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Semi-Flipped Classroom with Scalable-Learning and CATs

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Semi-Flipped Classroom with Scalable-Learning and CATs

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- The project aims to propose an **improved format** for the **problem solving sessions** in the course *Automatic Control I (1RT490)*.
- The session format should encourage **active learning**, while improving **student attendance** for these *optional* problem solving sessions.

Outline

- Automatic Control I is given to engineering students in year 3 and 4.
- The course is given three times per year.
- It contains lectures, optional computer labs, mandatory process labs and *7 optional problem solving sessions*.
- Traditionally, these problem solving sessions consisted of the **teacher** solving different problems on the board, while the students remained relatively **passive**.

- To instead promote **active learning**, the session format was modified in 2018.
- The new format was inspired by the **flipped classroom** concept:
  - Students should passively listen to lectures at home and actively solve problems in-class with the teacher, not the other way around.
- **Online videos** with step-by-step solutions to 3-5 problems per session were thus recorded and uploaded to the online platform **Scalable-Learning**.
- The students were to watch these online videos **prior** to the in-class session, and instead spend the session asking questions and actively solve problems.

- This new session format was evaluated in a previous pedagogical project.
- While the students appreciated the online videos, **only a few** actually watched a significant number of them (Scalable-Learning provides this info).
- Most students asked for a more **teacher-focused** session format (the teacher solving problems on the board and reviewing relevant theoretical concepts).
- Student attendance and interest for the problem solving sessions also seemed to have **dropped** (*"...I might as well solve the problems at home..."*).

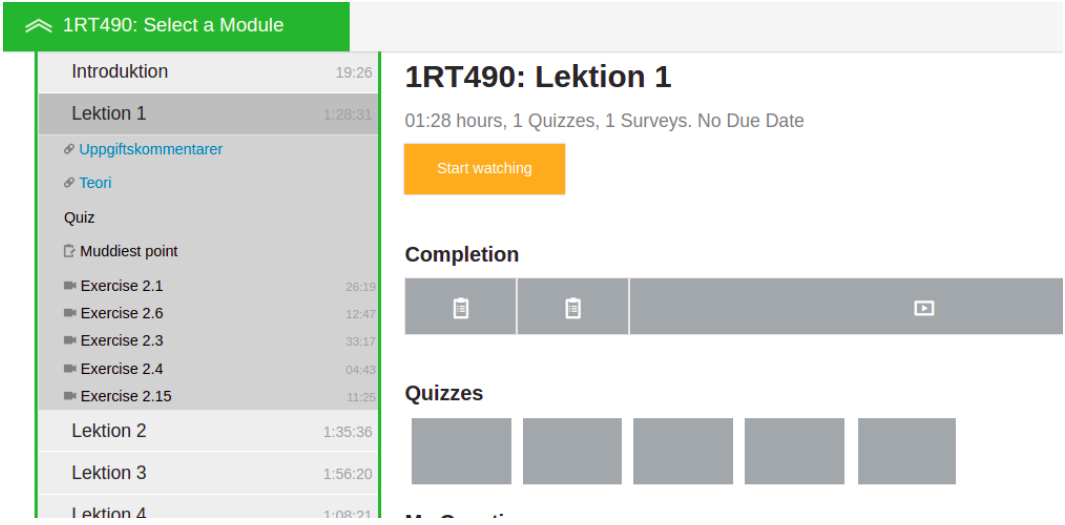
- Our main goals for the problem solving sessions thus seem partially conflicting:
  - We want to promote **active learning**, requiring that a significant portion of the session is devoted to the **students** solving problems.
  - We want to improve **student attendance**, (seemingly) requiring that a significant portion of the session is devoted to **teacher-focused** activities.
- If we only can convince a small number of students to actively solve problems (and the rest do not even attend the sessions), is it better to instead "give the students what they want" and implement a teacher-focused session format? Is **a lot of passive learning** better than **a small amount of active learning**?
- Or is there an "optimal" compromise? **Semi-flipped classroom**?

Outline

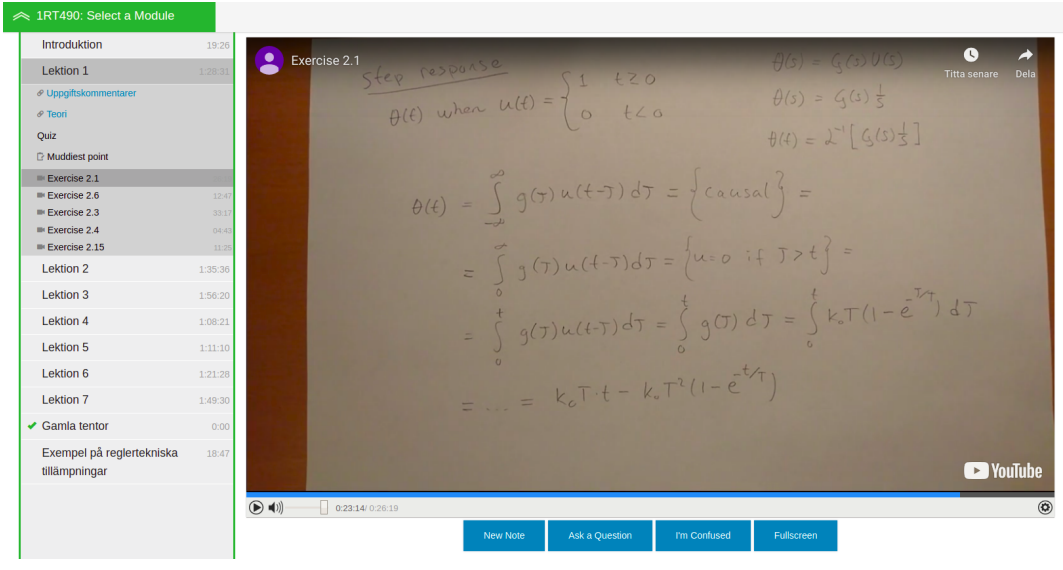
- The project aim was met by suggesting a session format in which:
  - **An equal amount of time** (45 min) is devoted to teacher-focused activities and student-active problem solving.
  - **Two CATs are incorporated**: *background knowledge probe* and *muddiest point*.
- **Background knowledge probe** is incorporated by creating a multiple-choice quiz for each session on *Scalable-Learning*. The quiz is based on a corresponding pdf containing a review of relevant theory.
- **Muddiest point** is incorporated by creating a free-text question for each session on *Scalable-Learning* (*"What in the course do you find most confusing / most difficult to understand at the moment?"*).

Outline

- The proposed problem solving session format is as follows:
  - The students are asked to **solve the quiz** and **answer the muddiest point question** on Scalable-Learning **prior** to the in-class session.
  - **The teacher analyzes the responses** on Scalable-Learning **prior** to the session.
  - The session begins with a **review of the quiz**.
  - The responses (both to the quiz and muddiest point) then guide what concepts the teacher mainly focuses on during a **review of the relevant theory** for the session.
  - **The teacher solves 1-2 problems** on the board.
  - (15 min break)
  - The second half of the session is devoted to questions and **active problem solving by the students**.


1RT490: Select a Module
Introduktion 19:26
Lektion 1 1:28:31
Uppgiftskommentarer
Teori
Quiz
Muddiest point
Exercise 2.1 26:19
Exercise 2.6 12:47
Exercise 2.3 33:17
Exercise 2.4 04:43
Exercise 2.15 11:25
Lektion 2 1:35:36
Lektion 3 1:56:20
Lektion 4 1:08:21
1RT490: Lektion 1
01:28 hours, 1 Quizzes, 1 Surveys. No Due Date
Start watching
Completion
Quizzes

3. Results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Exercise 2.15 11:23
Lektion 2 1:35:36
Lektion 3 1:56:20
Lektion 4 1:08:21
Lektion 5 1:11:10
Lektion 6 1:21:28
Lektion 7 1:49:30
Gamla tentor 0:00
Exempel på reglertekniska tillämpningar 18:47
Exercise 2.1
Titta senare
Dela
Step response
θ(t) when u(t) = {1 t≥0, 0 t<0
θ(s) = G(s)U(s)
θ(s) = G(s) 1/s
θ(t) = L⁻¹[G(s) 1/s]
θ(t) = ∫ g(τ)u(t−τ)dτ = {causal} =
= ∫ g(τ)u(t−τ)dτ = {u=0 if τ>t} =
= ∫ g(τ)u(t−τ)dτ = ∫ g(τ)dτ = ∫ k₀T(1−e^{−τ/T})dτ
= ... = k₀T·t − k₀T²(1−e^{−t/T})
YouTube
0:23:14/ 0:26:19
New Note
Ask a Question
I'm Confused
Fullscreen

3. Results

Quiz-frågor: länk

Samtliga frågor kan besvaras med hjälp av lektionens tillhörande teori: länk

1. Fråga 1

- [ ] a
- [x] b
- [ ] c

2. Fråga 2

- [x] a
- [x] b
- [x] c
- [ ] d

3. Fråga 3

- [x] Sant
- [ ] Falskt

Saved at: 12/11/2019, 9:29:25 AM

Submit Next

3. Results


Muddiest point
(Optional)
Attempt number : 1/1000
1. Vad i kursen upplever du som mest oklart / svårast att förstå just nu?
Submit

Outline

- Devoting an equal amount of time to teacher-focused activities and student-active problem solving seemed like the most natural compromise (45 min is hopefully enough to attract students who prefer the traditional session format, while being enough for the students to actually solve a couple of problems on their own).

- **Background knowledge probe** (quizzes) will hopefully give the teacher a better understanding of what knowledge the students have acquired during lectures, and encourage students to actively process important theoretical concepts.

- **Muddiest point** will hopefully be a practically convenient way of encouraging and collecting continuous student feedback.

- What if no students bother to solve the quiz or answer the muddiest point question prior to the session?
  - This problem can hopefully be (at least partially) mitigated by clearly explaining the purpose of these preparatory tasks.
  - Otherwise, the quiz can still be solved in the beginning of the in-class session, and the theory review can be adapted to what questions seemed most confusing among the students in attendance.

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- The proposed problem solving session format is probably not perfect either.
- The format needs to be **continuously evaluated and improved!**
- I suggest that the format is evaluated with specific questions in the course evaluation, for example:
  "Would you prefer that more/less time of the problem solving sessions was devoted to student-active problem solving?"

- Questions, suggestions or comments?