Feedbacks and Perspectives of a Flipped Classroom Experiments

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Introduction

- Change of practice in teaching to
  - be more student centered
  - improve technical skills of students
  - make course more interesting to teach
- More time interacting with the students
- Online material to improve in-class lecture

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The Course

- Parallel programming
  - Performance oriented
  - Many APIs (MPI, OpenMP, pThreads, …) to illustrate the concepts
- 26 students
  - Using their own laptop
  - Installing the software themselves
  - Two groups of students: Software engineering and computer architectures
  - Self organized groups
- 16 hours CM/TD/TP – Master 2

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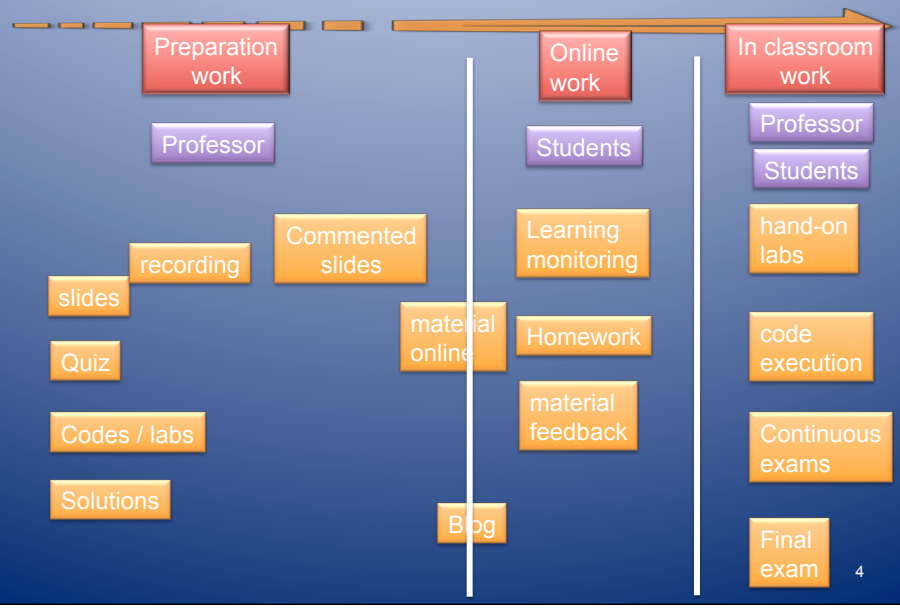
The Process



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Implementation

- Quicktime → Slides audio recording
- Youtube → video slides publication
- Google code → Labs codes
- ScalableLearning* → Online video + Quiz
- Piazza → Course blog
- Graphical tablet → Writing on the slides while recording

*http://www.scalable-learning.com

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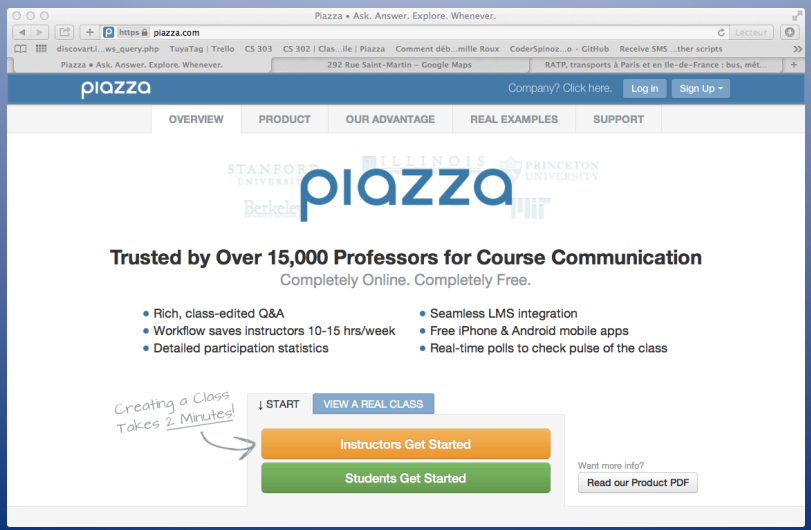
Piazza



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ScalableLearning Platform

- Developed at Uppsala University
- Specifically designed for flipped classrooms

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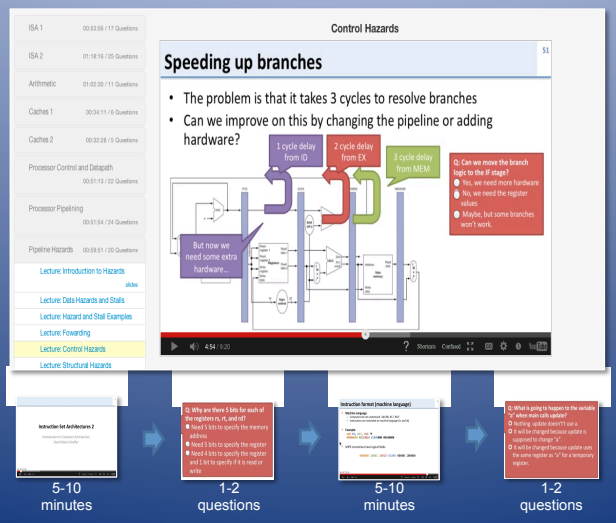
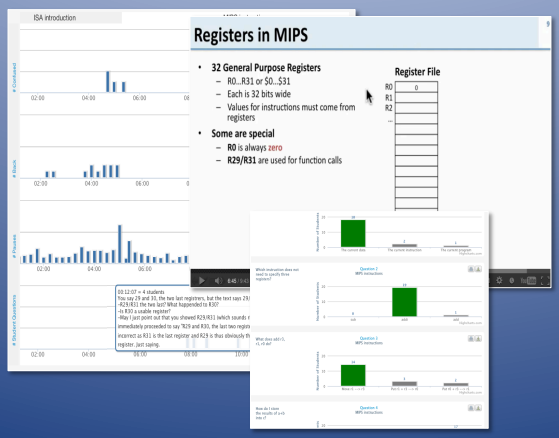
Active Lectures



Lecture Analytics



Cost for a 2 hours Classroom

[**Once**]* Course design : ~ 1 hour (starting with existing materials)
[**Once**] Video 2 x 10 minutes max : ~ 4 hours (20 slides + recording)
[**Once**] 6-8 quiz for the videos: ~ 2 hours
[**Once**] Put material online: ~ 30 minutes
[**Once**] Labs design (code, …) : ~10 hours (corresponding to 2 hours of student work)
[**Recurring**] Quiz answer analysis: ~ 20 minutes
[**Recurring**] Students feedback on material analysis: ~ 15 minutes
[**Recurring**] Material update : ~ 20 minutes in average
[**Recurring**] Blog responses and homework information: ~ 20 minutes
[**Recurring**] In classroom: 2 hours
[**Recurring**] Continuous exams: ~ 15 minutes**
[**Recurring**] Final exam: ~15 minutes**

***[Once]** Assuming the course is given 4 years.
** (Average cost for a 2 hours course)

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Total Cost

- A 2 hour flipped classroom for this course costs:
  - [Once] : 17h30 → 4h20 in average (17h30 / 4 years)
  - [Recurring] : 3h30
  - 33 slide decks, many simple codes
- Overall cost for a 2 hours in classroom is about 8 hours
  - Assumes the basic course material was already available
  - High preparation cost with pressure for frequent updates

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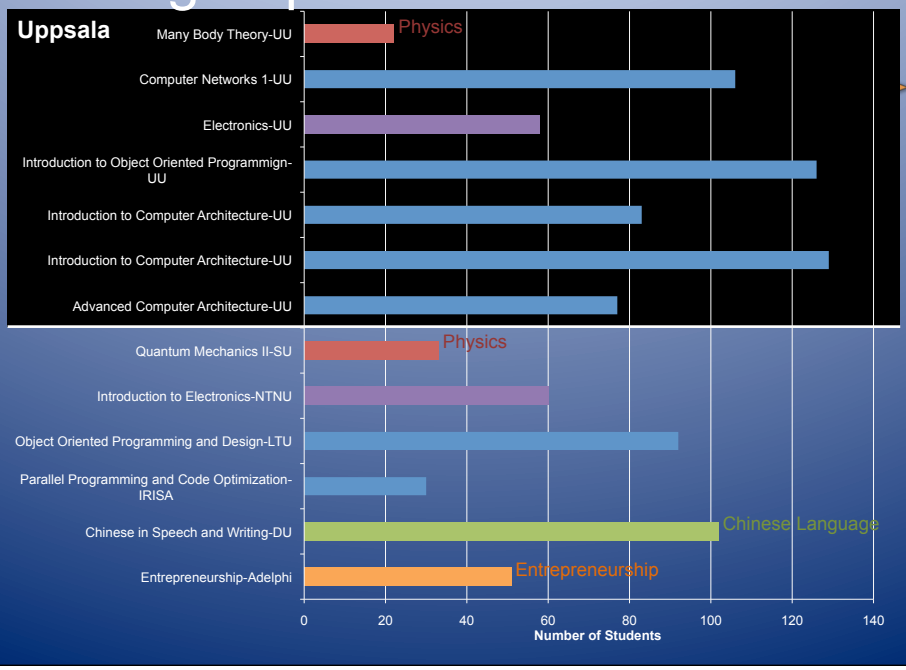
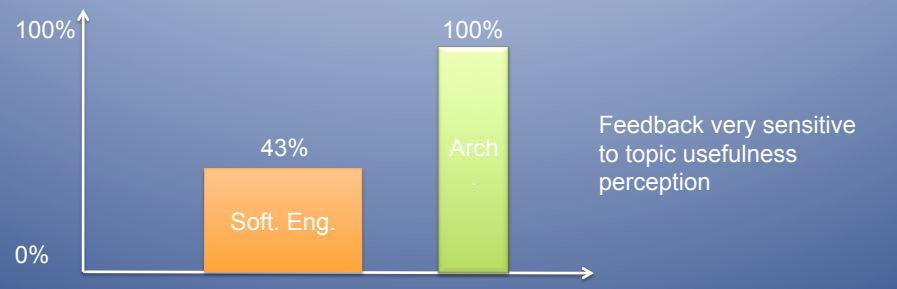
First group of courses: Fall 2013



Students Feedback



"I did learn lot of stuff true. But this was a course without an objective to me."

- How to address this feedback?

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Some Lessons

- Contract with students important
- Added value for in-class lecture must be clear
  - Solution to exercise, …
- Online material must be more focus, leaving less to interpretation
  - Clarifying pedagogical approach
- Some part are better left as usual lectures
- Monitoring students answer is very satisfying
  - can follow up on student difficulties

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Pros and Cons

Cons

- Disruption in student practices
- Lack of homework students time
- Students may not come to the courses
- Does not fit very well in the professor teaching duty accounting

Pros

- More time to help the students
- Better monitoring of student learning
- Faster identification of course unclear parts
- Tighter loop concepts-experiments

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Future Improvements

- Self organized student groups not working well
- Experience of the performance by students missing
  - Syllabus presentation not enough
- Students – Professor relationship highly impacted by available materials on Internet
- Many side effects on University organization

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Exploiting Technological Platforms

- Support for labs important
  - Motivate students
  - Make labs interesting and fun
- Insert concepts into current practices / technologies
  - Improve value for successful work
- Example of
  - Smart phones
  - 3D printer
  - Drones

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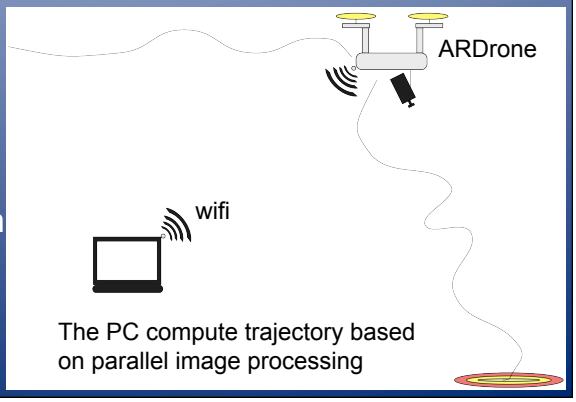
Drone for Parallel Programming

- Parrot AR2.0 Drone
  - Provide a nice Linux API
  - Right tradeoff between complexity and capabilities
- Parallel computing for an efficient target analysis
- Show concrete impact of performance
- Put teaching content in an up-to-date context



Side Effects on University Organization

- CM/TD/TP model out-dated
  - How to define a service when part is "online" and the other part is in classroom
  - For instance the online part is in the agenda (e.g. ENCR)
- In-class lecture organization
  - Group work
  - Wifi, Bring your Own Device
- Colleagues' responses
- Dealing with large group of students requires specific design

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Bring Your Own Device

- Get student to more "system" practices
  - Improve student technical skills
  - Homework can include labs
- But logistic more complex
  - Wifi and other connection techniques must be available and robust
  - The university may have to provide the laptops to avoid heterogeneous device side effects

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Conclusion

- Flipped classroom method is flexible enough for implementing many tradeoffs
  - Not everything has to be flipped
- A good support to revisit teaching practice in a pervasive Internet era
- Platform such as ScalableLearning well designed and efficient
- Logistic can be a roadblock
- Need to update the CM/TD/TP accounting system

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