Digital Tools in Teaching and (e)Learning

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TAMPERE UNIVERSITY OF APPLIED SCIENCES

Pedagogical R & D

- Learning analytics
- Learning experience
- Learning outcoms

Sami Suhonen

Principal lecturer in engineering Physics

- Flipped Learning
- Online studies
- Educational videos
- Development of teaching methods

Digimentor

- Teacher's digital tools
- Helping colleagues
- Training, workshops
- Pedagogical point of view

Agenda:

Presentation and general discussion:

- Tools for teaching and learning online
- Educational videos:
  - Why videos?
  - How can anyone easily produce educational videos to support teaching and learning: different methods to produce educational videos.
  - How to add interactivity to any video.
- Activating students in classroom and online:
  - Examples of online teaching in TAMK: Synchronous Asynchronous
  - Polling apps
  - Presentation of some Apps & Methods

Break (10 min)

Workshop: Hands-on training with the presented apps and tools

Digitalization in teaching and learning

Teacher tools and actions to increase:

- Student activity
- Accessibility of the studies
- Interaction

Pedagogical level:

playposit (fka eduCanon)

padlet

Poll Everywhere

PRISM

YouTube

System level: Learning management system

Administration level: ”Production control system”, annual planning etc.

Digitalizaion projects

Background

Teaching

Studying

Learning

"Learning by doing"
"Assessment as learning"

Pedagogical solutions:

Activating methods

- Measurement assignments
- Educational videos
- Continuous assessment
- Group work
  Peer instruction
  Flipped learning

Top Tools for Learning 2018

Results of the 12th Annual Digital Learning Tools survey

Jane Hart


c4lpt.co.uk/top100tools/top100-edu/
1. YouTube (1)
2. Google Docs/Drive (5)
3. PowerPoint (4)
4. Google Search (2)
5. Twitter (3)
6. Dropbox (10)
7. Prezi (14)
8. Kahoot (15)
9. Powtoon (22)
10. Word (16)
11. Moodle (27)
12. Screencast-O-Matic (31)
13. WordPress (9)
14. Google Chrome (33)
15. Facebook (6)
16. Google Forms (34)
17. Skype (7)
18. Padlet 35
19. Google Apps for Education (GAFE) (40)
20. Camtasia (24)
21. Slideshare 18
22. OneNote (19)
23. Pinterest 29
24. Gmail (32)
26. Audacity (28)
27. Evernote (17)
28. Office Mix (42)
29. Trello (43)
30. iSpring (44)
31. Google Maps (49)
32. Khan Academy (52)
33. Quizlet (53)
34. Wikipedia (11)
35. Snagit (26)
38. Sway (59)
39. Google Hangouts (41)
40. Google Plus (45)
41. Blogger (56)
42. Adobe Connect (62)
43. Whats App 13
44. Articulate 25
45. Excel 46
46. Diigo 54
47. Google Scholar 60
48. Canvas 67
50. SurveyMonkey 70
51. Movie Maker (77)
52. Google Classroom (80)
53. Adobe Captivate (39)
54. edPuzzle (81)
55. Easygenerator (51)
56. Udutu (61)
57. Scoopit (72)
58. Edmodo (86)
59. Weebly (88)
60. ThingLink (90)
62. Explain Everything (95)
63. Google Sites (96)
64. Blackboard (99)
65. Mahara 100
66. Webex 36
67. Desire2Learn (D2) (108)
68. Jing (109)
69. SharePoint (38)
70. Nearpod (110)
71. Outlook (50)
72. Wix (112)
73. Canva (57)
74. Keynote (64)
75. Firefox (65)
76. iMovie (69)
77. Piktochart (85)
78. GoAnimate (89)
79. TodaysMeet (94)
80. OneDrive (103)
81. eXe (114)
82. Animoto (115)
83. Blackboard Collaborate (123)
84. Zoom (65)
85. Turnitin (126)
86. Grammarly (128)
87. Pixton (130)
88. Sakai (131)
89. BigBlueButton (146)
90. Schoology (150)
91. Notability (152)
92. Kaltura (155)
93. Moovly (156)
94. Explaindio (157)
95. Zeetings (158)
96. ILIAS (159)
97. Remind (160)
98. WeVideo (161)
00. PlayPosit (165)

Background

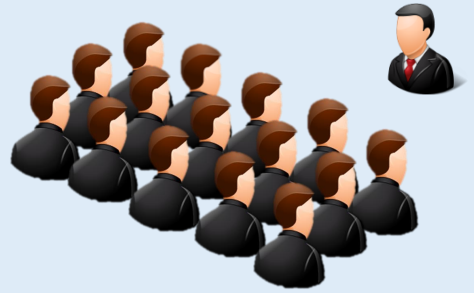
Improved Learning in a Large-Enrollment Physics Class

Louis Deslauriers,[1,2] Ellen Schelew,[2] Carl Wieman*†‡

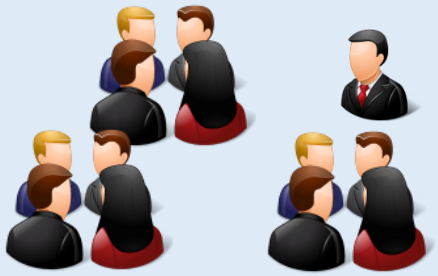
We compared the amounts of learning achieved using two different instructional approaches under controlled conditions. We measured the learning of a specific set of topics and objectives when t**aught by 3 hours of traditional lecture given by an experienced highly rated instructor** and **3 hours of instruction given by a trained but inexperienced instructor using instruction based on research in cognitive psychology and physics education.** The comparison was made between two large sections (N = 267 and N = 271) of an introductory undergraduate physics course. We found increased student attendance, higher engagement, and more than twice the learning in the section taught using research-based instruction.

Deslauriers, L., Schelew, E., & Wieman, C. (2011). Improved learning in a large-enrollment physics class. *science*, *332*(6031), 862-864.

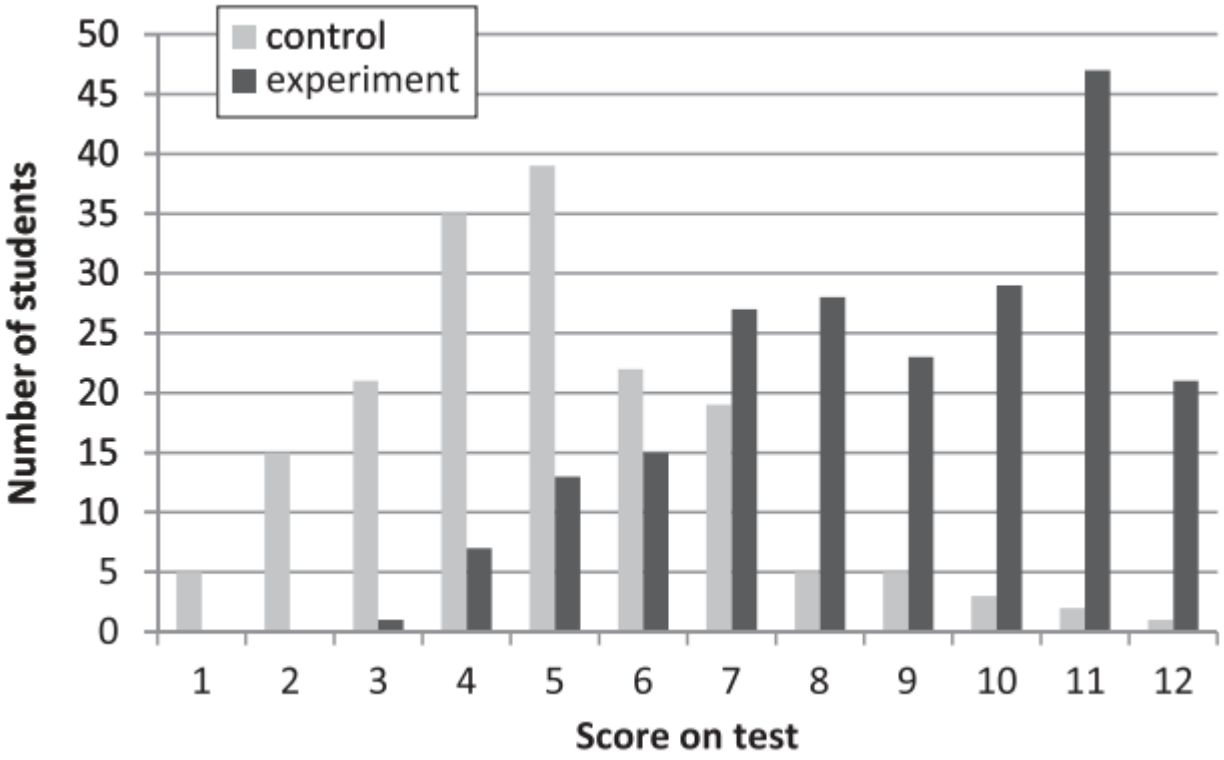
Lecturing



Activating methods



Background



The design goal was to have the students spend all their time in class engaged in deliberate practice at "thinking scientifically" in the form of **making and testing predictions and arguments about the relevant topics, solving problems, and critiquing their own reasoning and that of others.** All of the activities are designed to fit together to support this goal, including moving the simple transfer of **factual knowledge outside of class as much as possible** and creating tasks and feedback that motivate students to become fully engaged. As the students work through these tasks, they **receive feedback from fellow students and from the instructor.** We incorporate multiple "best instructional practices," but we believe the educational benefit does not come primarily from any particular practice but rather from the integration into the overall deliberate practice framework.

Deslauriers, L., Schelew, E., & Wieman, C. (2011). Improved learning in a large-enrollment physics class. *science*, *332*(6031), 862-864.

Background

Classroom

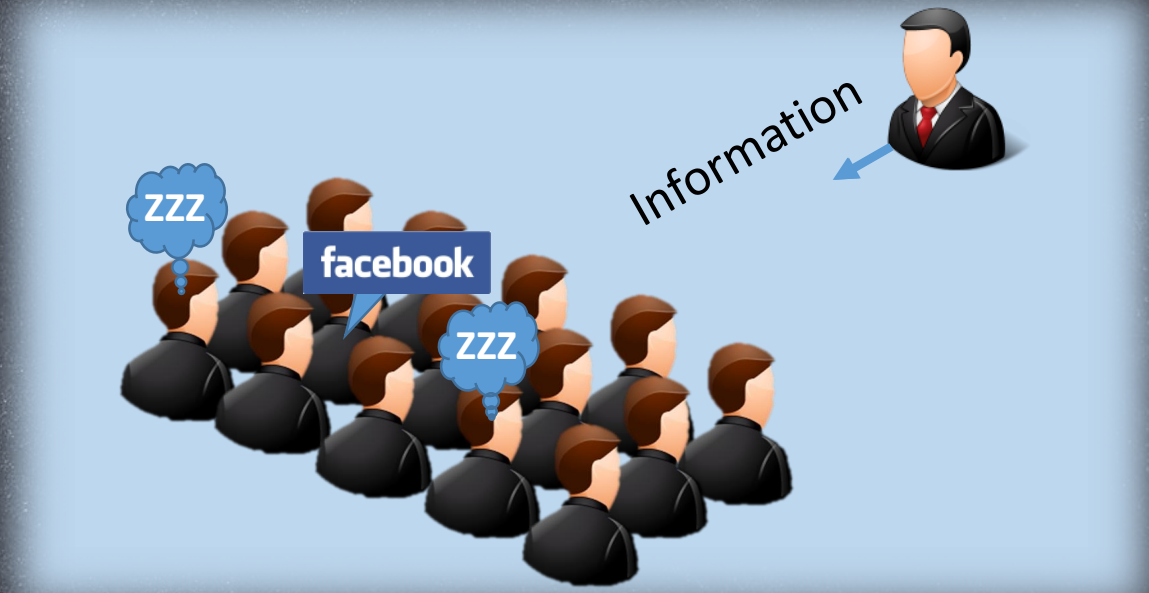
Worst case:

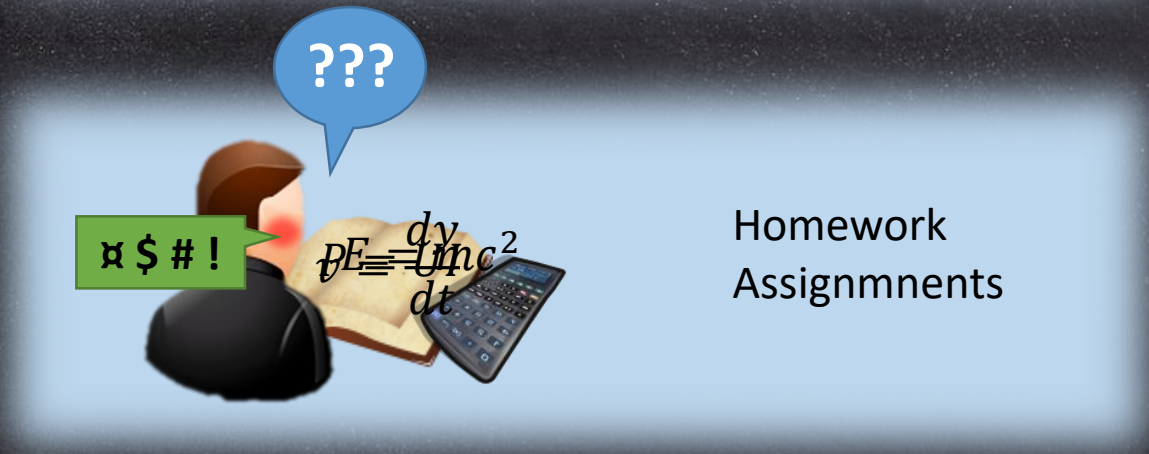
- Passive
- Alone
- Not engaged

At home:

Worst case:

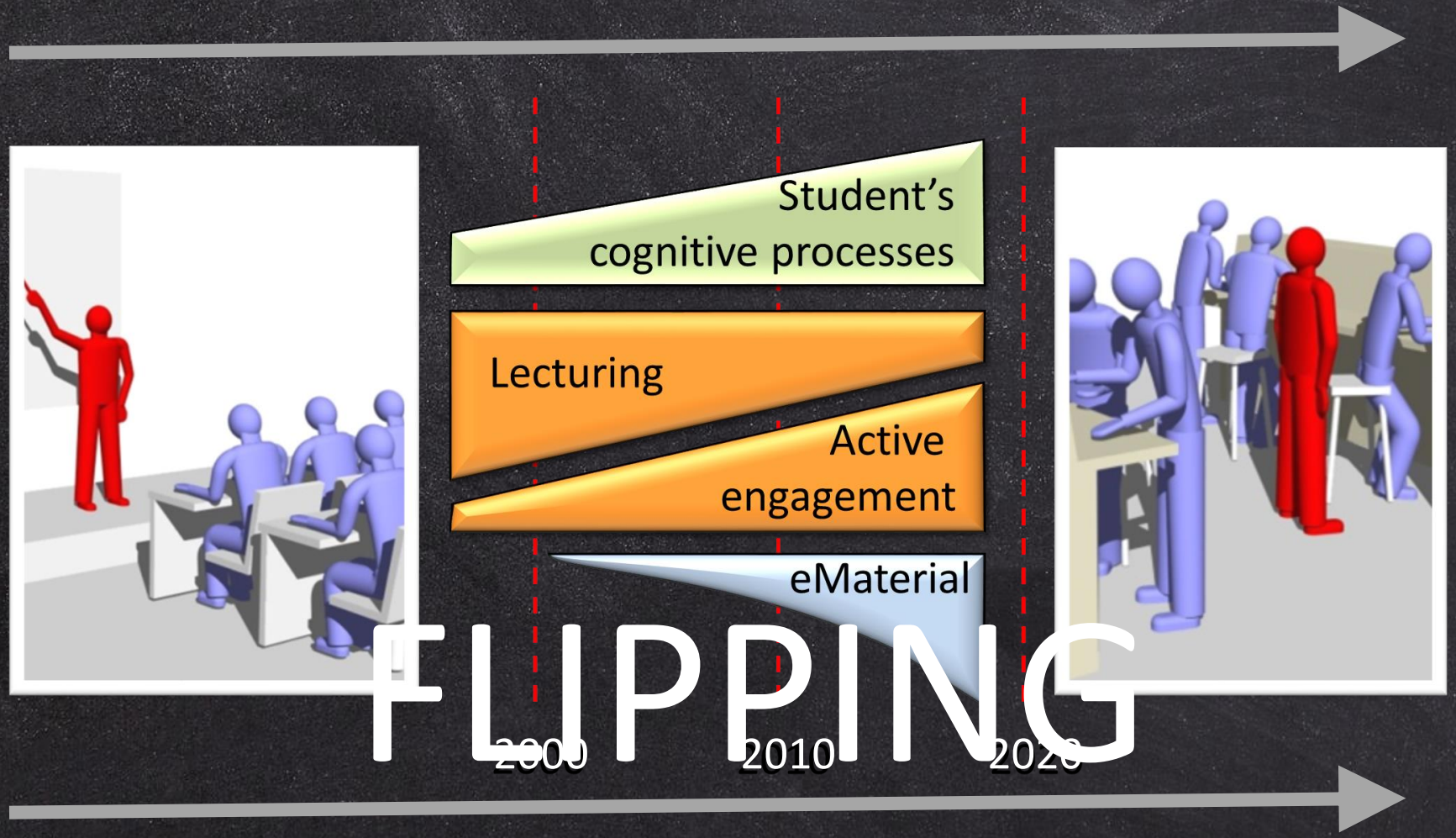
- Alone
- Stuck…





Icons: www.icons-land.com

Flipped classroom/teaching



Flipped classroom/teaching

Educational videos

Face-to-face teaching (Blended learning Flipped learning)

Videos

YouTube
YouTube
YouTube
YouTube
YouTube
YouTube
YouTube
YouTube
YouTube

TAMK Physics:

2000-3000 short videos

Online teaching and studying

Icons: www.icons-land.com

Physics in TAMK

Small particles
IR radiation
Kinematics
Convection
Energy
Friction
Thermodynamics
Electromagnetics
Induction
Heat pumps
Atomic models

Engineering topics and subjects, Mathematics Scientific Reporting

Needs of a degree program

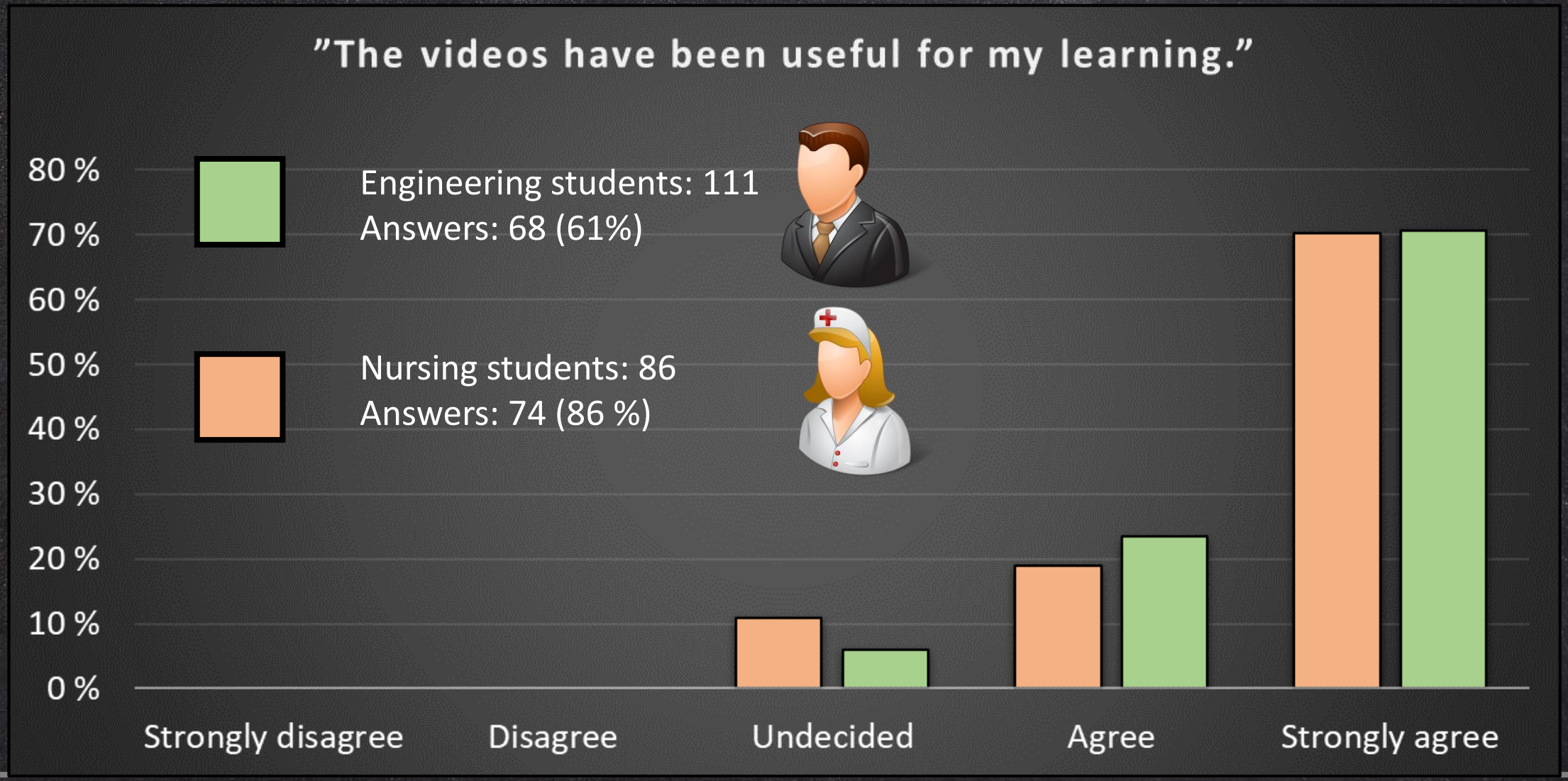
Course 1

Course 2

Face-to-face teaching

Online teaching

Educational video clips



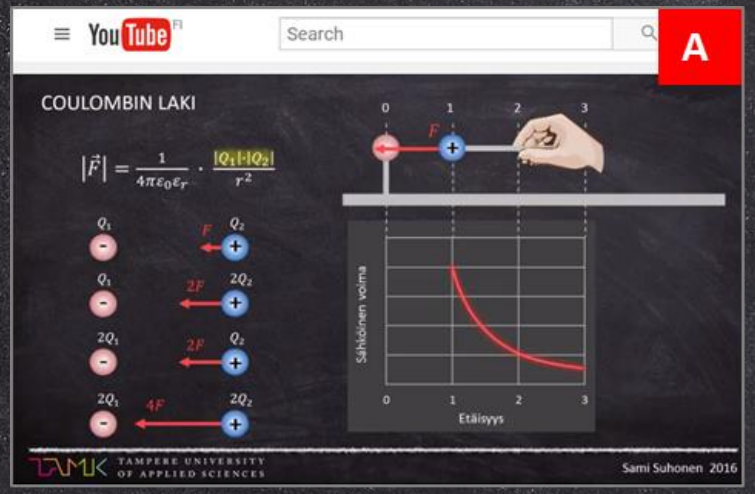
Educational videos

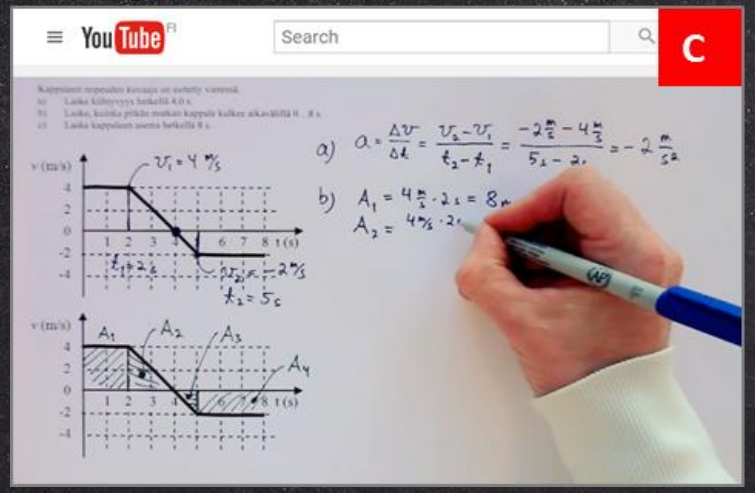
A) Theory videos to present the phenomena and formulas

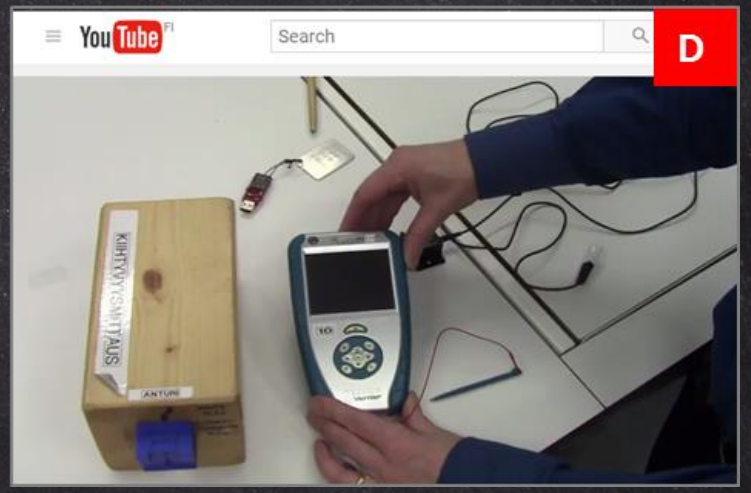
B) Demonstrations and measurements

C) Homework solutions

D) Instructions for equipment and laboratory work

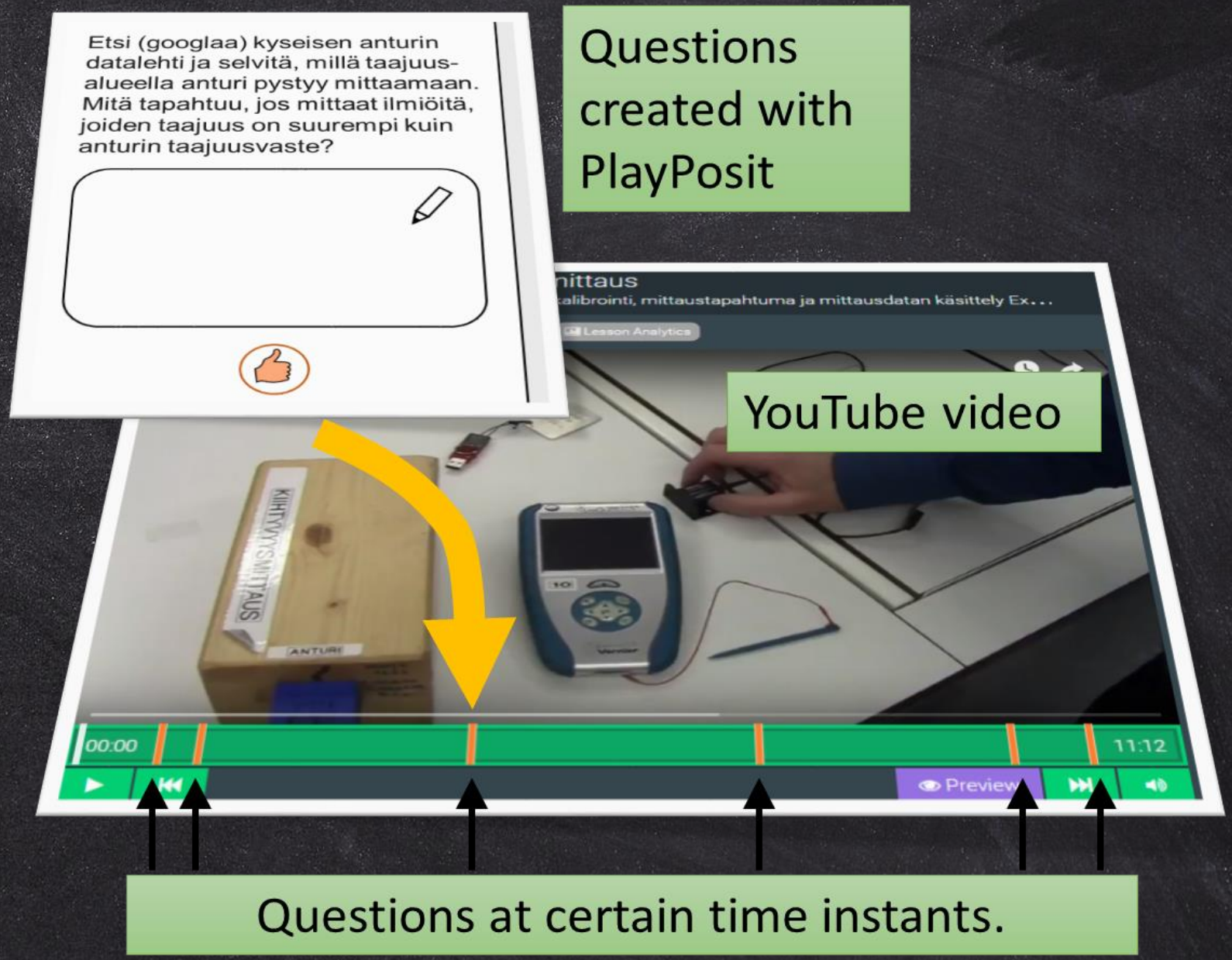






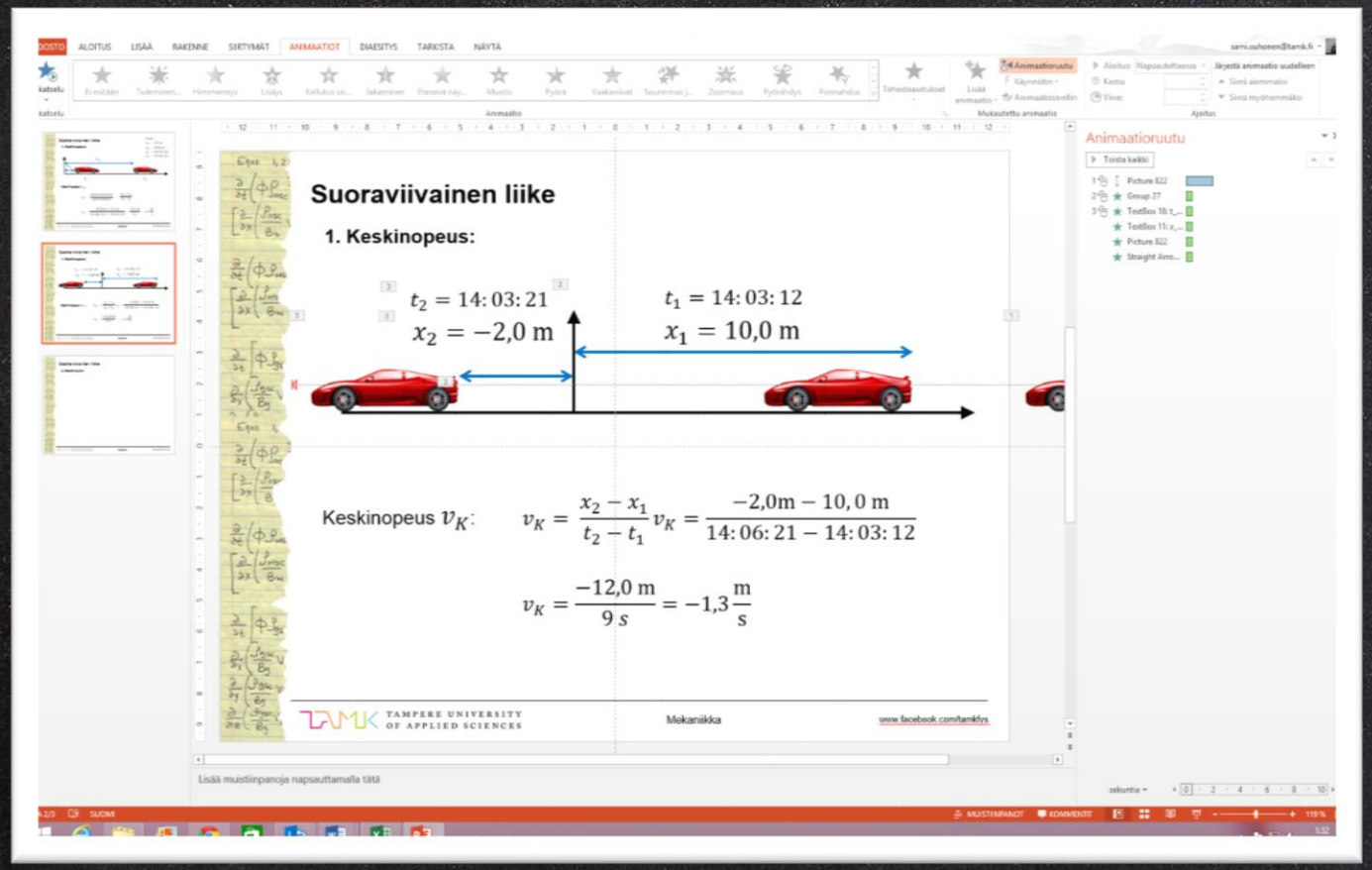
Educational videos

Interactivity to videos



Methods for producing video clips:

1) Power Point → video clip

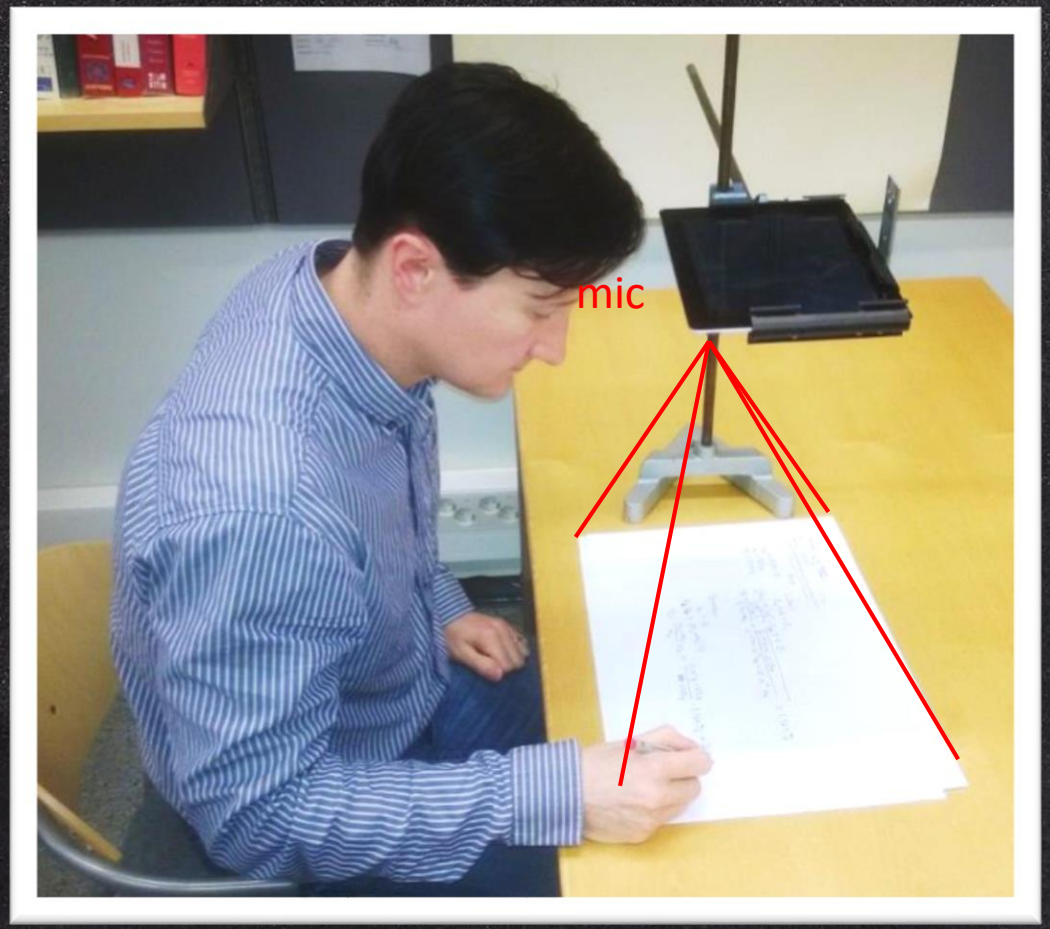


- Time-consuming
- Quite easy
- Rather large area
- Equations rather easy to present

- Good quality graphics
- Few animations
- Embedded video
- Easily editable in all ways
- We use this for theory video clips

Methods for producing video clips:

2) iPad (or any video camera) + paper



- Fast
- Easy
- Large area
- Equations easy to present

- Graphics quality depends on the person ☺
- Not easily editable (only clipping and voice-over)
- We use this for homework solution video

Methods for producing video clips:

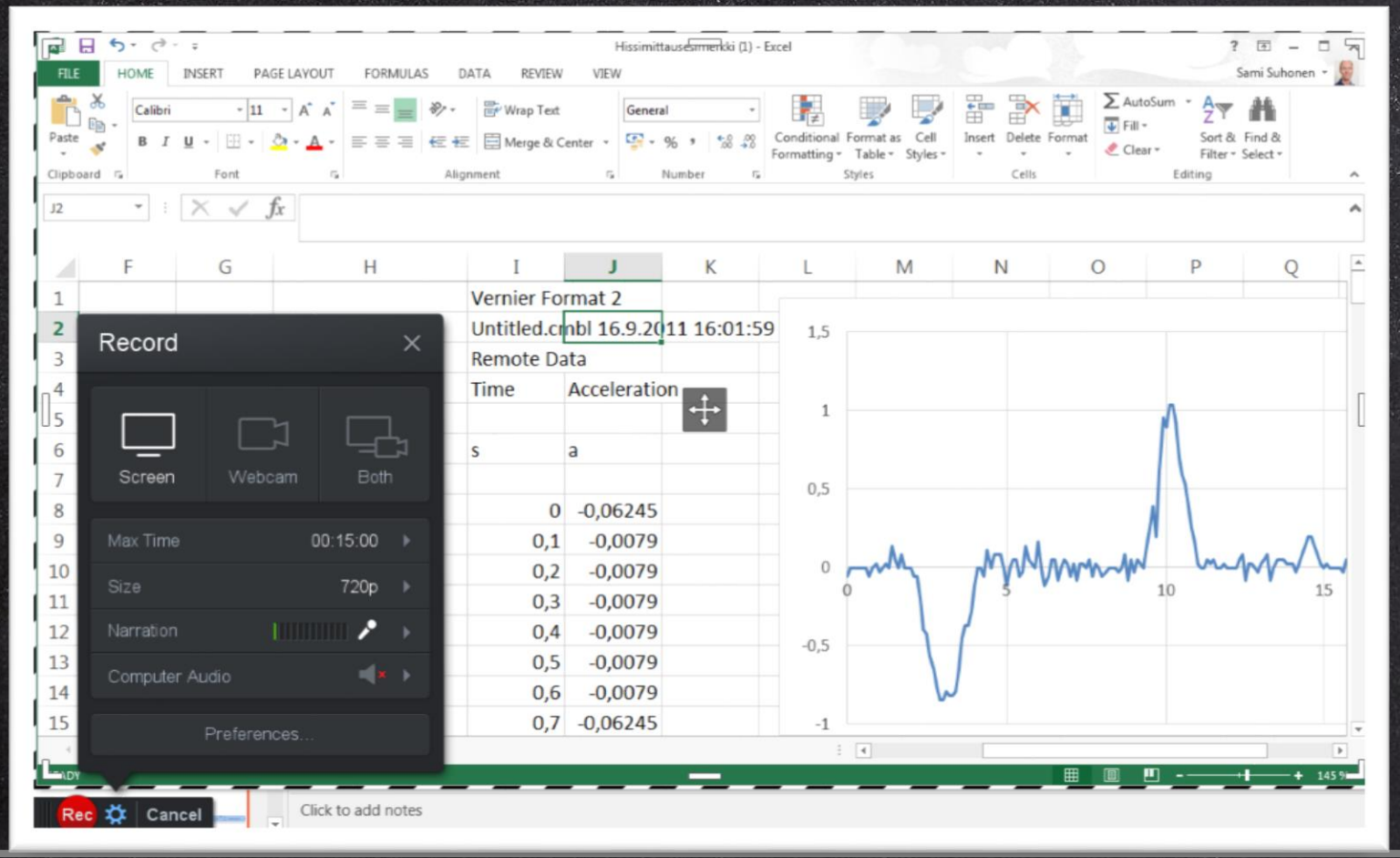
3) iPad + Explain Everything

- Faster than PP
- Quite easy
- Unlimited area or slides
- Equations more difficult to present

- Good quality graphics
- Embedded video and pictures
- Easily editable in all ways
- We use this for theory videos + homework solution videos

Methods for producing video clips:

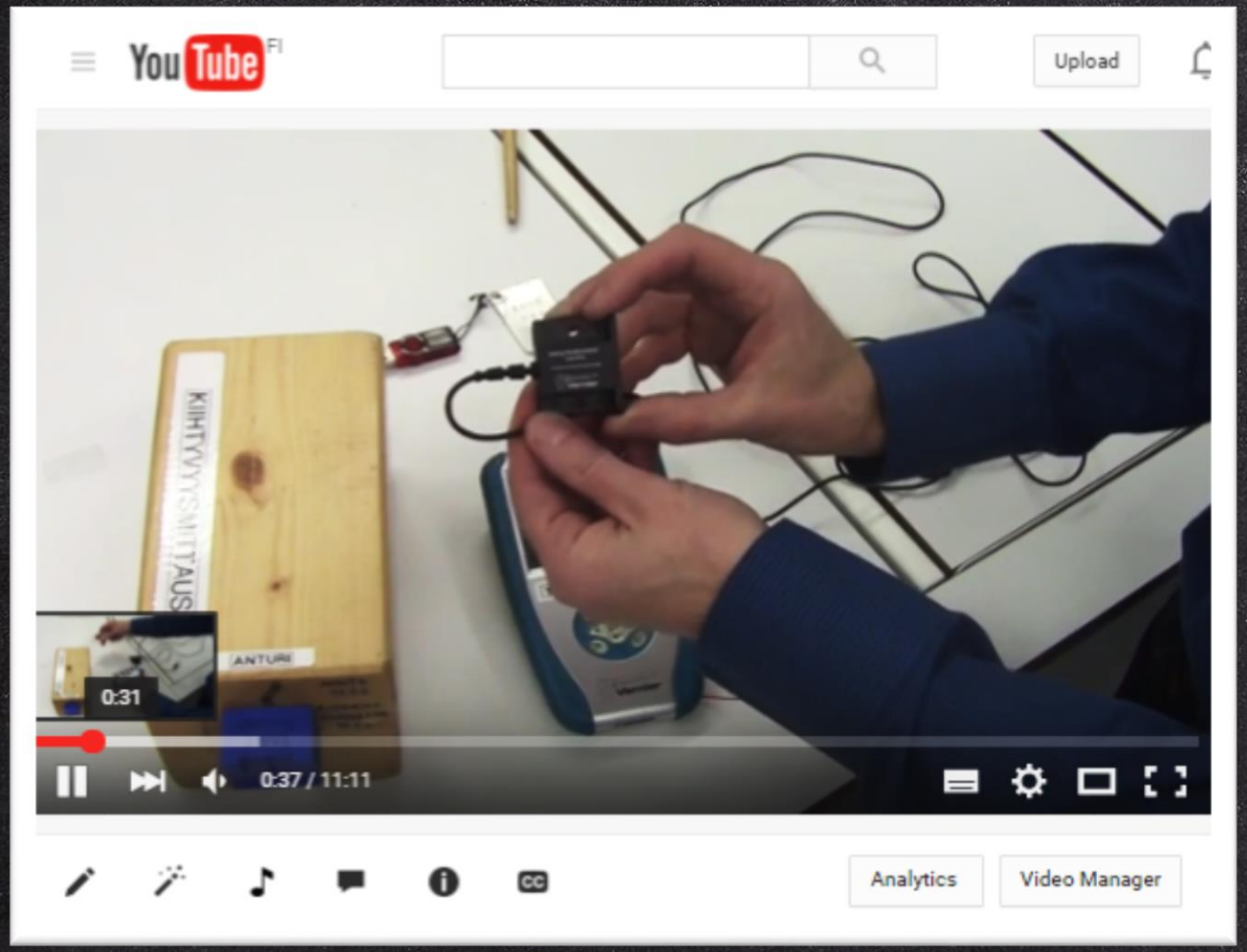
4) Screen Capture Videos



- Good for explaining the usage of different programs
- Possible to edit only with video editing software
- We use for Excel (signal processing etc.)

Methods for producing video clips:

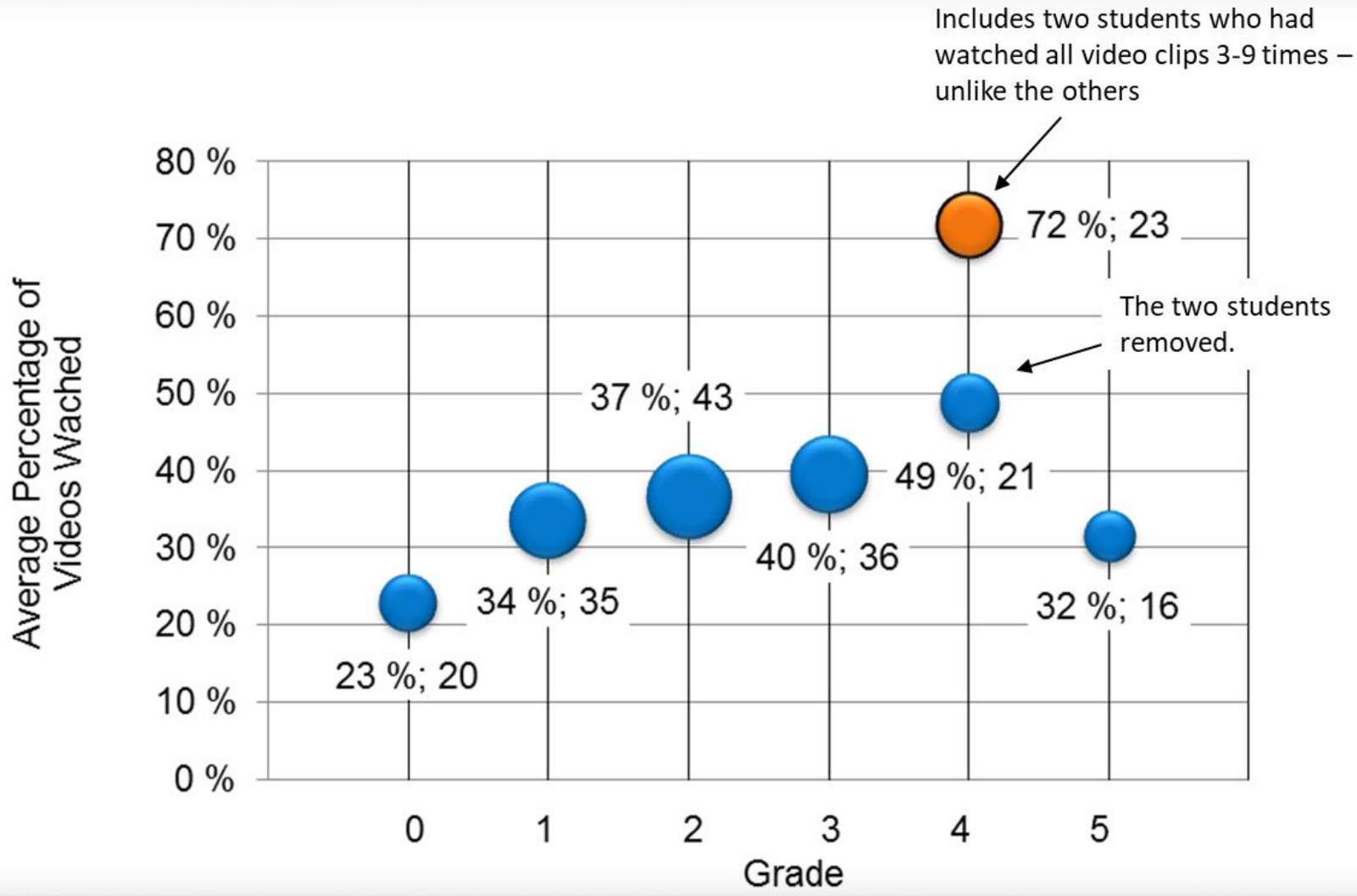
5) Video Camera + Cameraman



- Cameraman needed
- Good for explaining the proper use of laboratory equipment
- Usually video editor is needed (to add clips to one complete video)

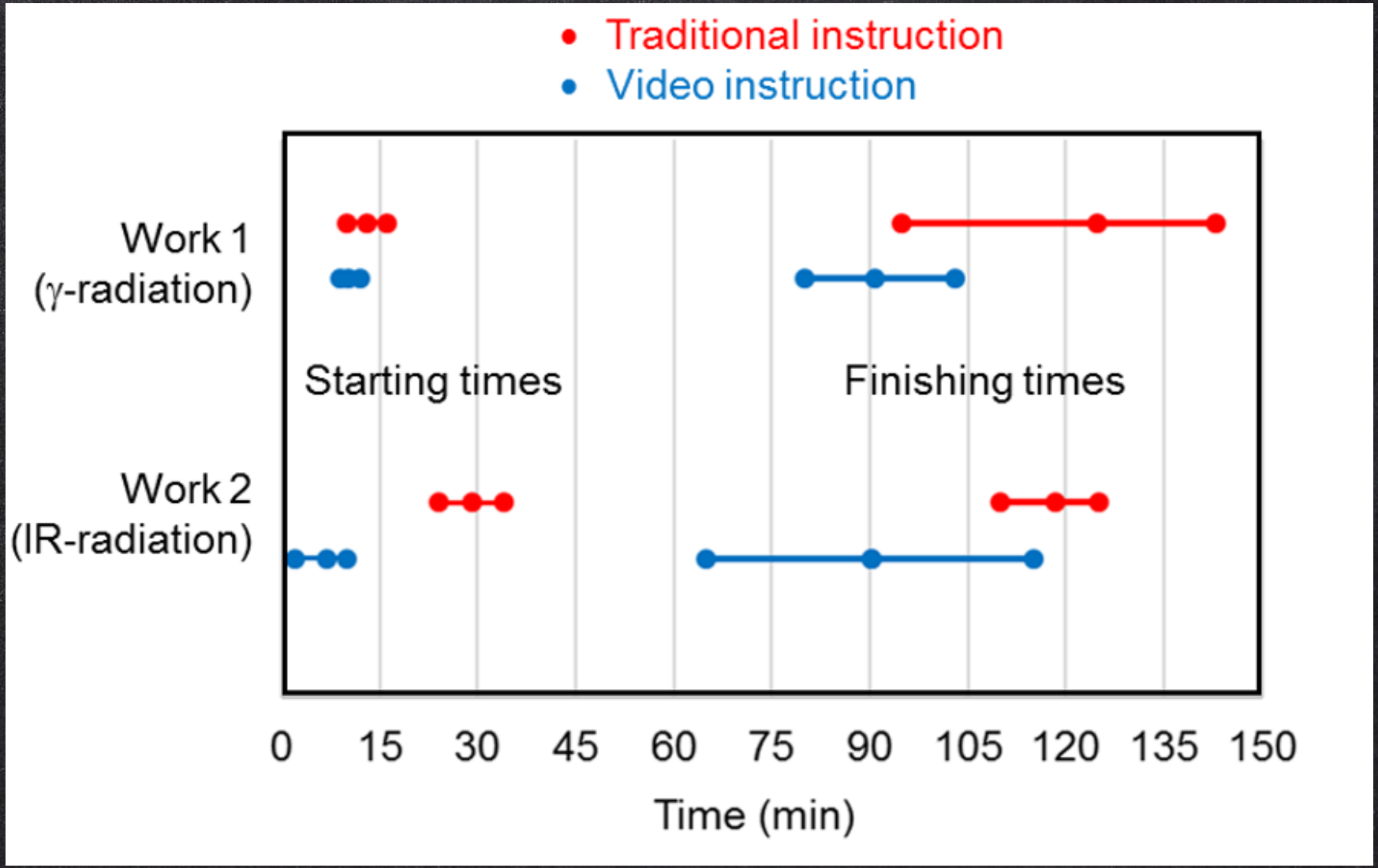
Educational videos

Impact?



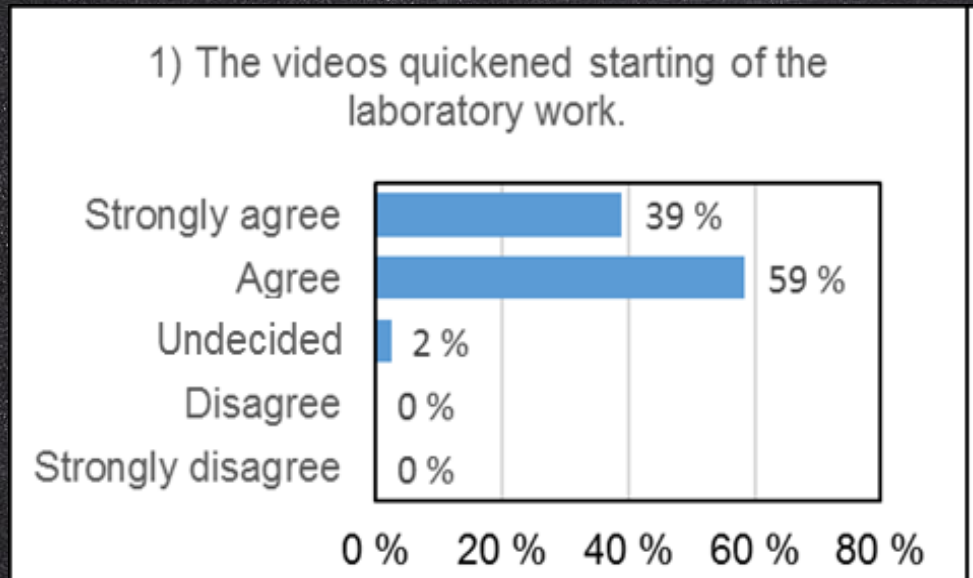
Educational videos

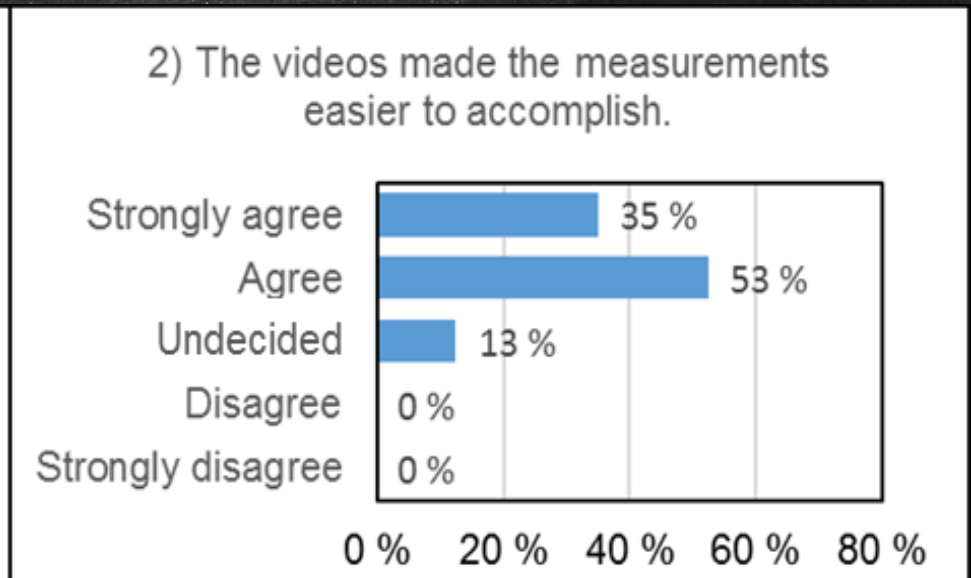
Impact?

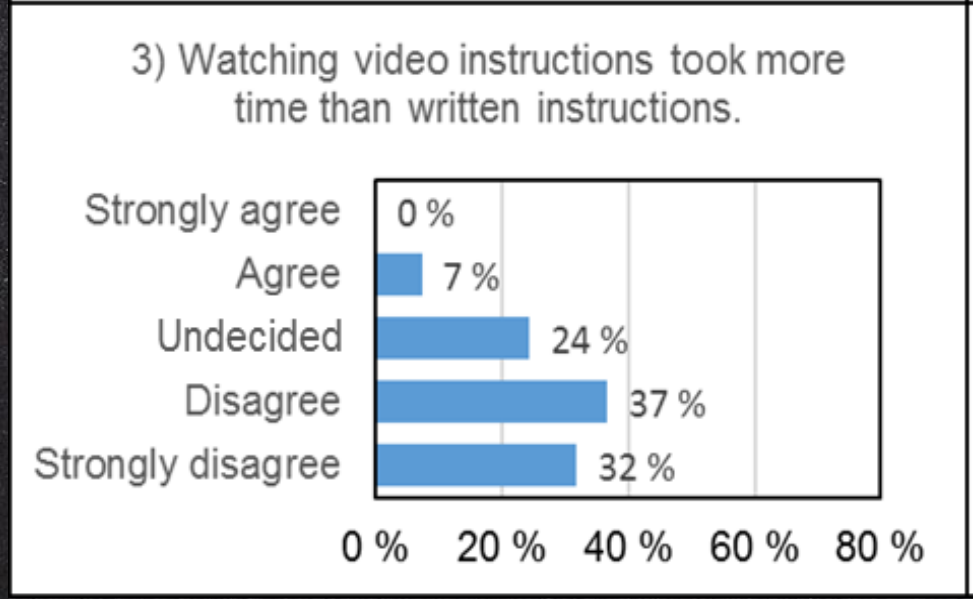


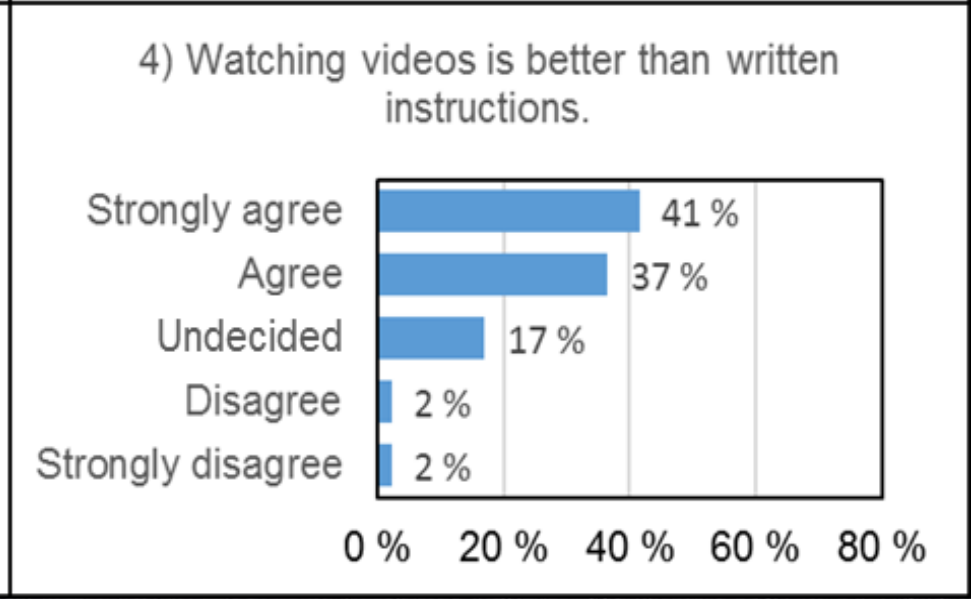
Educational videos

Impact?



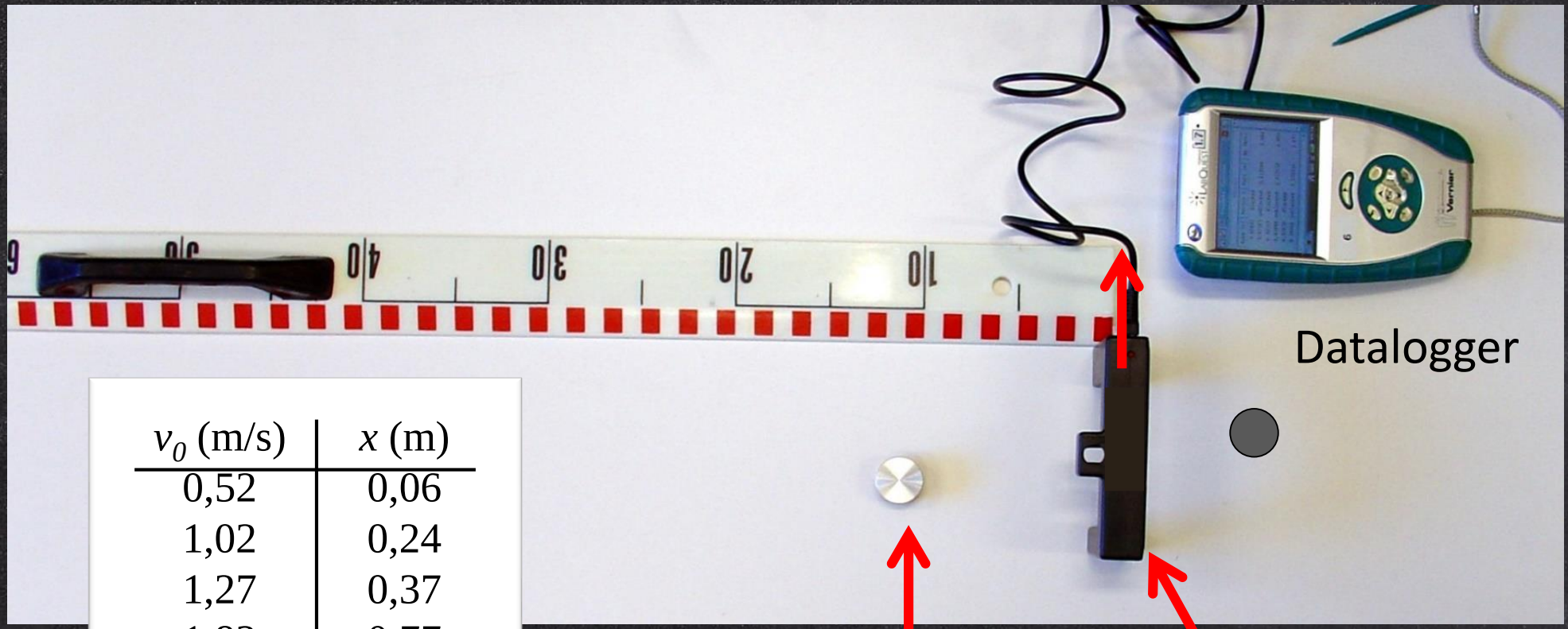






Measurement assignments

Example: Coefficient of kinetic friction using energy principle:



v_0 (m/s)	x (m)
0,52	0,06
1,02	0,24
1,27	0,37
1,82	0,77

Measurement assignments

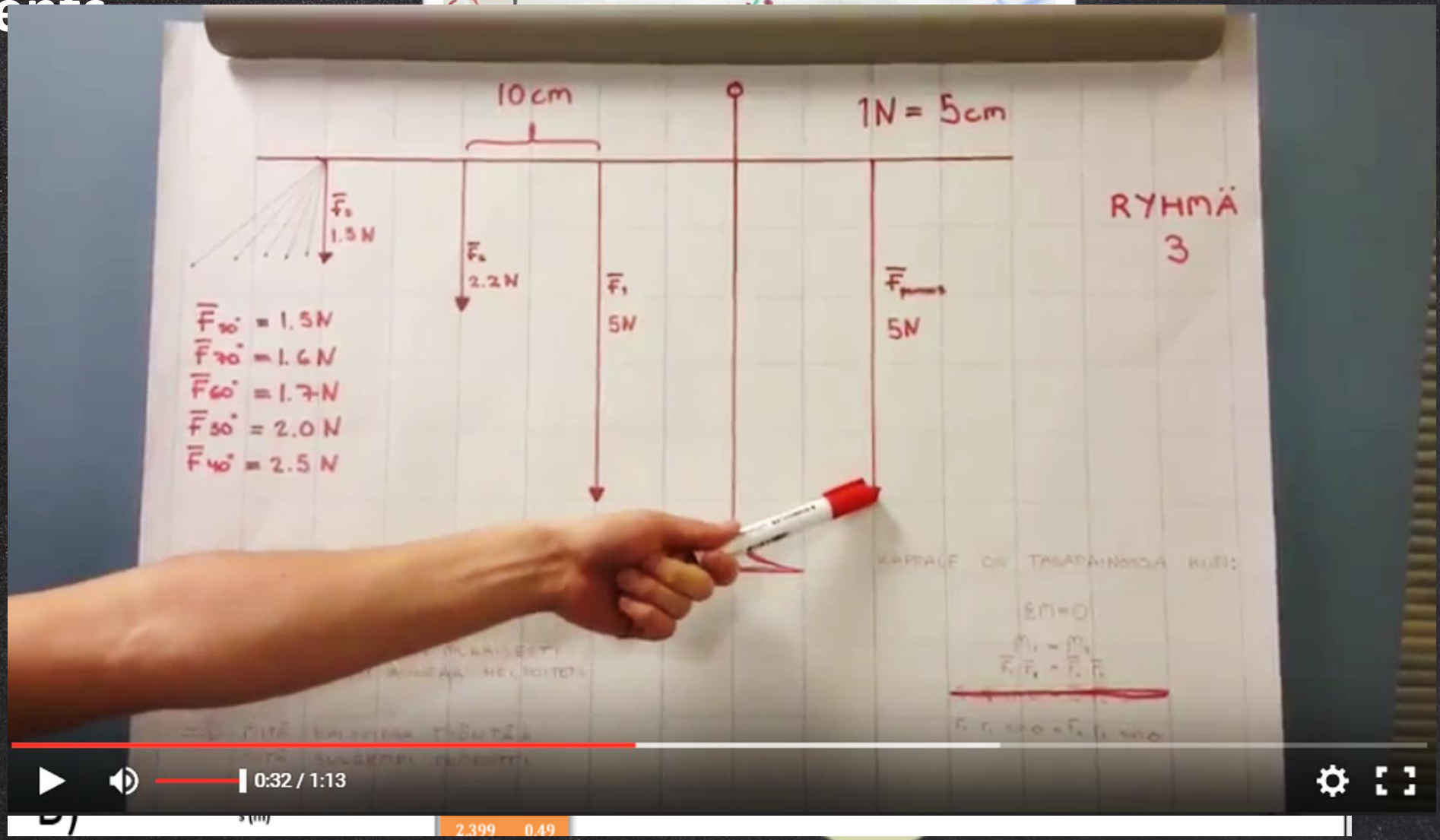
”Learning by doing”

Physics, engineering and metacognition

Students:

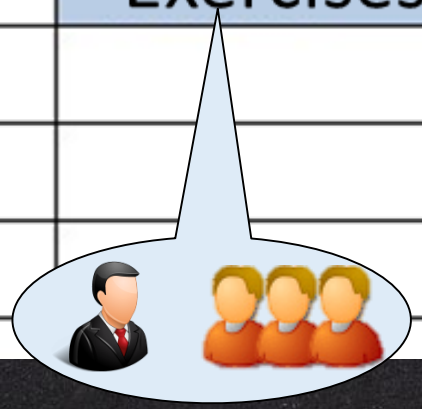
- Discuss and argument their suggestions for the solution
- Evaluate peers’ suggestions and solutions
- Evaluate themselves: Am I guessing or do I know?
- Find a joint solution to the problem (hopefully based on scientific thinking…)
- If it goes wrong, they evaluate WHERE it went wrong and why. Helps to make thinking visible.
- If it goes wrong, it is nobody’s fault (it is the group…)

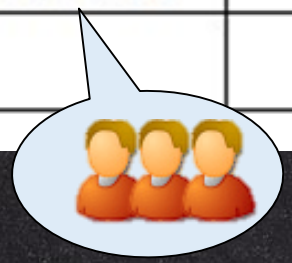
Measurement Assignments



Measurement Assignments

Time	Mon	Tue	Wed	Thu	Fri
8-9					
9-10		Conceptual			
10-11		Lecture			Instructions
11-12		Exercises			Meas.
12-13			Exercise		Meas.
13-14			Exercise		Results
14-15					





Every other week

~ 25 % of the classroom time

Measurement Assignments

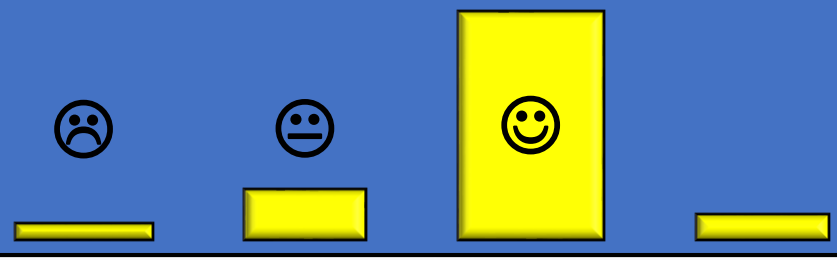
Week	Task	Weight	Assessed
1.	Measurement	5 %	Group
2.	Week exam	10 %	Individual
3.	Measurement	5 %	Group
4.	Week exam	10 %	Individual
5.	Measurement	10 %	Group
6.	Week exam	10 %	Individual
7.	Final Examination	50 %	Individual
	Total:	100 %	

Measurement Assignments

”Your opinion about measurement assignments.”

Group:	☹	😐	☺	**n.a.**	**N**
M1	4 %	13 %	80 %	2 %	46
M2	2 %	13 %	83 %	2 %	46
M3	0 %	16 %	59 %	25 %	32
TF	21 %	25 %	50 %	4 %	24
EC	0 %	22 %	72 %	6 %	18
TOTAL	5 %	16 %	72 %	7 %	166

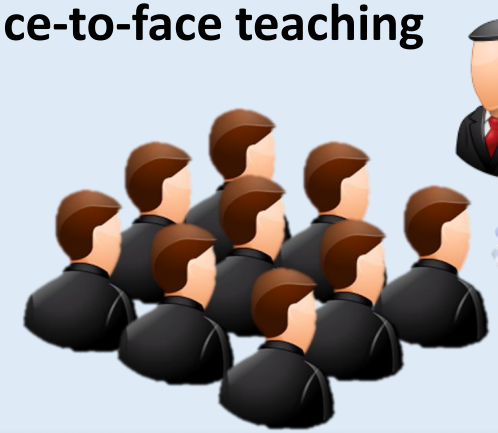
TOTAL:



Feature	Laboratory measurement	Measurement assignment
Actor:	▪ Pair of students	▪ Student group
Subject matter:	▪ Familiar from theory point of view	▪ New(ish)
Equipment:	▪ Complicated	▪ Usually simple
Teacher's role:	▪ Instruct, help, guide, evaluate	▪ Briefing in the beginning, ▪ No interfering ▪ Evaluate, (assess)
Time scale:	▪ Measurements: 3 h ▪ Reporting: 5-10 h ▪ Time ~ few weeks	▪ Brainstorming: 0,25 h ▪ Studying the background: 0,5-1 h ▪ Measurements: 0,5 h ▪ Analysing and reporting: 0,5-1 h
Learning objectives:	▪ Carry out organized measurements ▪ Plan measurements ▪ Evaluate uncertainty ▪ Importance of measurements ▪ Deepen the understanding	▪ Construct and deepen the understanding of the topic. ▪ Peer work, team work. ▪ Evaluate own understanding of the subject matter. ▪ Evaluate peers' understanding of the subject matter
Sharing results	▪ Usually only to teacher	▪ Shared and presented to other groups

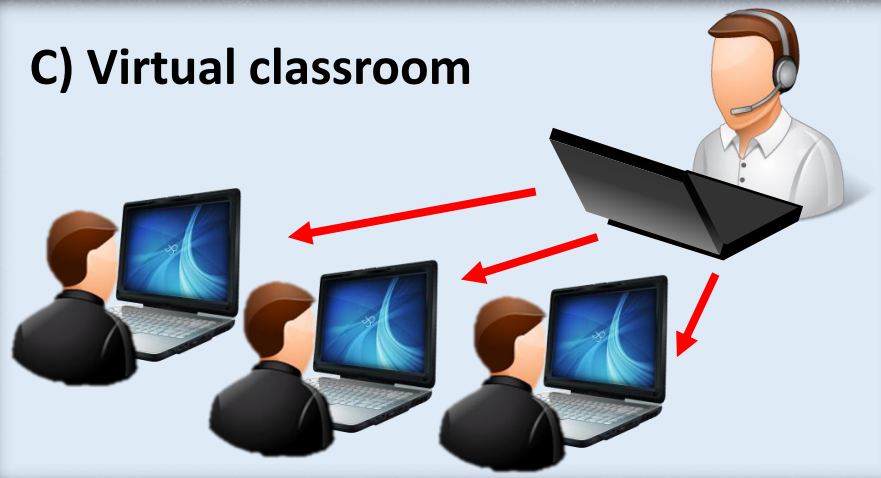
Studying and teaching methods

A) Face-to-face teaching



B) Face to face teaching streamed to distance learners (Adobe Connect)

C) Virtual classroom



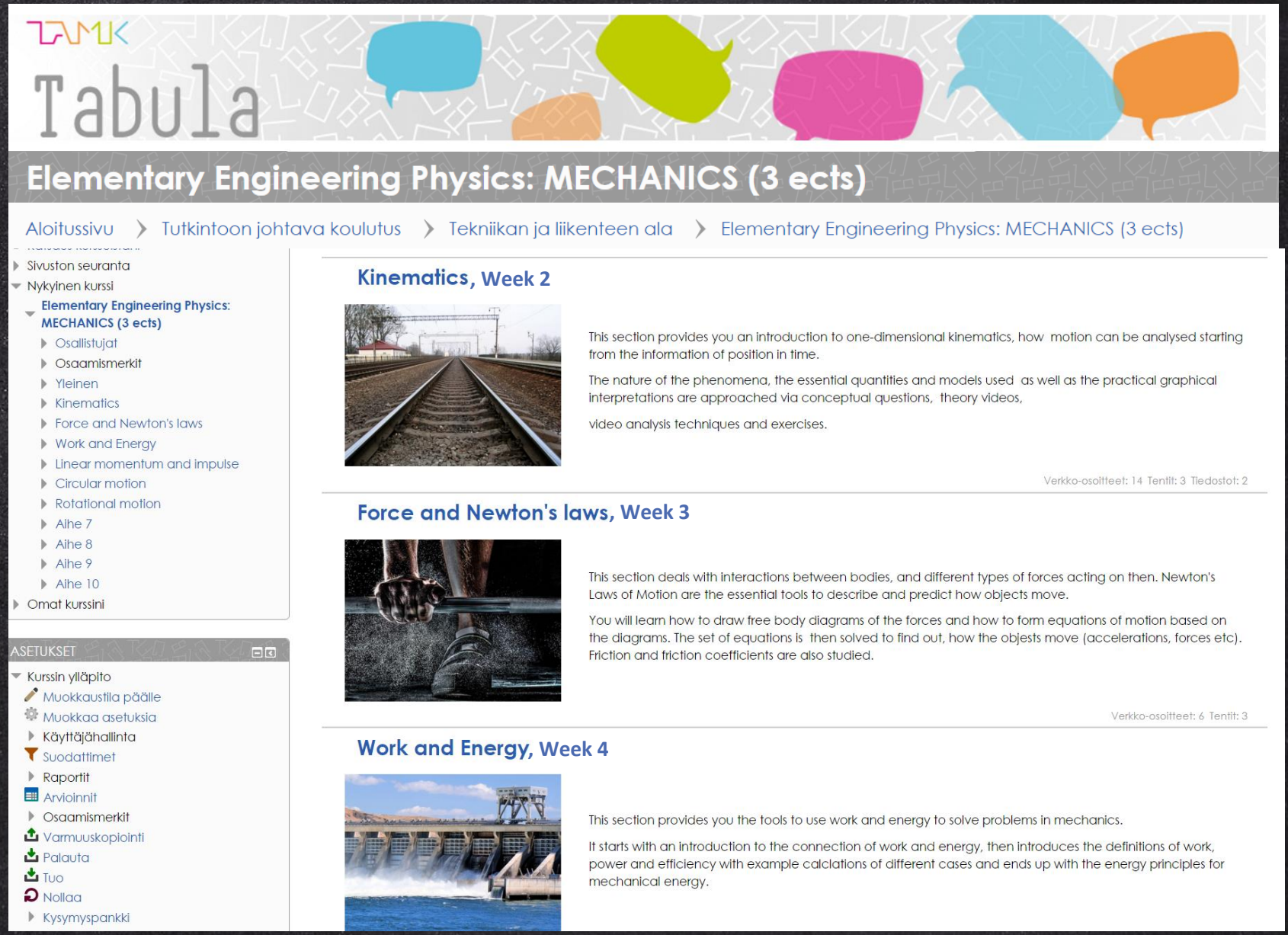
D) Asynchronous online course

Icons: http://www.icons-land.com

Physics in TAMK

Physics online courses:

- All theory courses are also offered online.
- The first laboratory course “*Basics of measuring and scientific reporting”* is being converted
- Asynchronous
- Scheduled at week level



Measurement assignments online?

A) Smart phone sensors and apps

B) Video analysis using smart phones

C) Presenting measurements in video

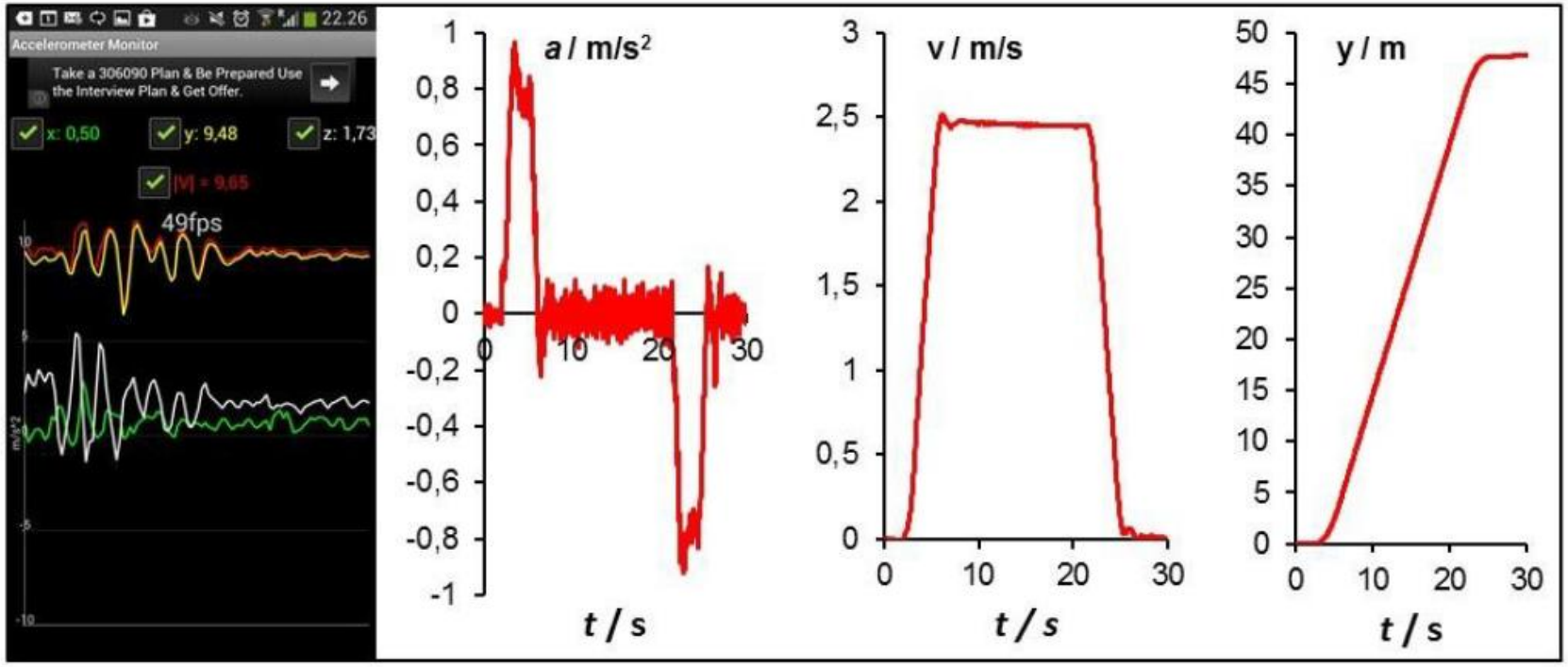


Fig. 5. An exemplary acceleration measurement of a lift and its analysis. Measured with Samsung Galaxy S4 Zoom and "Accelerometer Monitor" applet.

Measurement assignments online?

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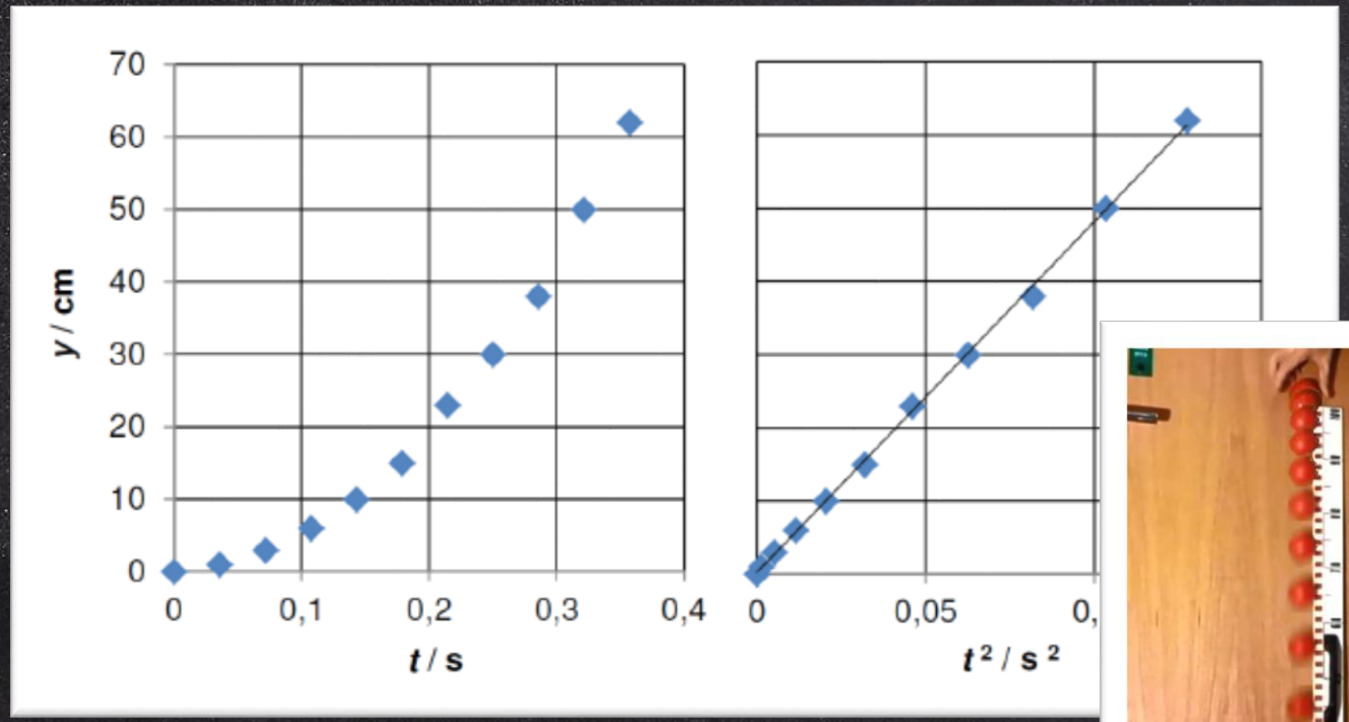

Measurement assignments online?

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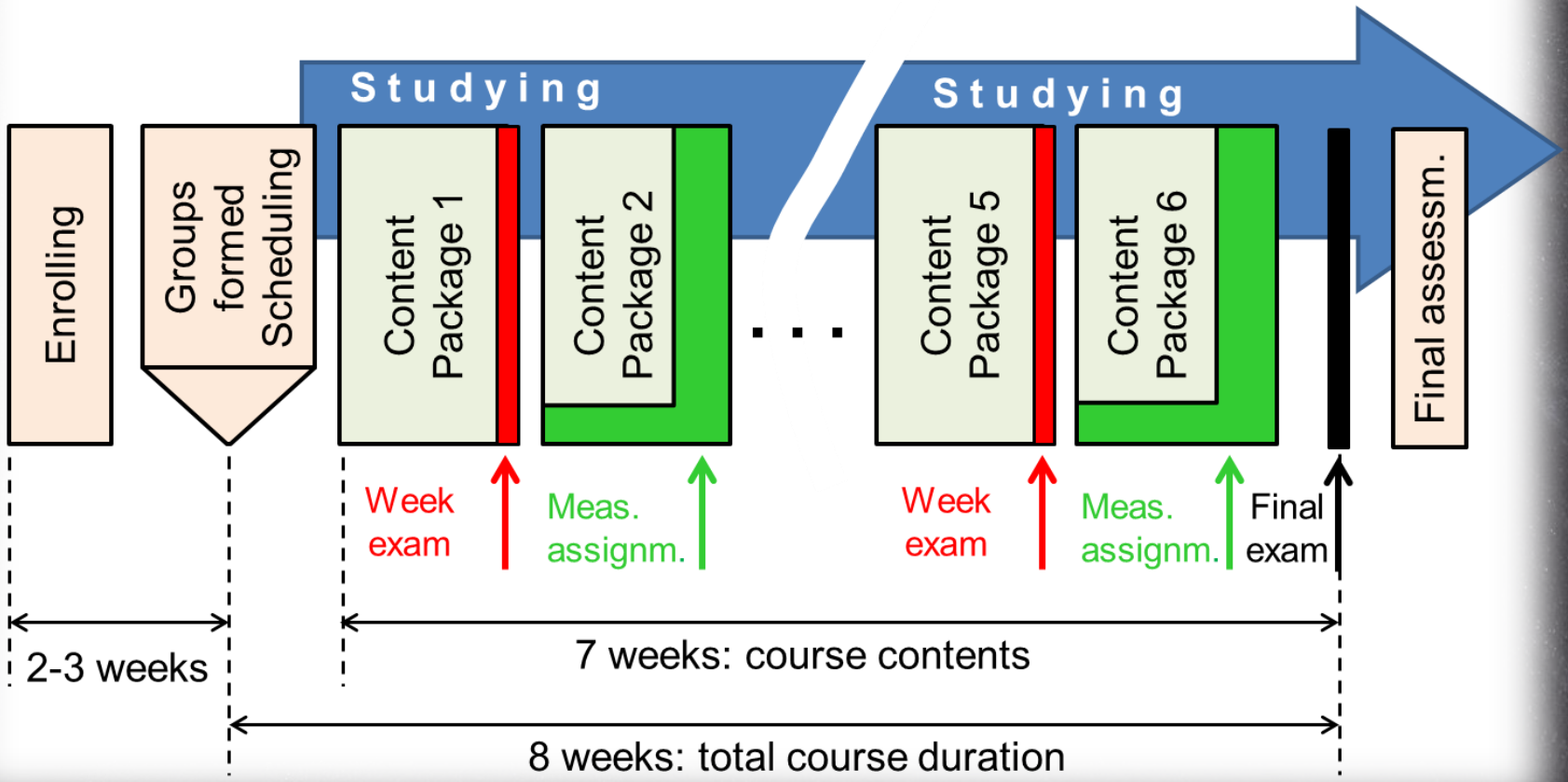
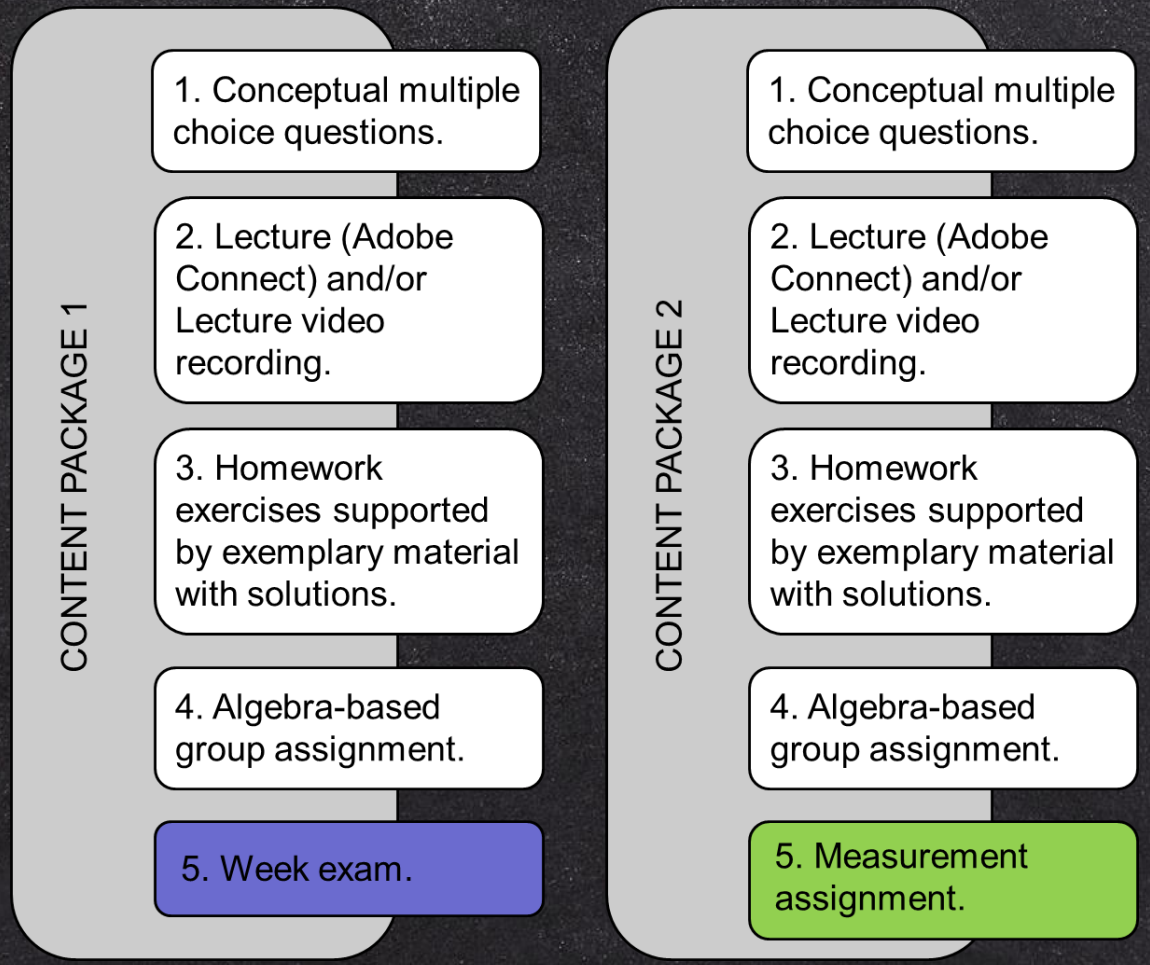
Asynchronous Online Physics Courses

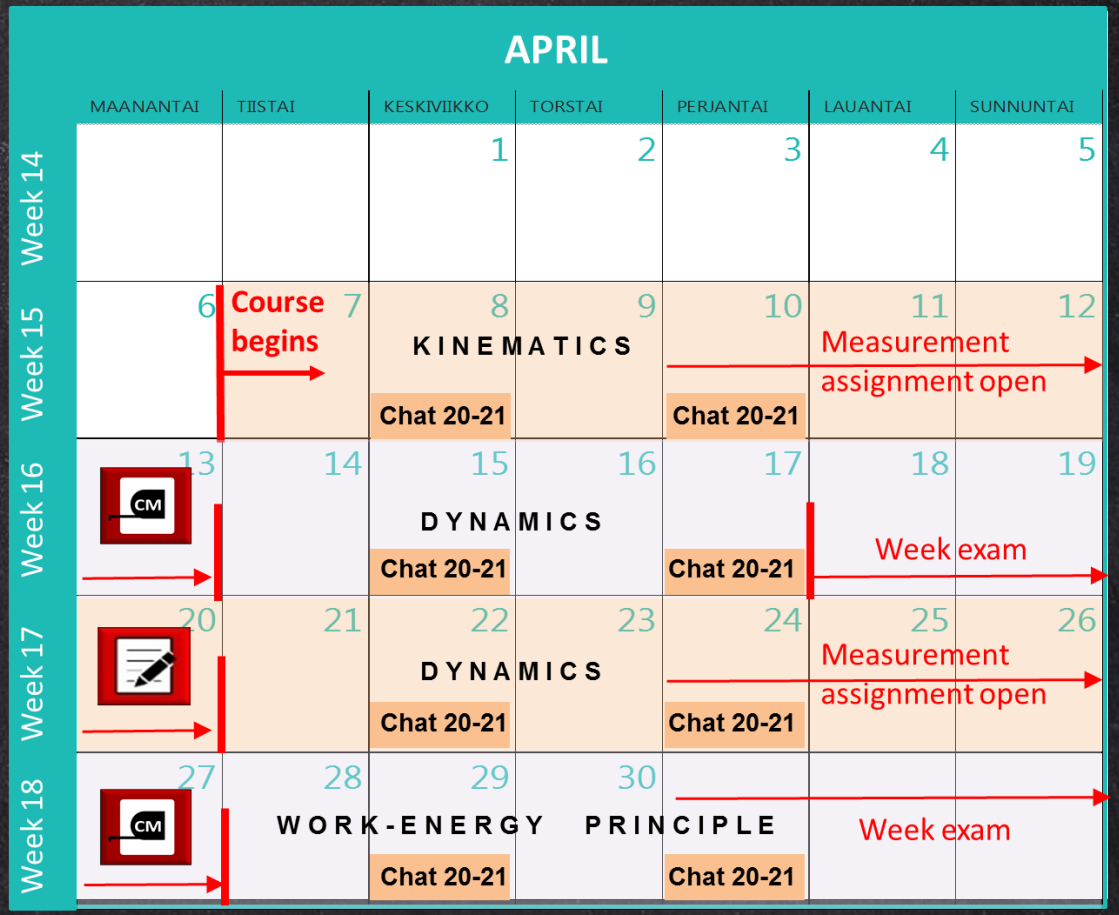
Structure of the online implementation



Asynchronous Online Physics Courses

Structure of the online implemention





Some of our latest publications:

1. Juho Tiili, Sami Suhonen (2017) Teacher's own instuctional videos to support teaching - how and why? Proceedings of PTEE 2017 conference, Zilina, Slovakia
2. "S. Suhonen, J. Tiili (2017) Videos in physics theory and laboratory teaching:usage and retention analytics. Proceedings of SEFI 45th Annual conference, Azores, Portugal"
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Thank you!

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