



Flipping the classroom

AIMMS workshop May 2019

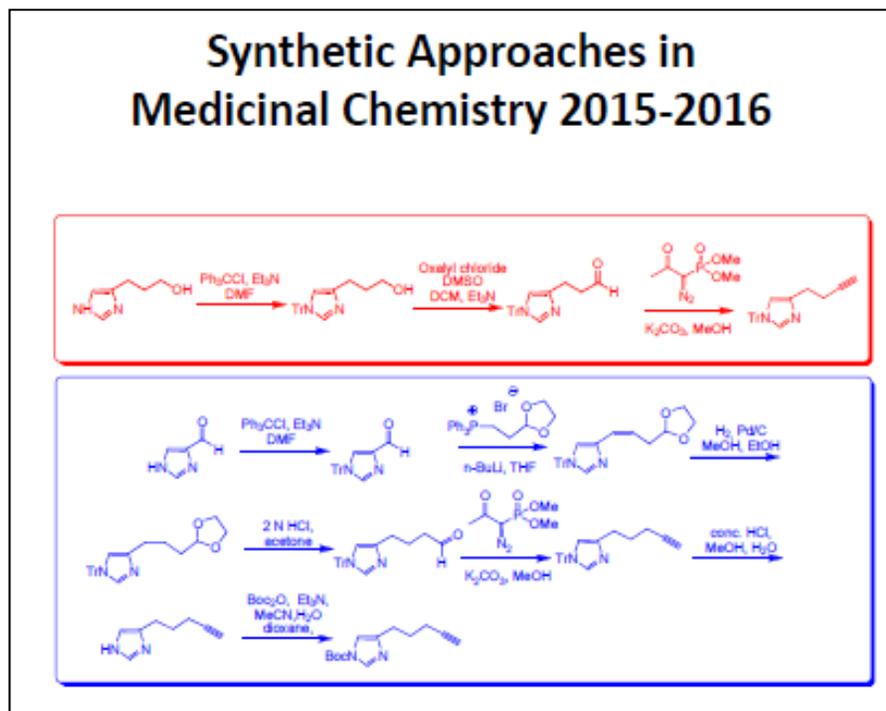
Maikel Wijtmans

Division of Medicinal Chemistry



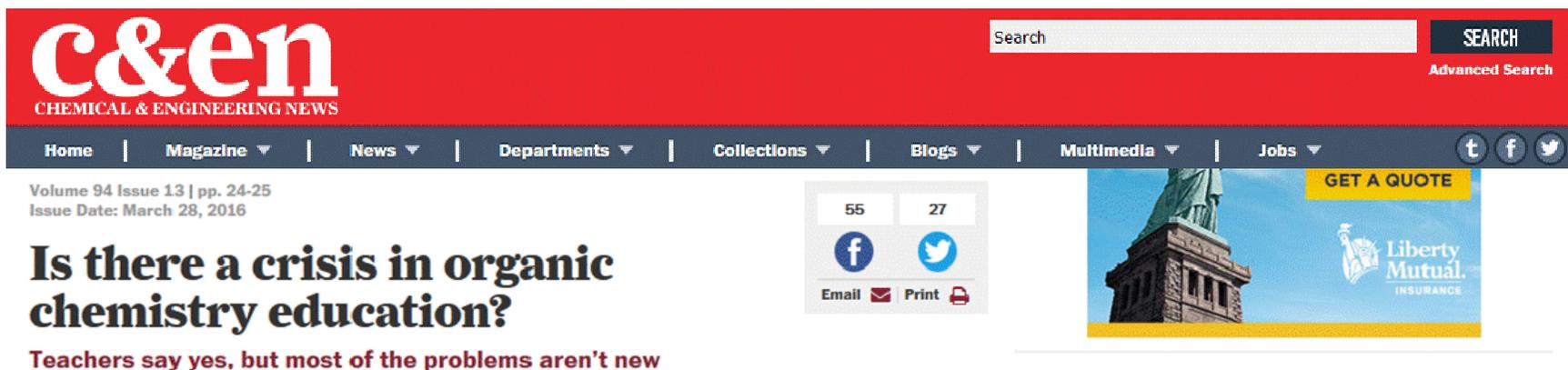
The course

- **Synthetic Approaches in Medicinal Chemistry**
 - Master Drug Discovery and Safety
 - Specialistic course
 - Small scale (ca. 10-15 people)
 - Large amount of course material



Organic Chemistry

- Organic chemistry: tough
 - PRACTICE!
 - Global reputation: new methods welcome



The screenshot shows the top of a C&EN article page. The header is red with the 'c&en' logo and 'CHEMICAL & ENGINEERING NEWS'. A search bar is on the right. Below the header is a navigation menu with links for Home, Magazine, News, Departments, Collections, Blogs, Multimedia, and Jobs. The article title is 'Is there a crisis in organic chemistry education?' with a sub-headline 'Teachers say yes, but most of the problems aren't new'. The article is from Volume 94 Issue 13, dated March 28, 2016. There are social media sharing options for Facebook (55 shares) and Twitter (27 shares), along with Email, Print, and a printer icon. A Liberty Mutual Insurance advertisement is visible on the right side of the page.

Orgo teachers hope that their students come to realize that organic chemistry operates through just a few underlying fundamentals, she said, but the students often can't see them. "Our studies have shown they can go through an organic chemistry course and not understand some fundamental ideas."



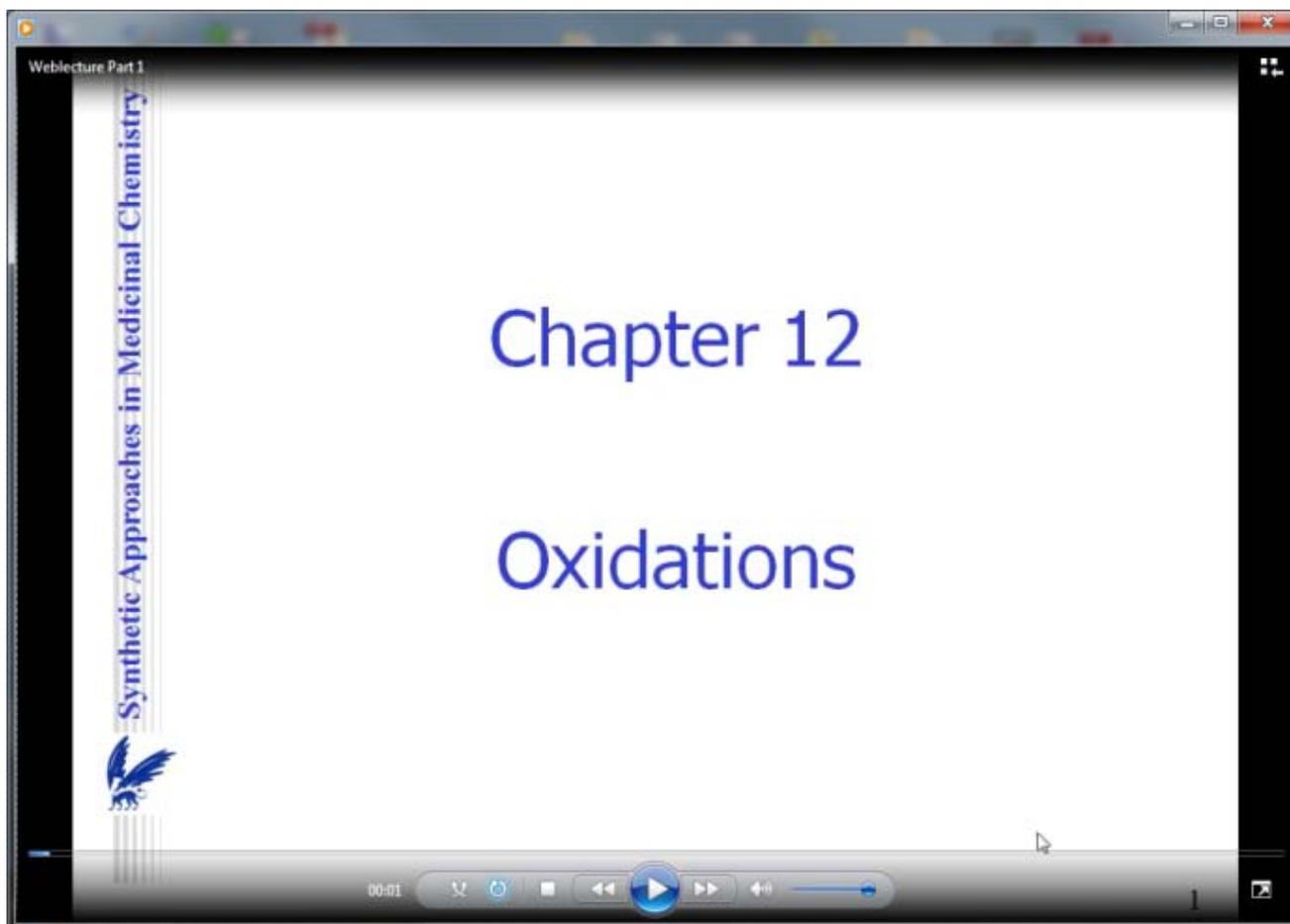
My 'Flipped' journey

- **Organic chemistry: tough**
 - PRACTICE!
 - Global reputation: new methods welcome
- **Started efforts in 2011**
- **Goals:**
 - Alternative way (conceptual) of teaching organic chemistry
 - New master program left gap in Period 4: two rounds?
- **Approach:**
 - Record all lectures
 - Recycle for self study: all contact time for interaction/practice



My 'Flipped' journey

- Recording with Camtasia & laptop teacher
 - MP4s



2010-2011

2011-2012

2012-2013

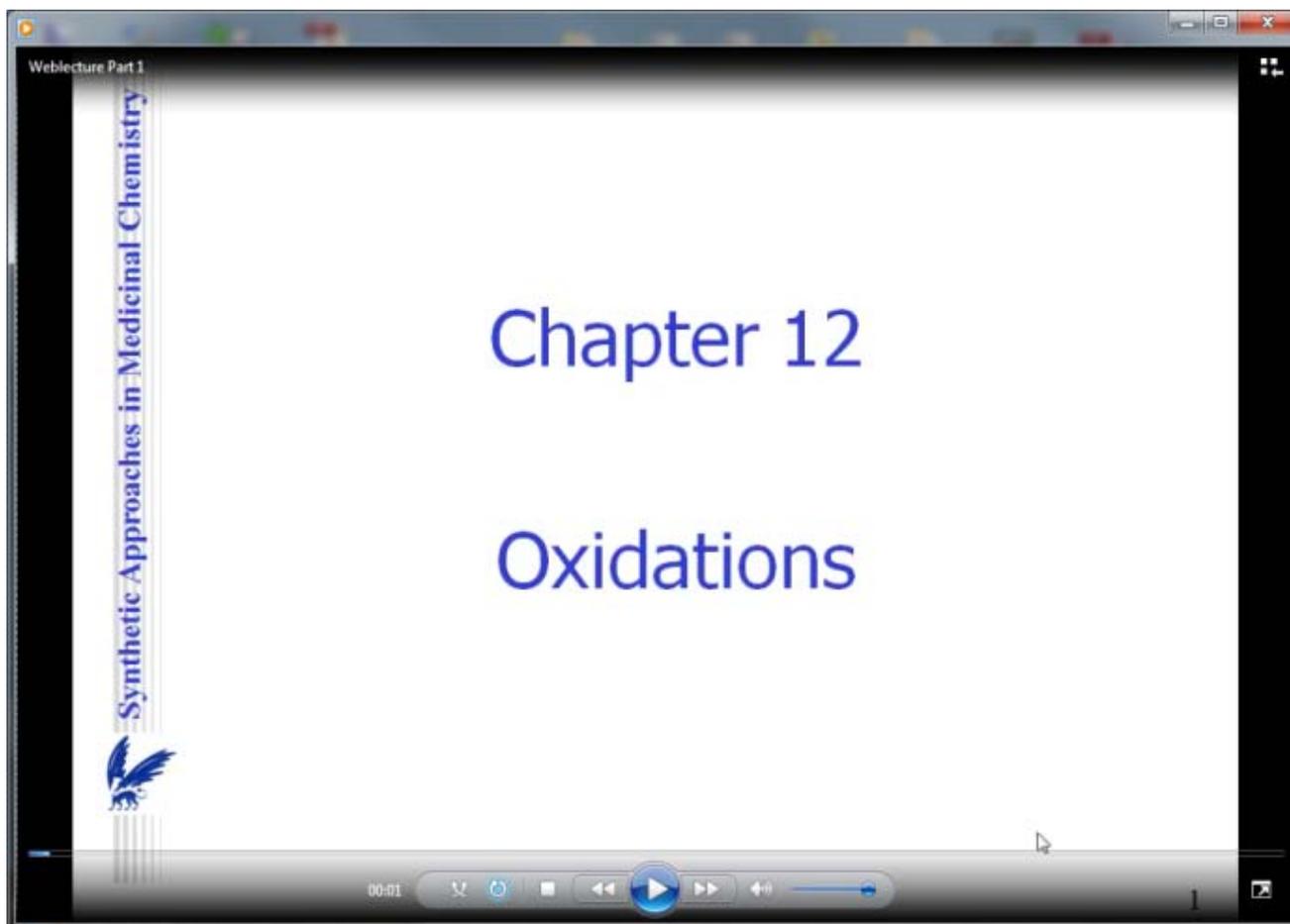
2013-2014

2014-2015
& onwards



My 'Flipped' journey

- Flipped classroom with MP4s
 - Twice a year!



2010-2011

2011-2012

2012-2013

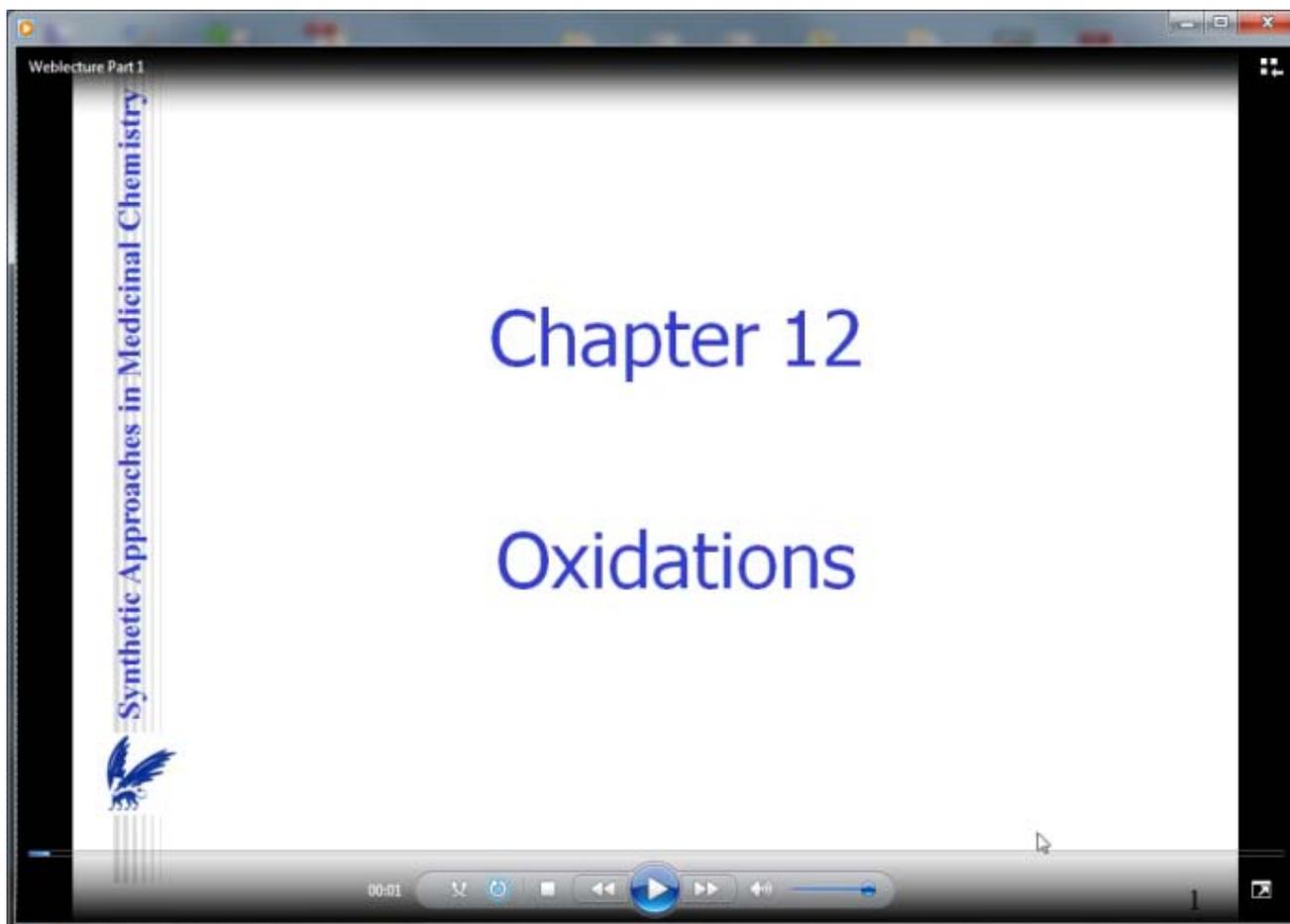
2013-2014

2014-2015
& onwards



My 'Flipped' journey

- Flipped classroom with MP4s
 - Scaled back to once/year; expanded # contact hours



2010-2011

2011-2012

2012-2013

2013-2014

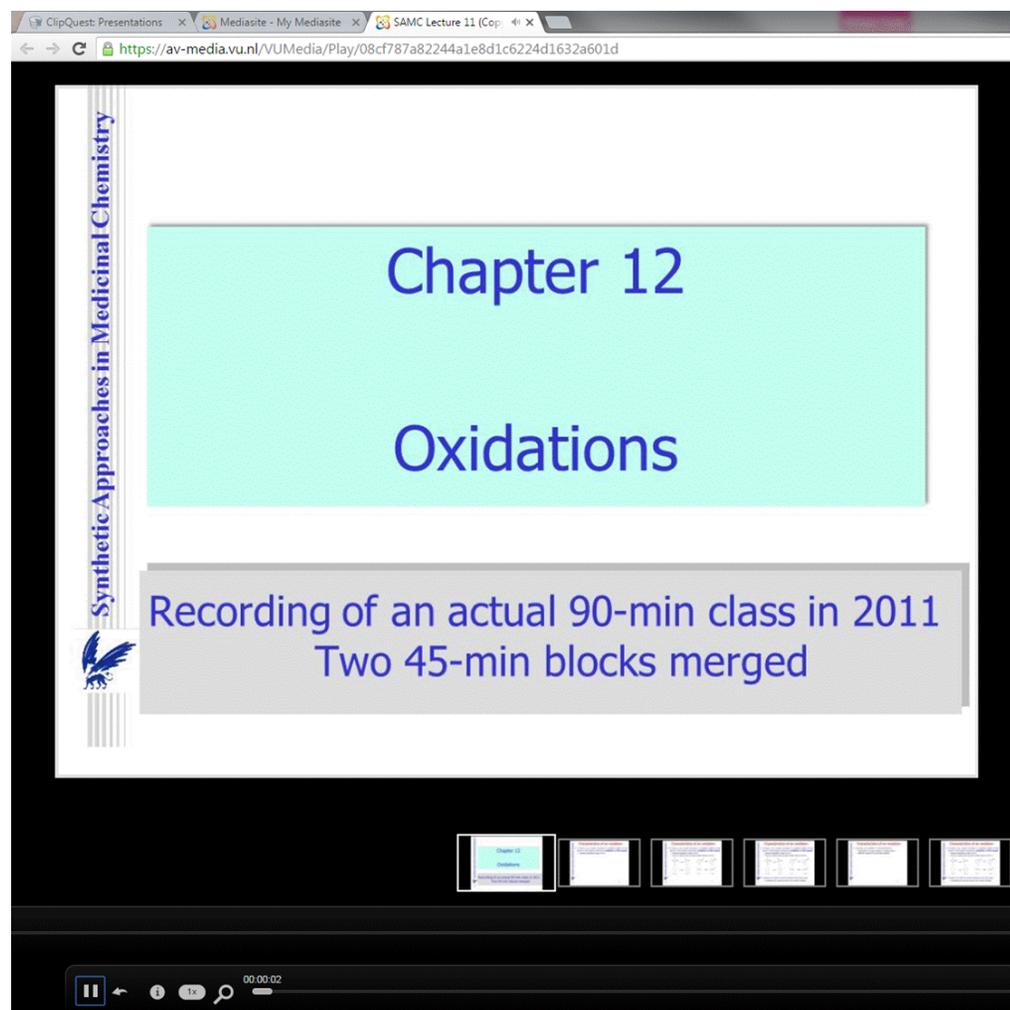
2014-2015
& onwards



My 'Flipped' journey



- Flipped classroom with MediaSite slidecasts
 - MP4s transferred to MediaSite



2010-2011

2011-2012

2012-2013

2013-2014

2014-2015
& onwards



Approach 2014-2015 onwards

- **Schedule**

Oct 26, 11.00-12.45:	Intro
Oct 28, 11.00-12.45:	Chapters 1 & 2
Nov 2, 11.00-12.45:	Chapter 3
Nov 4, 11.00-12.45:	-----
Nov 9, 11.00-12.45:	Chapter 4
Nov 11, 11.00-12.45:	Chapter 5
Nov 16, 11.00-12.45	Chapter 6/Question time
Nov 18, 9.00-12.00:	Exam #1
Nov 23, 9.00-10.45:	Chapter 7
Nov 25, 11.00-12.45:	Chapter 8
Dec 2, 11.00-12.45:	Chapter 10
Dec 4, 11.00-12.45:	Chapter 11
Dec 7, 11.00-12.45:	Chapter 12
Dec 9, 11.00-12.45:	Paragraph 3.6/Question Time
Dec 16, 9.00-12.00:	Exam #2



Approach 2014-2015 onwards

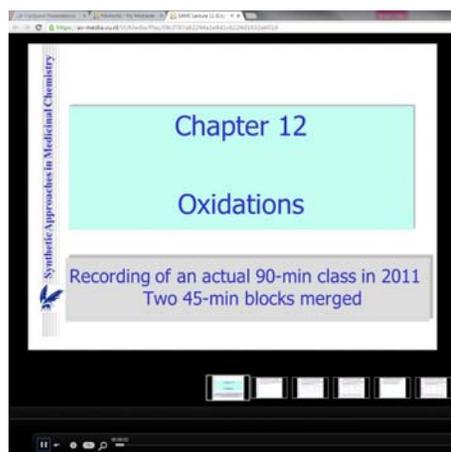
- **Intro**
 - A single regular lecture
 - Setting the stage

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Approach 2014-2015 onwards

- **Prior self study required**
 - 11x105 min=19 hours

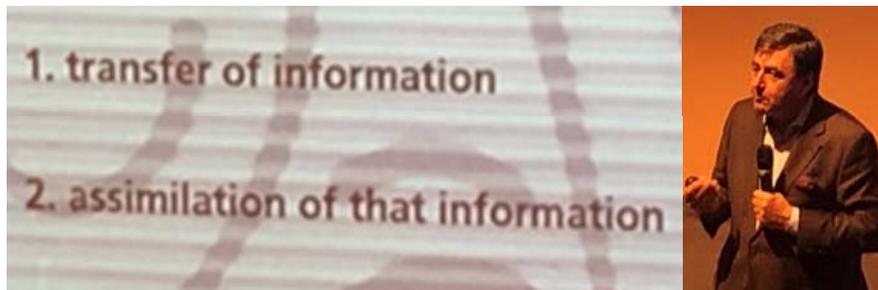


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Approach 2014-2015 onwards

- **Prior self study required**
 - 11x105 min=19 hours
- **Contact hours**
 - Questions about slide(cast)s
 - Problems on white board
 - Recent articles
 - Spontaneous articles
 - Lots of discussion/interaction



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Electronic engagement

- Viewing statistics 2015-2018
 - Incl. book; option to study PDF instead of slidecast

	4 years total
#students (exam)	
#students that watched >3h	
#students that watched >10h	
#students that watched \geq 19h	
Total hours watched	
Average watch time/student (exam)	

Electronic engagement

- Viewing statistics 2015-2018
 - Incl. book; option to study PDF instead of slidecast

	4 years total
#students (exam)	63
#students that watched >3h	59
#students that watched >10h	
#students that watched \geq 19h	
Total hours watched	
Average watch time/student (exam)	

Electronic engagement

- Viewing statistics 2015-2018
 - Incl. book; option to study PDF instead of slidecast

	4 years total
#students (exam)	63
#students that watched >3h	59
#students that watched >10h	51
#students that watched \geq 19h	38
Total hours watched	
Average watch time/student (exam)	

Electronic engagement

- **Viewing statistics 2015-2018**
 - Incl. book; option to study PDF instead of slidecast

	4 years total
#students (exam)	63
#students that watched >3h	59
#students that watched >10h	51
#students that watched \geq 19h	38
Total hours watched	1323h
Average watch time/student	21h

Strong electronic engagement



Retrospective grade analysis?

- Not possible properly
 - Groups too small
 - Variables (#exams, #contact hours, #periods, programme)
- Bird-eye's view:
 - No evident ↓ or ↑
- Focus on 'mode of approaching organic chemistry'

“Our studies have shown they can go through an organic chemistry course and not understand some fundamental ideas.”



Key evaluation results students

- **Three years combined (2013-2015)**
 - Own evaluation

"The videos/slidecasts were of sufficient quality and clarity for self-study"	86% ✓	3% ✗
"Interactive sessions contribute well to a better understanding of the class material"	90% ✓	0% ✗
"In SAMC, the Flipped Classroom method has more advantages than disadvantages compared to a 'classical' setup"	89% ✓	0% ✗

	2015	2014	2013
Next year again?			



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"In SAMC, the Flipped Classroom method has more advantages than disadvantages compared to a 'classical' setup"	89% ✓	0% ✗

	2015	2014	2013
Next year again?	4.69 / 92%	4.57 / 100%	4.82 / 100%



Key evaluation results students

- Three years combined (2013-2015)
 - VU evaluation

"Teacher encouraged students to think about the material"	100% ✓	0% ✗
"I learned a lot from this course"	100% ✓	0% ✗

2018: "(...) Also I think that the classes were very interactive, where we asked questions that maybe in another classes you do not ask and you never understand."



Evaluation teacher: Tips

- **Contact time**
 - Socratic approach needs time: a few students get impatient
 - Very intensive for teacher: continuous improvising/being challenged
- **Less suitable for 1st year BSc (colleague tried)**
 - Consider Blended instead



Evaluation teacher: Tops

- Less class preparation time teacher
- Contact hours: quality time teacher/student
 - Students participate
 - Highly interactive & continuous discussion
 - Fun!
- Forum for conceptual approach on orgchem
 - Understand underlying principles
- Forum for 'talking science'
 - Articles (planned/spontaneous)
 - Forum for showing scope/limitations science
 - "I don't know"
 - "What experiment would answer that question?"

