Blending a MOOC with interactive teaching

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Agenda

- Context of E-learning in geomatics
- What is a MOOC
- Motivation for a MOOC in geomatics
- Scenario and resources development
  - Design
  - Content and structure
  - Video recording
- Implementation on a MOOC platform
- First session
- Perspectives
Context of E-learning in geomatics

- Geomatics is in the curriculum of the **first year** of civil and environmental engineering.
- This basic course has gathered an average of **200 students** over the last ten years.

- E-learning was introduced since 2004 with **online tools for calculus** (basics of surveying).
- Simultaneously, a learning management system (MOODLE) has been used for most of our lectures.
- Regular progress reports at FIG events, such as Munich (2006) and Sydney (2010)

Context of E-learning in geomatics

- **Scope of the first year course**
  **Fundamentals in geomatics**

- **Focus on:**
  - Geodesy, coordinates systems and map projection
  - Surveying (levelling, theodolite)
  - GPS
  - Digital surface model

- **Pre-requisites:**
  - Maths, geometry
  - Trigonometry
What is a MOOC?

- **MOOC = Massive Open Online Course**
  - **Massive**: unlimited access, great number of students
  - **Open**: access via the Web, open licensing of content
  - **Online**: interactive resources, interactions between students and instructors, forum of discussion

- or rather a **FLOT = Formation Libre Ouverte à Tous**

- **Major MOOC providers**

<table>
<thead>
<tr>
<th>Initiative</th>
<th>For profit</th>
<th>Free to access</th>
<th>Certification fee</th>
<th>Institutional credits</th>
</tr>
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<tbody>
<tr>
<td>EdX</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Coursera</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Partial</td>
</tr>
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<td>Udacity</td>
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<td>Partial</td>
</tr>
<tr>
<td>Udemy</td>
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<tr>
<td>P2PU</td>
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<td>Yes</td>
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</tbody>
</table>

Source: wikipedia (11.05.15)

Why a MOOC for geomatics?

- **EPFL decided to play a leading role in Europe**
  - Strong incentive to create MOOCs
  - Dedicated budget for the development phase
  - Setup of a recording studio
  - No pressure to save on teaching expenditures

- **Basic course in geomatics**
  - To face the increasing number of students.
  - To make the training in geomatics more visible.
  - To use contact hours for interactive activities.

_To take the lectures at home ..._
_... and do the homework in the field!_
Scenario and resource development

- Designing a MOOC requires **new skills**.
  - Precise script – like never before!
  - Very adequate material (figures, animations, …)
  - Accurate wording and terminology
  - Good balance between text, figures, interactive notes, quiz
  - Precise timing

- **Recording a MOOC is not recording a lecture** in the classroom.
  - Major task = to design the scenario and prepare the resources.
  - Recording one lesson takes ~ 4 days.

- **Course “éléments de géomatique”**
  - 8 lessons: basic of geodesy, cartography, levelling, theodolite, GPS, digital elevation models
  - Duration: ~ 10 - 12 weeks

- **Resources**
  - 1 lesson = 2-4 videos (lecture), 1-2 videos (practicals), 2 quizz, 1-2 calculus exercise
  - Lecture notes (1 dedicated chapter for each lesson)
  - The videos give an overview of the course and highlight some of the important concepts…
  - …the detailed explanations are given in lectures notes
Scenario and resource development

- Video resources: the MOOC studio

MOOC recording
3 video channels:
- Front: instructor (incl. sound)
- Top: hand on tablet
- Tablet: slides + writing

Scenario and resource development

- Video resources: outdoor recording sequences
Scenario and resource development

- Learning process proposed in the MOOC
  - Watching the videos will guide the students in their learning activity and will provide some practical use of instruments
  - Solving exercises and reading attentively lectures notes is the active learning process

Scenario and resource development

- Structure of a MOOC
Scenario and resource development

- Video recording and editing
  - Combination of the 3 recording channels
  - Image processing, quality improvement
  - Editing of subtitles (French, English)
  - Final check by teaching staff
  - Upload on the platform

![Diagram showing recording and editing process]

Implementation on a MOOC platform

- Example of content for one lesson
  - Lectures: 4 videos (introduction, definitions, contrôle, cheminement)
  - Video exercise: “lecture sur la mire”
  - 1 quiz
  - 2 exercises
  - 1 video: how to solve the exercise

List of resources

<table>
<thead>
<tr>
<th>4. Niveaulement géométrique</th>
<th>Status</th>
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<tr>
<td>2. Video: Définition des outils : principe de mesure</td>
<td>published</td>
</tr>
<tr>
<td>1. Video: Contrôle du niveau</td>
<td>published</td>
</tr>
<tr>
<td>1. Video: Cheminement</td>
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</tr>
<tr>
<td>1. Exercice : lecture sur la mire</td>
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</tr>
<tr>
<td>1. Video : résolution de l'exercice : épaissir d'une dalle</td>
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</tr>
<tr>
<td>Quiz : Instrument et mesures</td>
<td>published</td>
</tr>
<tr>
<td>Exercice : Point zéro</td>
<td>published</td>
</tr>
<tr>
<td>Exercice : Epaisseur d'une dalle</td>
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</tr>
</tbody>
</table>

List of resources: Quiz-in video: levelling

Example question: What is the measure? Enter your answer in the same unit as the problem.
Example: 1.23
Implementation on a MOOC platform

- **Platform**
  - Coursera: for-profit educational technology founded in 2012 by faculty members of Stanford University
  - Management of courses
    - Videos
    - Quiz, quiz-in videos
    - Exercises
    - Peer assessment
    - Assignments
    - Forum
    - Grading system
    - Analytics

- Quiz and exercises
More demand on the teaching staff

- **Tasks for the MOOC**
  - To manage and to coordinate the course resources.
  - To refine (or debug) the content of quiz/exercise.
  - To write weekly announcements.
  - To monitor the forum (without active participation).

  *To become familiar with the platform is not so easy (new version, bug reports, …)*

- **Tasks for local students**
  - To help with exercises.
  - To organise practicals.
  - To organise written exams.
  - To update the lecture notes.

First session worldwide

- **Launch of the first session in February 2014**
  - 3'500 learners have joined the course
  - 2'500 visited the course content (watching at least 1 lecture)
  - 1'000 have submitted 1 exercise or more
  - More than 100 statements of accomplishment have been delivered by Coursera (~10% of the active learners)

- **Origin of participants**
  - 130 different countries
  - 45% from Europe
  - 28% from Africa
  - 18% from North and South America
  - 9% from the Asia-Pacific region
First session @ EPFL

- Introduction of practical exercises
  - GPS measurements
  - Levelling
- Coaching of students
  - Weekly sessions with students and teaching assistants
- Use of the MOOC
  - MOOC session is open during the semester
  - Use of all resources for training
- Exam @ EPFL
  - 2 written tests: quiz + calculus

Second session - numbers

Learner activity recorded during the 2nd session (spring 2015), not quite finished
Perspectives

- **Training resources**
  - Towards shareable and common resources
  - Increase availability of (geo)data; trend of open data
  - Development of online tools (e.g. GIS online)

- **More interactions**
  - Active participation on forum (part of the learning process)
  - To motivate students to work together (local community)

- **Networking**
  - Identification of teachers involved in MOOC development
  - Network of university: exchange of resource and best practice

- **Collaborative MOOCs**
  - Creation of new MOOCs within network of universities
  - Mutual contribution of each partner
    - E.g.: course in geomatics with local use cases

- **MOOCs Africa @ EPFL**
  - Access to Internet
  - Partnership
  - Certification
Still time for a comic strip?

http://theupturnedmicroscope.com/

MOOC & new educational tools

We have merely added a new blade.
Many thanks you for your attention!

- Any question?
- Please visit our MOOC: https://www.coursera.org/course/geomatique

Come along,
have a drink
and a surprise!

Wednesday May 20
17:30 – 18:30
at "Culture Beat"