



Development of e-learning. Using SMART teaching technologies.

Case: course mathematics

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Development of e-learning. SMART teaching technologies

Lecture capturing

- Lecture capturing is increasingly in demand as a method of developing online lectures. Live lecture capturing is creating videos of the live lectures and is publishing them afterwards in the intranet, the LMS(learning Management System) or on YouTube. Lab developed lecture capturing is creating videos in a lab of a simulation of the lecture.



Development of e-learning. SMART teaching technologies

Lecture capturing is a method of developing online lectures.

- **Life lecture capturing** is creating videos of the life lectures and is publishing them afterwards in the intranet, the LMS (learning Management System) or on YouTube.
- **Lab developed lecture capturing** is creating videos in a lab being simulations of the lectures.



Life lecture capturing

3 types of life lecture capturing methods:

- *Life video lecture capturing during the face to face session.*
- *Capturing life video by combining the input with input from using a digital interactive whiteboard (smartboard)*
- *Screencasting of PC screen output (prepared in advance) and handwritten pen input on wacom display (during the session)*



Life lecture capturing

Life video lecture capturing during the face to face session.

:Oregon State University has implemented lecture capturing as a solution on institutional level.



Life lecture capturing

Capturing life video by combining the input with input from using a digital interactive whiteboard (smartboard) in connection with a PC, a projector and whiteboarding SW..

The whiteboard accepts PC output (prepared in advance) and finger and pen writing on the whiteboard (during the session). The end presentation file combining all the info will be available after class.

Missouri State university is a good example.

(<http://www.youtube.com/education?category=University/Mathematics>)



Life lecture capturing

Screencasting of PC screen output (prepared in advance) and handwritten pen input on wacom display (during the session) and screen capturing SW, results in a life presentation.

Hasselt University is capturing computer screen output created by combining in advance prepared presentation in PFD format with life handwriting annotations on a Wacom display (<http://www.wacom.com/en/business-and-education/products/pen-displays>) added as annotations during the session. After class the presentation can be available as a file or can be available as an online web video presentation



Lab lecture capturing

An online **simulation**/ presentation of a life lecture can be prepared offline using screen capture software and hand-writing facility on a Wacom display or another tablet.

***computer screen capturing** of a combination of prepared content (pictures, ppt slides, ...) with handwritten content and voice input, all created on a computer whiteboard and in a screen capturing software environment.

*The simulated lecture is **published as a flash-file online** (video file)



Examples

Some famous examples of application of *Lab developed lecture capturing to develop online courses* are

*Missouri State university),

<http://www.youtube.com/watch?v=kQCy0U0Zjg4>

*KHAN Academy

<http://www.khanacademy.org/math/differential-equations/first-order-differential-equations/differential-equations-intro/v/what-is-a-differential-equation>

*NROC

<http://nroc.remote-arnet.net/course/view.php?id=181>

*COURSERA

<https://www.coursera.org/course/mathematicalmethods>



CASE: Problem of mathematics

First year students in applied economic sciences experience problems with the course mathematics.

* ***Incoming students*** : a remedial activity before the start of the academic year.

* ***In the course:***

- students have a different mathematical attitude, and as a consequence need a different guidance.
- students need additional help to succeed in math.

* **an e-tutor**



CASE: Problem of mathematics

Pedagogical devide in Math teaching

In math teaching and learning two main patterns do exist:

- Traditionally, attention was and is still focused on **computational fluency**, linked with the capacity of solving mathematical exercises around learnt methods.
- But more and more the focus is changing to a new pattern of **conceptual understanding**, defined as understanding the mathematical concepts and procedures, resulting from applying in practice the learnt math concepts while solving business problems.



CASE: Problem of mathematics

Pedagogical devide in Math teaching

Challenge: to facilitate both

- computational fluency: teaching of topics or concepts, but reduced in time
- conceptual understanding: attention is paid to providing practical applications of concepts and on developing mathematical models.

The course will be **a hybrid course**, in an **experientially based** format by including an integrated **lab component**



A hybrid course teaching model

we decided on the following **hybrid course model**, composed of 5 components:

- 1.(online) individualised **remediation** of pre-requisite math knowledge.
- 2.A few **face-to-face lectures** introducing the concepts of the theory, and the applications in a business environment
- 3.a **practice session** in the classroom where students are guided in solving exercises
- 4.**Online lectures and practice** sessions to support individual learning
- 5.**online self-study exercises** and problems guided by the system



CASE: e-tutor course mathematics

The **math-e-tutor** is supporting students when learning mathematics

Video's: a simulation of the face-to-face classroom sessions.

Support of the selfstudy: additional exercises and support in that process.



Presentation of e-tutor

Our e-tutor is an example of **advanced technology**, a new technology applied to teaching and learning

Presentation: <http://vimeo.com/76821191>



E-tutor is conceptually strong

We developed 2 concepts:

1. **Lab-lecture capturing**: creating flash animations to present an online version of the class sessions of theory, applications and exercises
2. Supported self-study of **stepwise solving exercises**



Lab lecture capturing in e-tutor mathematics

The presentation part of the e-tutor is developed as a “lab lecture capturing” application.

- Attractive **visual presentations** of the theoretical modules: the concepts, the exercises and applications in business context.
- Software **Lecturescribe** (Clemson University) or Camtasia:
 - spoken + handwritten explanation
 - handwritten input on a **Wacom display**
 - published as a **flash file**.



Demo: presentation of theory

https://www.sugarsync.com/pf/D30739_7_8021410206

<https://math-e-tutor.uhasselt.be/>



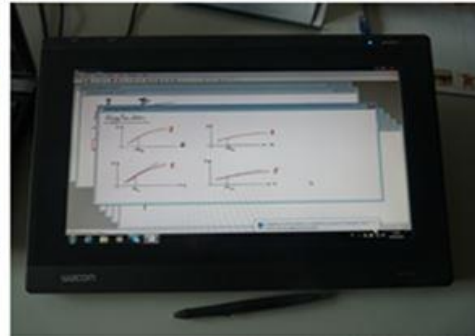
Demo: presentation example exercises

https://www.sugarsync.com/pf/D30739_7_8021411677



Lab lecture development infrastructure

PC + WACOM display + open source SW Lecturescribe



The lab infrastructure is composed of a multimedia desktop and a **Wacom display** with pen. **LectureScribe** is the open source software to develop the flash file.

Spoken explanations and handwritten input on a Wacom display are integrated and published as a **flash file**.



future opportunities

The **quality** of the online lectures is high and can **replace** the face-to-face lectures.

Discussion: why not moving some learning content to the online environment, thus **freeing face-to-face lecturing time for more problem solving activities in the classroom?**



Future opportunities

VISION:

- Flipped class
- Experiential learning in the classroom
- Support of students online individual learning: a mix of e-learning and life virtual communication and collaboration