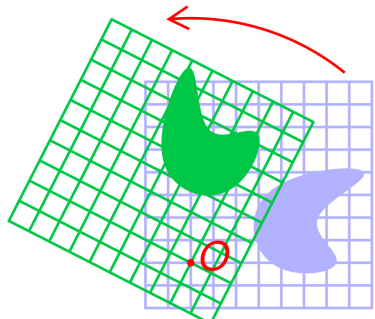
Graphical example:



Important result: square matrices represent shearing...



. . . and rotations



Writing on slides - debate time!

- what did you like?
- what did you dislike?

Why writing on slides? My opinions

Better than whiteboards because:

- can draw on graphics
- faster to erase, choose colors, thickness
- can do ctrl-z / ctrl-c / ctrl-p
- can be taped easily

Worse than whiteboards because:

- need the hardware
- requires us to change

Why writing on slides? My opinions

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Worse than whiteboards because:

- need the hardware
- requires us to change

Poll: how many said at least once to the students “prepare for a changing world”?

Bonus!

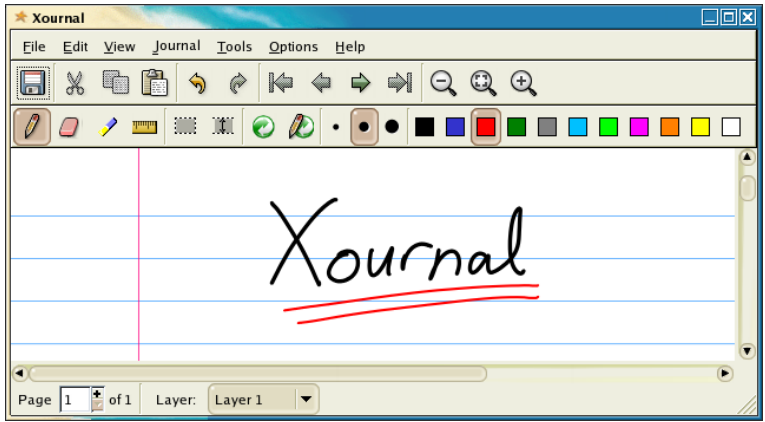
(suggestion: browse with me)

An incomplete list of competitors of *RealTimeBoard*

- AWW App
- Whiteboard Fox
- Web Whiteboard
- Twiddla
- Groupboard
- ...

Writing on slides: hardware tools

Writing on slides: software tools



registering videos

Registering videos: when do I do it?

1. lessons and seminars
2. FAQs from students
3. demonstrations (e.g., how to use SW tools)

Registering videos - debate time!

- when would you use it?
- when would you not use it?

Why registering the videos? My opinions

Pros

- for students:
  - material always available & less pressure to be in class
- for teachers:
  - free some time & puts the responsibility on students

Cons

- for students:
  - may feel like "staying at home"
  - may need to adapt to a new teaching strategy
- for teachers:
  - need to learn how to do and feel comfortable
  - risk of "shame" for errors that may go public

Why registering the videos? Students' opinions

- "I really like to whole "modern" concept with recording of writing during the lectures, its fantastic to use during the repetition or when you don't understand a part completely"
- "I like that the classes are being filmed so you can go back to watch"
- "The recorded lectures is bloody brilliant"

Registering videos: tools

Open Broadcaster Software

Kazam Screencaster

zoom

Bonus!

OBS and zoom can do simultaneous taping and streaming

jemdoc – light markup

part II: students activation strategies

Agenda

- flipped classrooms
- peer instructions

Flipped classrooms - what

Flipped classrooms - why

Pros

- for teachers:
  - can focus on stuff that is more fun
  - can reuse material from other years / other peers
  - can understand better how students are understanding
- for students
  - more useful time in class & more individualized teaching

Cons

- for teachers
  - have to re-think at the material and to do the videos – can take a lot of time
- for students
  - must follow a more constant workload during the learning period

Flipped classrooms - Student's opinions

- "I've really enjoyed this concept of flipped classrooms and would really like to see more teachers implement this in their teaching"
- "The flipped classroom videos are great, because its very often that I find myself not paying attention during regular lectures, or maybe not understanding something. The videos gives me the opportunity to rewatch anything I didn't understand"
- "It has been extremely helpful to use Scalable learning. It helps if there is something one have missed and it is also very helpful when studying for the exam"
- "It does feel like more work, but I think I've learnt more this way"

Flipped classrooms - how

Flipped classrooms - how

setting up the homepage

Flipped classrooms - how

ssh scripts for transferring the material

active learning

Active learning: what

= try to involve students in the learning process
more than what they would do by just listening

Active learning: why

Active learning through peer instructions

Active learning through peer instructions

aim = foster:

- discussions among and with students
- sharpen focus and understanding

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Active learning through peer instructions

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Active learning through peer instructions

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3. the teacher shows the aggregate responses, without giving the correct answer

Active learning through peer instructions

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4. students form small groups,

Active learning through peer instructions

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4. students form small groups, discuss the question,

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5. the teacher shows the new aggregate responses,

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4. students form small groups, discuss the question, then provide again an *individual* answer
5. the teacher shows the new aggregate responses, then gives the correct answer, then takes and responds to questions

Active learning through peer instructions - example

Which of these are reasons for the seasons?

Active learning through peer instructions - example

Which of these are reasons for the seasons?

1. the height of the sun in the sky during day
2. the Earth's distance from the sun
3. how many hours the sun is up each day

Active learning through peer instructions - example

Claim: Every card with a VOWEL on one side has an EVEN number on the other side. Which cards must you turn over in order to test whether the claim is true?

Active learning through peer instructions - example

Claim: Every card with a VOWEL on one side has an EVEN number on the other side. Which cards must you turn over in order to test whether the claim is true?

1. A only
2. A and 4 only
3. A, D and 4 only
4. A and 7 only

(a.k.a. Wason selection task)

Peer instructions: better in dedicated rooms

https://www.youtube.com/watch?v=OI3WabrXcR4

some ideas from my experience

Potential ideas

- final lab report = “scientific paper”

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- 2-stages feedback for the lab reports – algorithm:
  1. students do a first version of the report;
  2. students get feedback;
  3. students improve the report, but highlight what they improved in the second version in a summary, and write the modifications in blue;
  4. students get the grade (now without feedback).

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- flexible lab groups
- "logical learning units" flowchart

a call for arms

A call for arms

why did I get the “pedagogical prize 2017”?

A call for arms

why did I get the “pedagogical prize 2017”?

my opinion: a strive for improving, that makes me seem "innovative" and caring

A call for arms

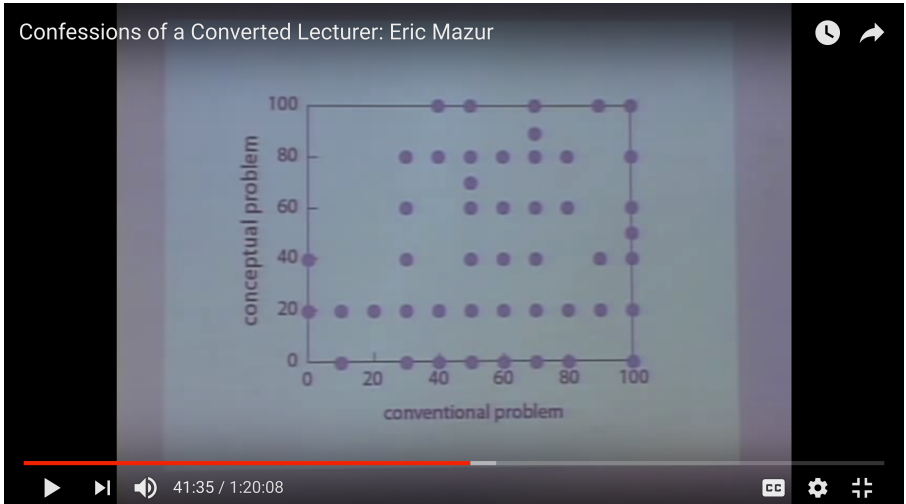
will teaching change in the next decades?

A call for arms

will teaching change in the next decades?

how do we want to adapt? And which performance index shall we maximize?

A call for arms - concepts, not procedures!



A call for arms - add oral examinations!

are students going to just solve exercises when they will go working?

A call for arms - get out of the comfort zone!

can one really understand what it means to be a student if that person hasn't been studying for years?

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