

Blending a MOOC with interactive teaching



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Agenda

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- What is a MOOC
- Motivation for a MOOC in geomatics
- Scenario and ressources development
 - Design
 - Content and structure
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- First session
- Perspectives

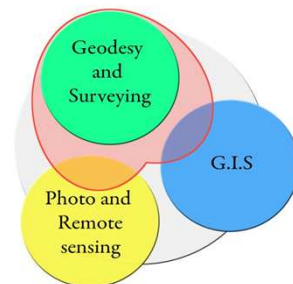


Context of E-learning in geomatics

- 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



Geomatic engineering

Basic course for Civil and Environmental engineering

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

| Initiatives | For profit | Free to access | Certification fee | Institutional credits |
|-------------|------------|----------------|-------------------|-----------------------|
| EdX | No | Yes | Yes | No |
| Coursera | Yes | Yes | Yes | Partial |
| Udacity | Yes | No | Yes | Partial |
| Udemy | Yes | Partial | Yes | Partial |
| P2PU | No | Yes | No | No |

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.

Scenario and resource development

- 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



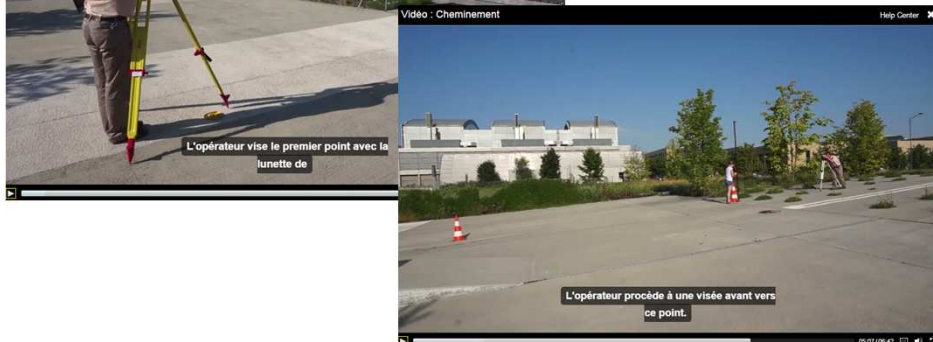
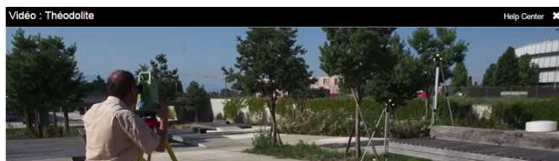
MOOC recording
3 video channels:

- front: instructor (incl. sound)
- Top: hand on tablet
- Tablet: slides + writing



Scenario and resource development

- Video resources: outdoor recording sequences



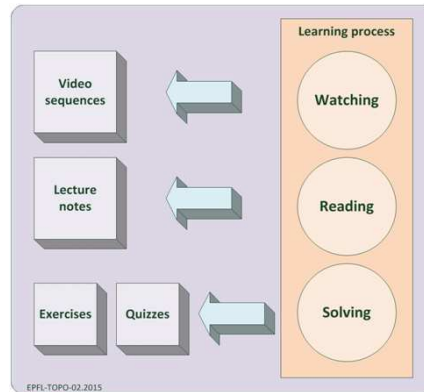
Scenario and resource development

- 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

Video : résolution de l'exercice : Epanasseur d'une dalle

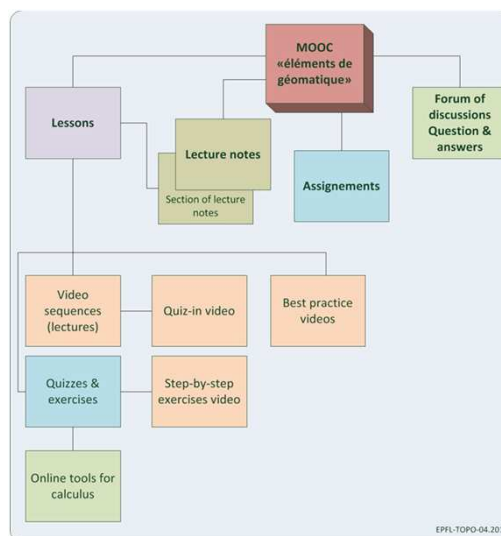
Principe du nivellement

- Mesures de différences de niveau ou dénivelée
- Mesure: arrière - avant
- Station (niveau) entre points de mesure



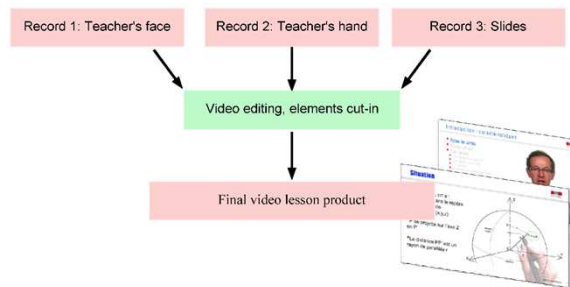
Scenario and resource development

- 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



Implementation on a MOOC platform

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

| 4. Nivellement géométrique | Status |
|--|-----------|
| Vidéo : Introduction au Nivellement Géométrique | published |
| Vidéo : Définition des attitudes, principe de mesure | published |
| Vidéo : Contrôle du niveau | published |
| Vidéo : Cheminement | published |
| Exercice : lecture sur la mire | published |
| Vidéo : résolution de l'exercice : Epaisseur d'une dalle | published |
| Quiz : Instruments et mesures | published |
| Exercice : Point nodal | published |
| Exercice : Epaisseur d'une dalle | published |

List of resources

Exercice : lecture sur la mire

Quiz-in video: levelling

Combien vaut la mesure ?
Donnez votre réponse en mètres, au mm près.
Exemple : 1.523

Submit
Skip

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

The screenshot shows the Coursera interface for the course 'Éléments de Géomatique' by Pierre-Yves Gilléron and Bertrand Memmod. The page is in French and features a navigation menu on the left with options like 'Annonces', 'Sommaire', 'Vidéos', 'Polycopié', 'Sources', 'PRATIQUE', 'Quiz', and 'Exercices'. The main content area is titled 'Leçon 8: Modèle numérique d'altitude' and includes an 'Announcements' section with a post from 'Borjour,'. The post text discusses the course's progress and the use of numerical models (MNA) in geomatics. On the right, there are sections for 'Upcoming Deadlines' (Homeworks and Quizzes) and 'New Lectures' (Videos).

Implementation on a MOOC platform

- 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
All Time ▾

2,635
visited the course

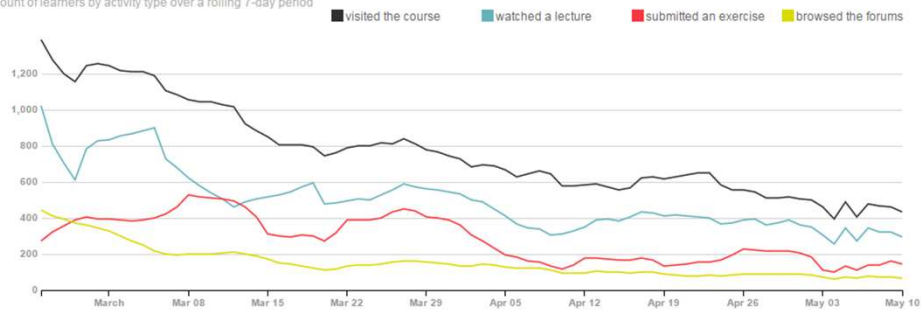
2,149
watched a lecture

939
submitted an exercise

761
browsed the forums

Types of Activity

Count of learners by activity type over a rolling 7-day period



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

Perspectives

- **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



Prof. P.-S. Ngohe-Ekam de l'ENSP de Yaoundé: enregistrement d'un module de MOOC collaboratif. © EPFL

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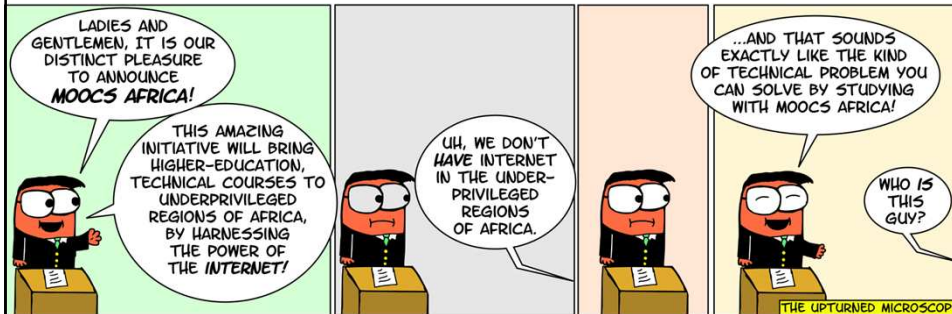
MOOCs Africa

Une démarche pionnière

En 2013, L'EPFL a créé le Centre pour l'éducation à l'ère digitale - CEDE ou MOOCs Factory. Ce centre, à travers son programme MOOCs pour l'Afrique, est en train de jouer un rôle pionnier en proposant aux universités d'Afrique des solutions sur mesure pour le renforcement de leurs capacités en matière d'enseignement supérieur et de formation continue.

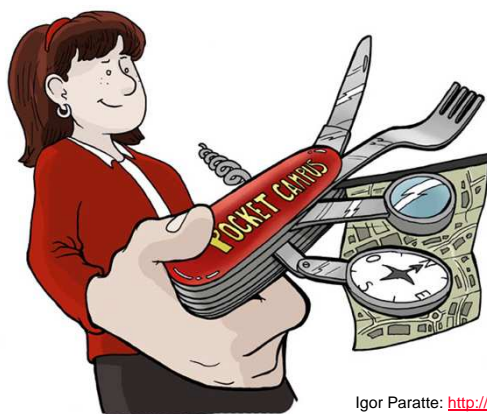


Still time for a comic strip ?



<http://theupturnedmicroscope.com/>

MOOC & new educational tools



Igor Paratte: <http://zlinks.ch/igorparatte/?p=511>

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>



Éléments de Géomatique

Le but de ce cours de base en géomatique est de présenter un aperçu des méthodes d'acquisition, de modélisation et de représentation des données à référence spatiale. Les ingénieurs civils et en environnement devront comprendre le rôle et les enjeux de la géomatique face aux disciplines de la construction, de l'aménagement et de l'environnement.



**FIG Working Week
Switzerland 2019**



by the way ...

**Come along,
have a drink
and a surprise!**

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

