

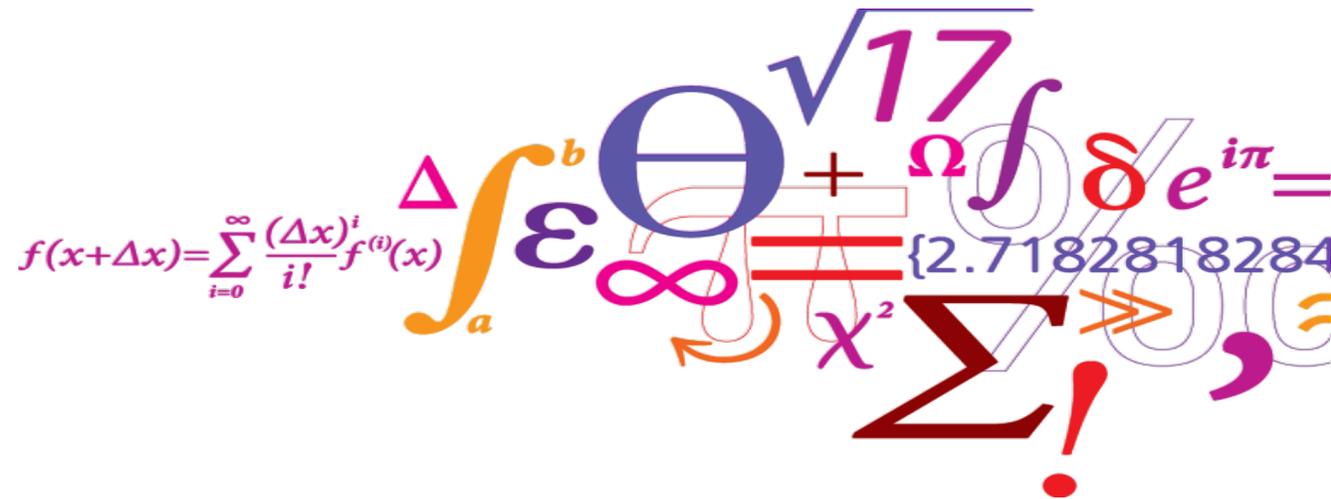
# Blended learning in Data technique and programming

Experiences

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## Topics

- Achieved results
- Background
- Different statistics
- Engagement
- Feedback from student
- Conclusion

## Problem statement

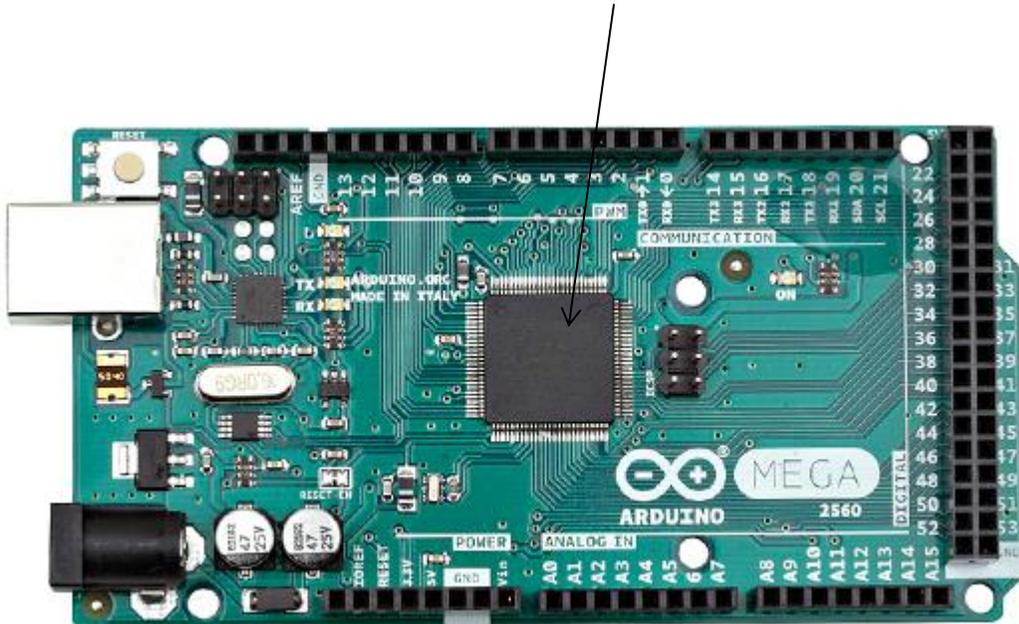
- *“Is it possible to compress 1 hours talk using slides to 5 to 10 minutes videos and to let the students be more active during the programming exercise?”*

## Results

- Students get 1 hour in average more for making programs
- Students learning outcome is approved
- Students can prepare everywhere
  - E-book
  - Videos – with slides and tutorials

# Curriculum – learning outcome

What can It do and how?



## the objectives of the course :

- Design and implement a structural program for a small microcontroller system
- Using C-language for control structures, pointers, data structures, functions and finite state machines
- Can use hardware C programming for activating the different hardware units, ports, timers, serial units etc.
- **Can explain the architecture of a microcontroller, memory hierarchy, registers and its operations**
- Can read the datasheet for a given microcontroller and use it in the C-programming
- Understand the difference between polling and interrupts and can use it appropriately in c-programs
- Verification of c-modules and make integration test using appropriately tools
- Carry out c-programming for a microcontroller interfacing different peripheral units
- **Can use a professional development tool**
- Carry out documentation for a c-program for an embedded system

The red is supported by video

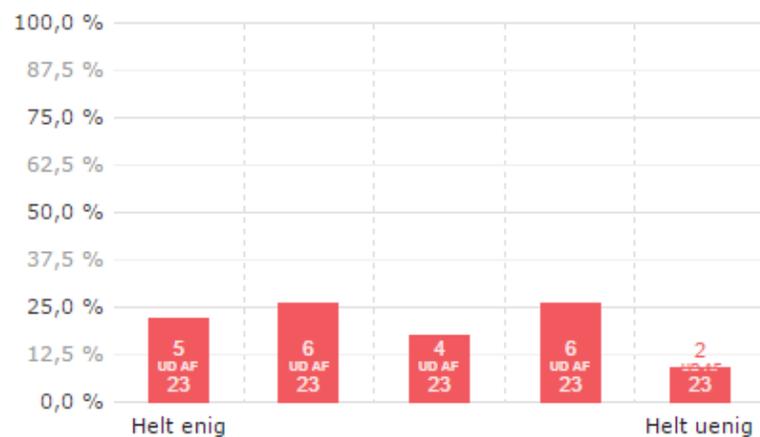
# Background

- Lecture 2 – 2½ hour slide series and blackboard
- Demo coding live demo
- 1½ left for supervising groups of 2 to 3 students plus extra during lunch until 14 -15 o'clock
- 4 assignments for hand-in progression incl. documentation
- 25 stud. in average fall
- 55 stud. in average Spring
- Exam
  - Report covering the last assignment – evaluated
  - Oral exam drag a question know before hand – 10 minutes exam
  - Grading by evaluating both together
- Inspired from
  - Blended learning course at Learning lab Spring 2016
  - Article about MOOC video production affects

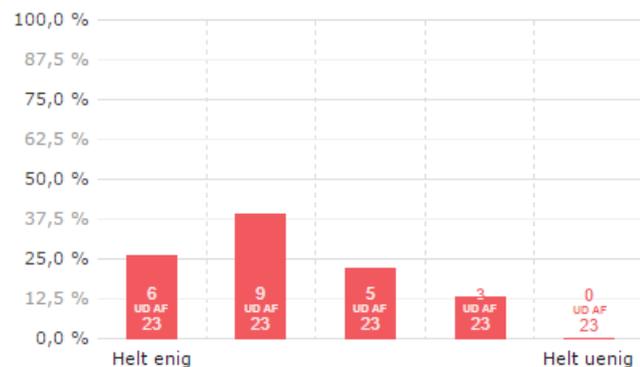
# Evaluation - midterm

- Fall 2016 23 – out of 30

1 Jeg synes, at jeg lærer meget i dette kursus



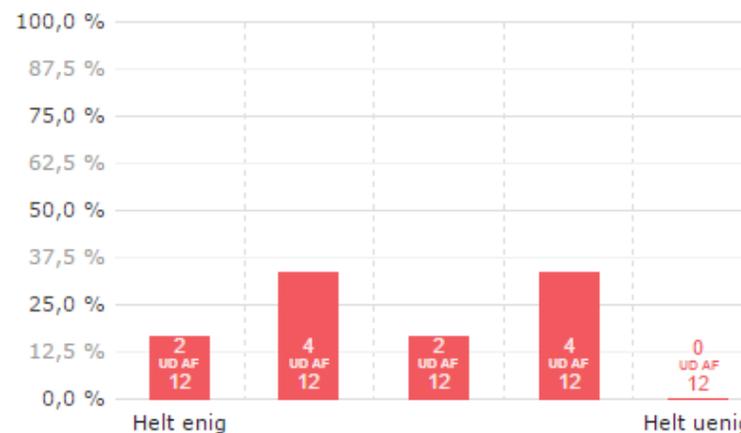
2 Jeg synes, at undervisningsforløbet lægger op til min aktive deltagelse



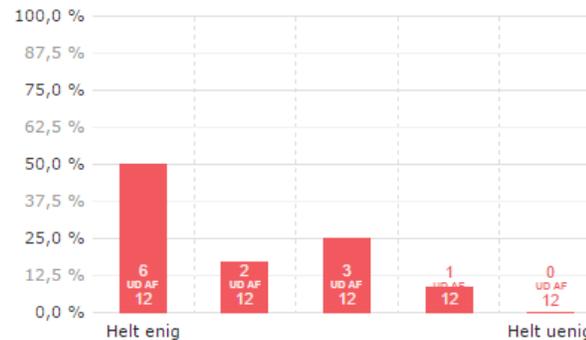
Spring 2016

12 out of 50

1 Jeg synes, at jeg lærer meget i dette kursus



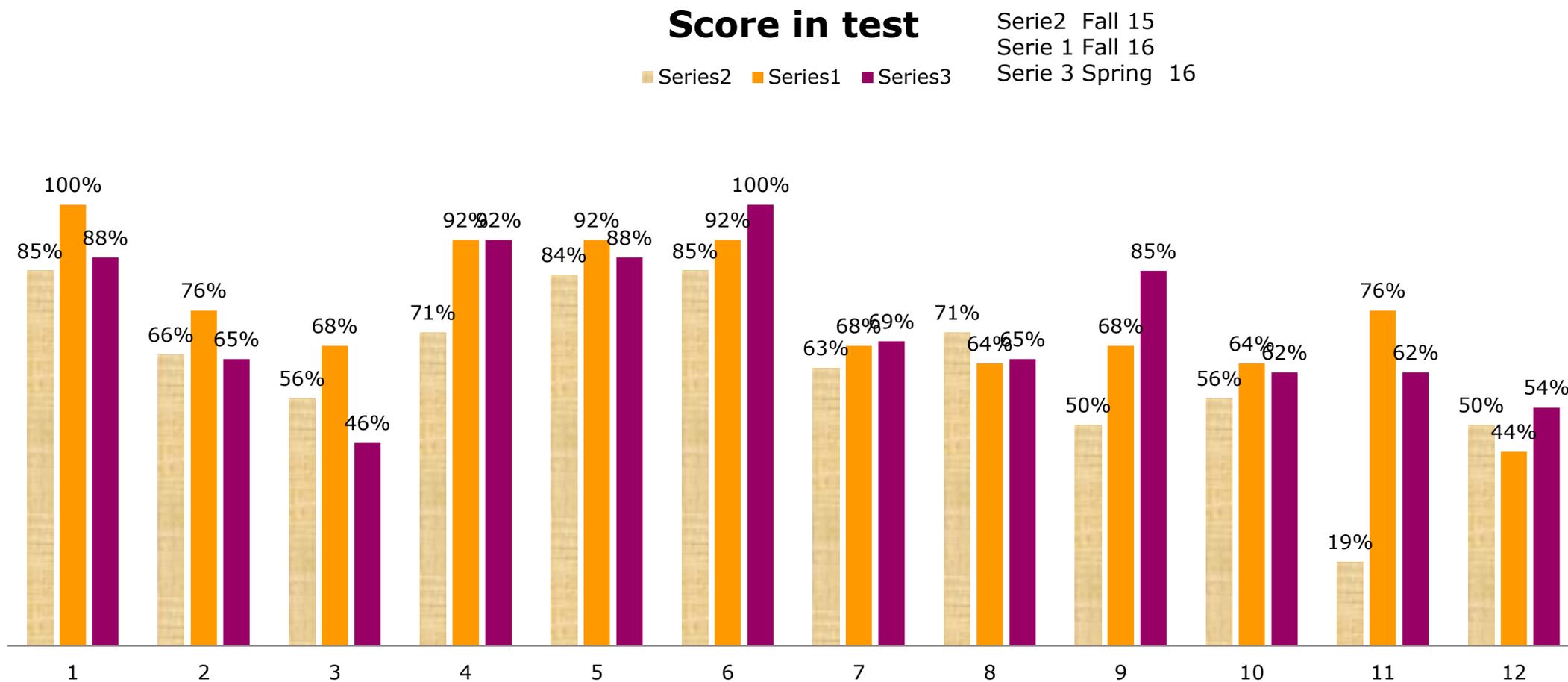
2 Jeg synes, at undervisningsforløbet lægger op til min aktive deltagelse



### Some comments from the midterm evaluation week 6 – fall 2016

- Feels there has been a continuous progress from time to time, as the teaching method gradually fall more and more in place, immediately supporter of "Flipped Classroom" principle. **More time with hands on and supervising is clearly the best.**
- It would be great if preparatory videos are named for example lesson: 2, 3 ... etc. That also began at last :-) This makes it easier to prepare.
- Yes, but I thought they could be more detailed, so the course could almost be an e-course at home, with coding on campus.
- Yes
- Yes, they are good to quickly get an overview of the topic.
- A little. But better structuring of the videos and better recording quality would help. Low possibly a manuscript that can be read from when narrating the videos, so that's 100% track of what needs to be said and how, when to recording.
- Yes

# Learning outcome –multiple choice test week 5



# How Video Production Affects Student Engagement: An Empirical Study of MOOC Videos

Finding	Recommendation
Shorter videos are much more engaging.	Invest heavily in pre-production lesson planning to segment videos into chunks shorter than 6 minutes.
Videos that intersperse an instructor's talking head with slides are more engaging than slides alone.	Invest in post-production editing to display the instructor's head at opportune times in the video.
Videos produced with a more personal feel could be more engaging than high-fidelity studio recordings.	Try filming in an informal setting; it might not be necessary to invest in big-budget studio productions.
Khan-style tablet drawing tutorials are more engaging than PowerPoint slides or code screencasts.	Introduce motion and continuous visual flow into tutorials, along with extemporaneous speaking.
Even high quality pre-recorded classroom lectures are not as engaging when chopped up for a MOOC.	If instructors insist on recording classroom lectures, they should still plan with the MOOC format in mind.
Videos where instructors speak fairly fast and with high enthusiasm are more engaging.	Coach instructors to bring out their enthusiasm and reassure that they do not need to purposely slow down.
Students engage differently with lecture and tutorial videos	For lectures, focus more on the first-watch experience; for tutorials, add support for rewatching and skimming.

Table 1. Summary of the main findings and video production recommendations that we present in this paper.

## Type of video's

- Slide show with talk
- Screen recording using the IDE explaining a code example
- Screen recording using the simulator – watch how the processor operate on register level
- Screen recording where writing a small program example is done
- Recording of a live demo in the lecture

## You tube video's- not public

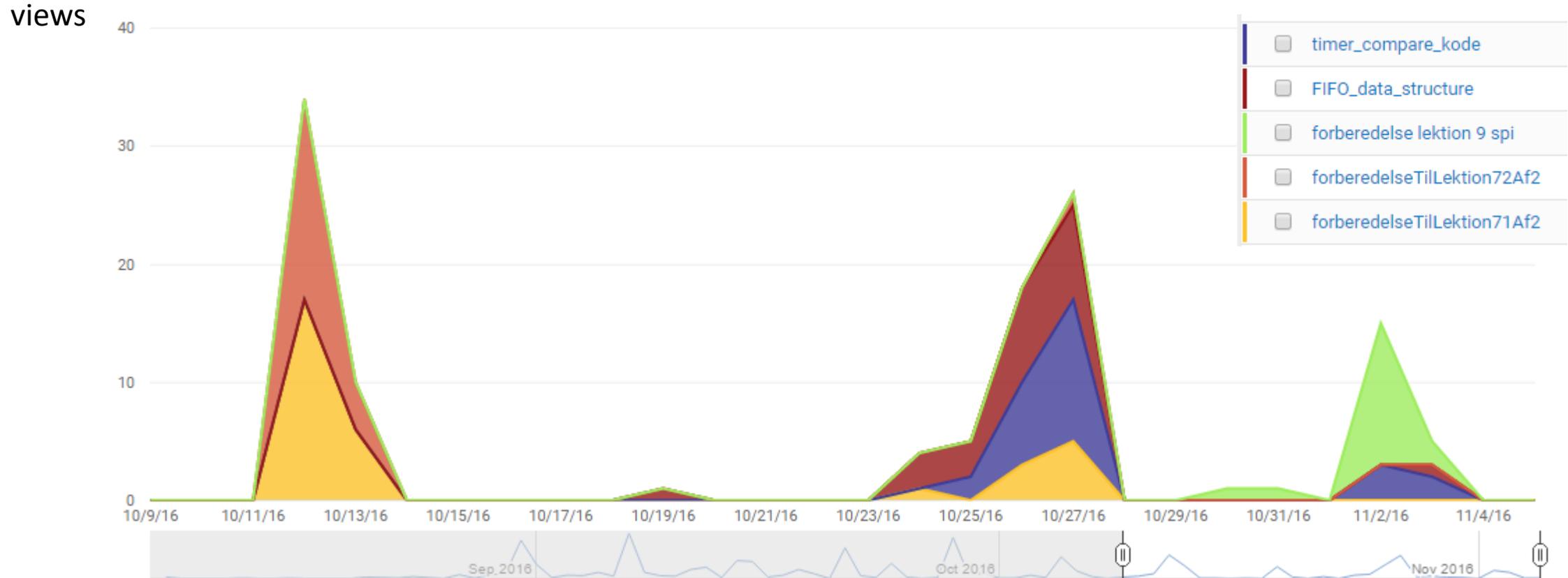
- Only students who knows the link can find the videos [playliste](#)
- Statistic

# Quiz after watching a video

- Google with few questions

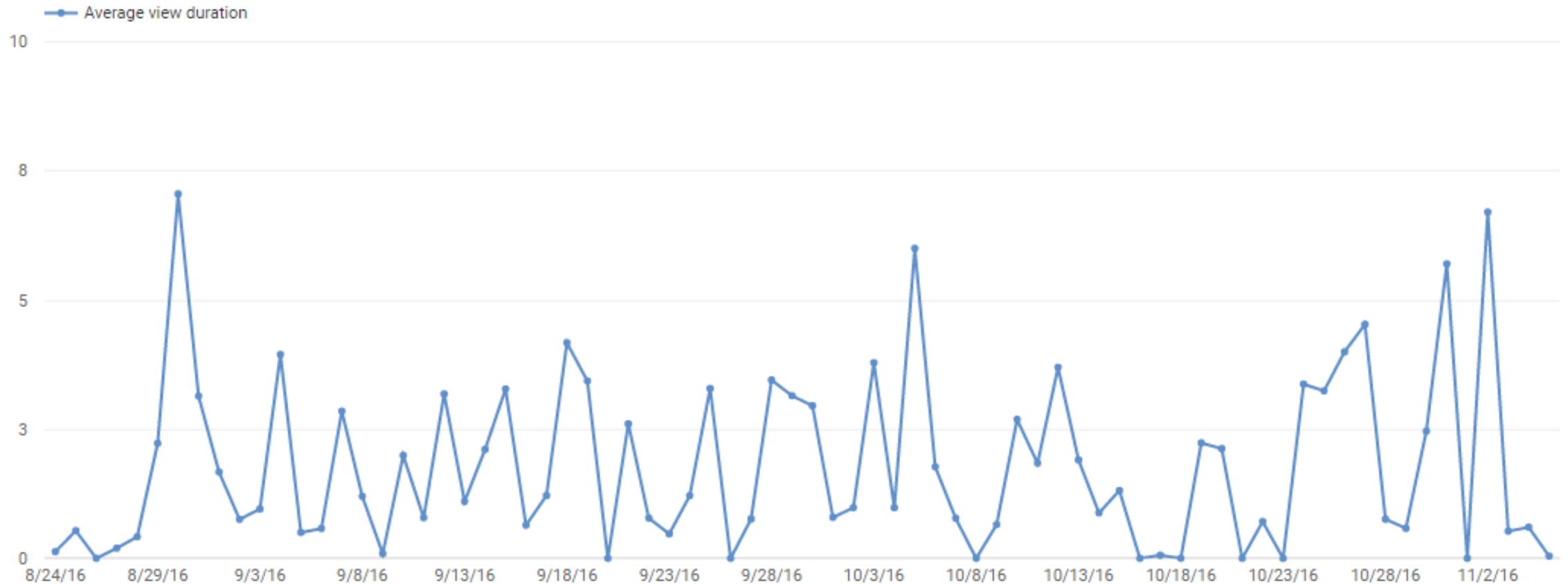
# How many did watch video's for how long?

# One month view watching statistic



Source: <https://www.youtube.com/analytics?o=U#dt=nt,fe=17110,fr=lw-001,fs=17083;fc=0,fcr=0,r=views,rpa=a,rpbm=110-120-,rpd=4,rpg=7,rpm=a,rpp=0,rppc=0,rpr=d,rps=93,rpsd=1,rpt=0>

# Average view time 10 sep. to 4 nov

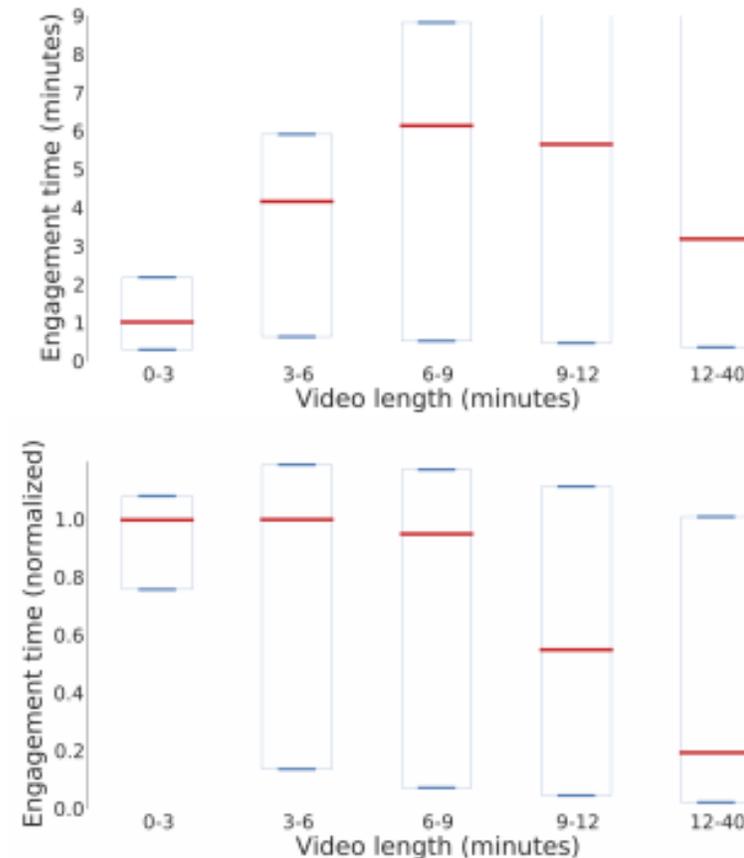


Typical seen the day before or when e-mail gets out

# Different Strategies for getting awareness

	Watch time (minutes)  ↓	Views 	Average view duration 	Average percentage viewed 
<a href="#">timer compare kode</a>	140 (16%)	26 (9.6%)	05:23	45%
<a href="#">FIFO data structure</a>	130 (15%)	24 (8.9%)	05:24	42%
<a href="#">forberedelse lektion 9 spi</a>	124 (14%)	16 (5.9%)	07:45	69%
<a href="#">forberedelseTilLektion72Af2</a>	122 (14%)	22 (8.1%)	05:32	38%
<a href="#">forberedelseTilLektion71Af2</a>	121 (14%)	32 (12%)	03:47	40%
<a href="#">demo receive complete Interrupt</a>	49 (5.6%)	20 (7.4%)	02:26	33%
<a href="#">simulering timer compare match</a>	40 (4.6%)	11 (4.1%)	03:38	51%
<a href="#">forberedelse til lektion6</a>	29 (3.4%)	16 (5.9%)	01:50	14%
<a href="#">brug af extra uart for testing</a>	21 (2.4%)	22 (8.1%)	00:56	34%
<a href="#">Atmel studio simulering af pull up og bit maske funktion</a>	12 (1.4%)	4 (1.5%)	03:01	44%
<a href="#">introduktion 62734</a>	11 (1.2%)	2 (0.7%)	05:24	51%
<a href="#">Arkitektur og hukommelse</a>	9 (1.0%)	5 (1.9%)	01:42	17%
<a href="#">using the simulator in atmel studio7</a>	8 (1.0%)	4 (1.5%)	02:06	29%
<a href="#">Microprocessor og microcontroler arkitekture lektion1</a>	8 (0.9%)	3 (1.1%)	02:31	23%
<a href="#">timer compare match kodning</a>	6 (0.6%)	2 (0.7%)	02:49	21%
<a href="#">Compilation Tool chain</a>	5 (0.6%)	3 (1.1%)	01:42	23%
<a href="#">PORTE i Atmega2560</a>	4 (0.5%)	5 (1.9%)	00:53	21%
<a href="#">How to enabling programming the arduino Mega</a>	4 (0.5%)	5 (1.9%)	00:53	18%
<a href="#">brug af stack</a>	4 (0.5%)	6 (2.2%)	00:42	19%
<a href="#">Instruction and operation</a>	4 (0.5%)	1 (0.4%)	04:04	71%

# Engagement in MOOC course



**Figure 2. Boxplots of engagement times in minutes (top) and normalized to each video's length (bottom). In each box, the middle red bar is the median; the top and bottom blue bars are 25th and 75th percentiles, respectively. The median engagement time is at most 6 minutes.**

Source: How Video Production Affects Student Engagement: An Empirical Study of MOOC Videos

## The challenge – how to get awareness

By using:

- the slide series with link
- the calendar in Campusnet
- the campusnet message :

– ex:

*then material and video is ready*

*watch video on <https://youtu.be/4keMGm7ee1Y>*

*take the quiz on <https://goo.gl/forms/qS9KxXO5bFHm7I333>*

*read the book Chapter 16 only acting on mega2560 not XMEGA examples and not assembler code!*

# Download activities from Campusnet

Type	Version (størrelse)	Dato	Ejer	Downloads	Markér
zip	Version 2 (22 KB) eksemple program til simulering brug af stack - you tube video om det lektion 3	19-09-2016 11:19	Ole Schultz	<u>18</u>	<input type="checkbox"/>

## demo\_receive\_interrupt\_buffer.zip

Type	Version (størrelse)	Dato	Ejer	Downloads	Markér
zip	Version 1 (56 KB)	05-10-2016 17:22	Ole Schultz	<u>33</u>	<input type="checkbox"/>

## What do you think

- Any ideas for getting more engagement, attention, awareness for preparation?
- [Open this document](#) and give at least one input per pair

## Engagement in the lecture

- Results from the online preparation quiz as a revision
- Using code questions – write a code statement in google form and results shown immediately after
- Multiple choice test – at ex. selecting a c-statement
- Poll's in Campusnet about the lecture-talk

## Example on questions for revision

### kodeopgave 4\_2016e

Form description

Opskriv i C statements for hvornår der kan læses en byte på UART1 \*

polling på et flag i statusregisterX- hvilket flag

Long answer text

Opskriv interrupt service rutinen for timer1 for compare match OCR1A interrupt

Long answer text

Læsning på en input pin1 tilhørende PORTD register - vælg det rigtige \*

- char var=PORTD & 0x02
- char var=PIND & 0x02
- char var=PORTD | 0x02
- char var=PIND | 0x02

# Answer examples

Opskriv i C statements for hvornår der kan læses en byte på UART1

(13 responses)

```
while(!(UCSR0A&(1<<RXC0)));
```

```
while(!(UCSR0A&(1<<RXC0)));
```

```
while(!(UCSR1A & (1<<RXC1))); (correct)
```

```
if (byterecieved == 1)  
data = URD1
```

```
UDR0
```

```
Pas
```

```
ISR(UART1_RX_VECT)
```

```
while(!(UCSR0A&(1<<RXC0)));
```

Opskriv interrupt service routinen for timer1 for compare match OCR1A interrupt

(12 responses)

```
ISR(TIMER1_COMPA_vect)
```

```
ISR(TIMER1_COMPA_vect)
```

```
TIMSK1|=(1<<OCIE1A);
```

```
TIMSK1|=(1<<OCIE1A);
```

```
ISR(TIMER1_COMPA_vect)
```

```
ISR(TIMER1_COMPA_vect)
```

[Embedded videos in google forms](#)

## How do students check their learning

- Using multiple choice check questions
  - Useful?
- Using quiz's - google forms
  - Useful?
- Poll's on Campusnet
  - Useful?
- Alternative? What do you think?
- [Give input here: https://goo.gl/forms/JG4IXOCRmwQ3jb123](https://goo.gl/forms/JG4IXOCRmwQ3jb123)

## Blog for sharing knowlegde

- <http://62734.blogspot.dk/>

## Questions – survey

### Survey

Why do you not watch the video's

*I should watch the videos for my own sake, but I have a lot of work with the other courses on the study and it will therefore be down prioritized to view the videos*

*Often I forget it or else I cannot find the time to put a little over an hour in line to watch a video while you have to read the book. But using them frequently if there is something I am in doubt as I can go in and find what I need.*

*Suggestions:*

Greater focus on e-learning, making it possible to substantiate any teaching on these videos, so you can go directly to the coding of the lessons.

## Conclusion

- Short video's max 5 minutes – informal setting with picture of the speaker
  - Quiz after watching the video
  - Revision questions
  - More time for active coding/programming
  - Better quality of the 3rd and 4th assignment re. previous
- 
- Challenge getting the full engagement