ANALYSE:
A Learning Analytics Tool for Open edX

Presenting for Open edX Conf 2015:
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Who am I?

❖ **PhD candidate at UC3M@Telematics**

❖ **Educational Data Mining & Learning Analytics**

❖ **Passionate about data**

❖ **Hard to count how many hobbies I have ☺**

Presentation Outline

❖ **My objectives for the presentation**

- Set you up within the context of our research

- Describe architecture of ANALYSE

- Show how to use ANALYSE

- Present and future of ANALYSE

Our research context and background

Introduction (I)

E-Learning platforms

Collect large datasets of raw events
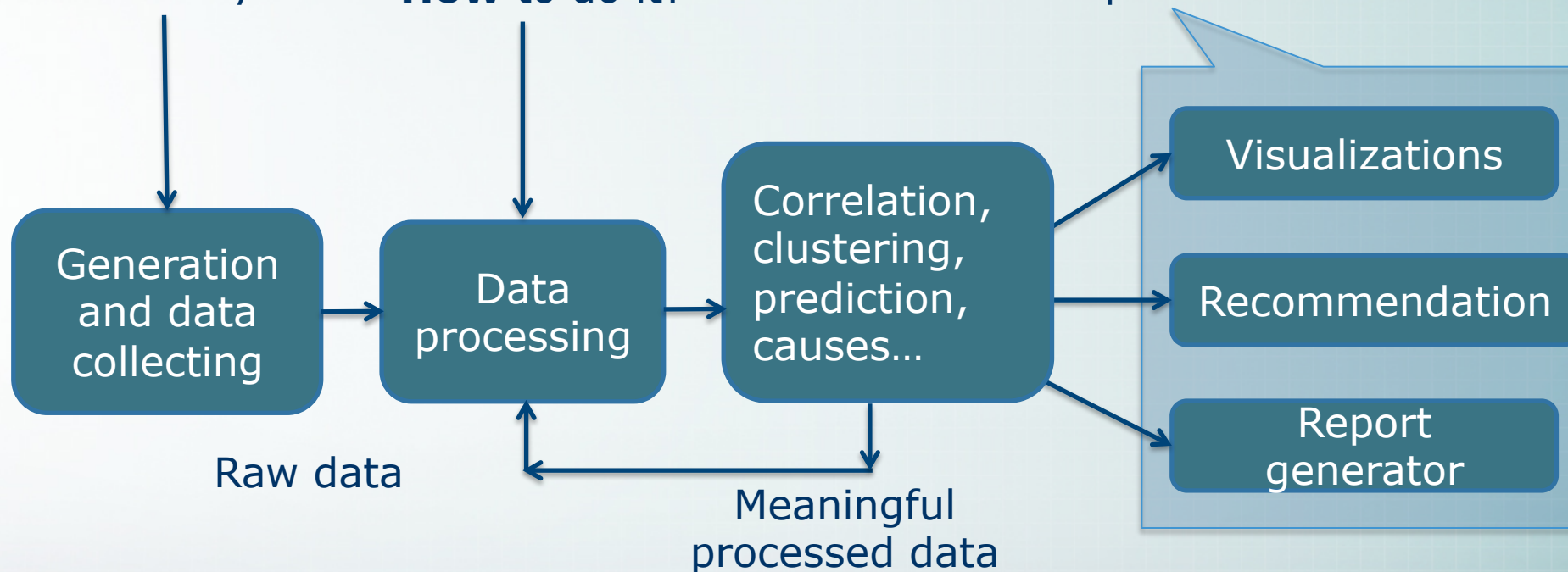
Hard to understand and make them useful

Introduction (II)

Technological problems arise

Which data is necessary?

What to obtain and **How** to do it?

What to do with the processed data?

Generation and data collecting

Raw data

Data processing

Correlation, clustering, prediction, causes…

Meaningful processed data

Visualizations

Recommendation

Report generator

Evaluation of the results in a educational context

Background context

- 0-Courses with flipped classroom methodology
  - Using the last open source Khan Academy release
  - Physics 2012. Chemistry, Math, Physics 2013 and 2014
  - SPOCs of 100 to 300 students per course

Visualization Dashboard: ALAS-KA (I)

Add on of the **L**earning **A**nalytics **S**upport in the **K**han **A**cademy platform

- More than 20 new indicators related to the learning process: individual and class visualizations
- Main technologies:
  - Google App Engine, Google Charts API and Python

- https://github.com/jruiperezv/ALAS-KA
- Short demo

Ruipérez-Valiente, J.A. Muñoz-Merino, P.J. Delgado Kloos, C. An architecture for extending the learning analytics support in the Khan Academy framework. *Proceedings of the First International Conference on Technological Ecosystem for Enhancing Multiculturality,* **277-284, Salamanca, Spain, 2013**

Visualization Dashboard: ALAS-KA (II)
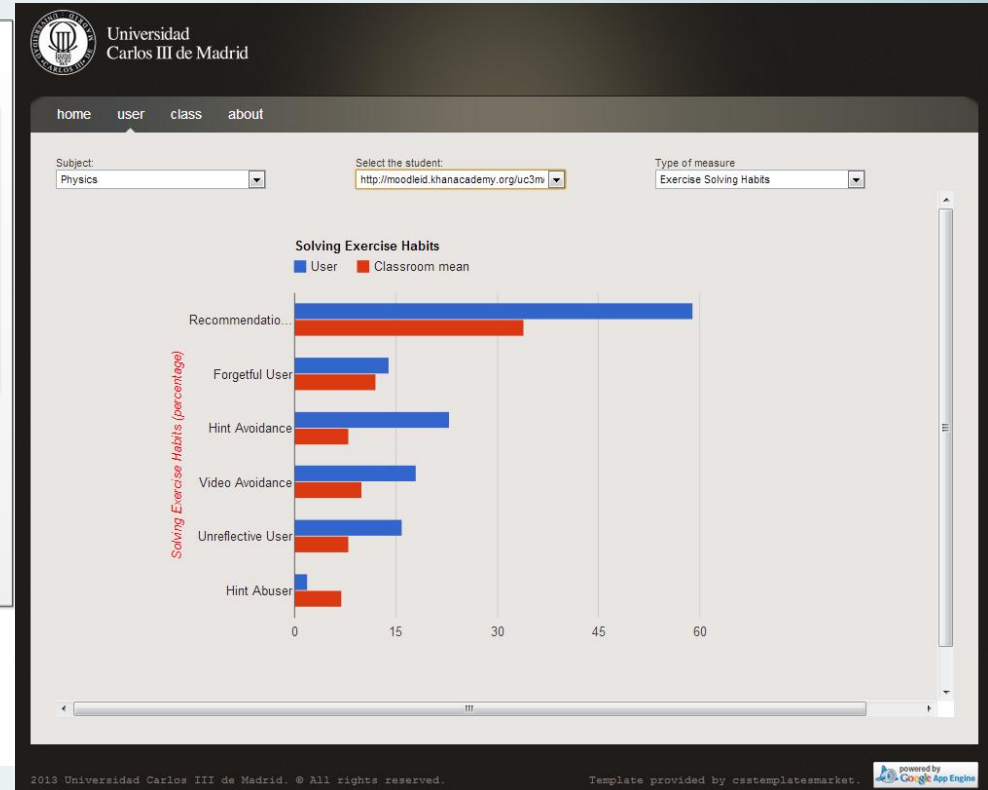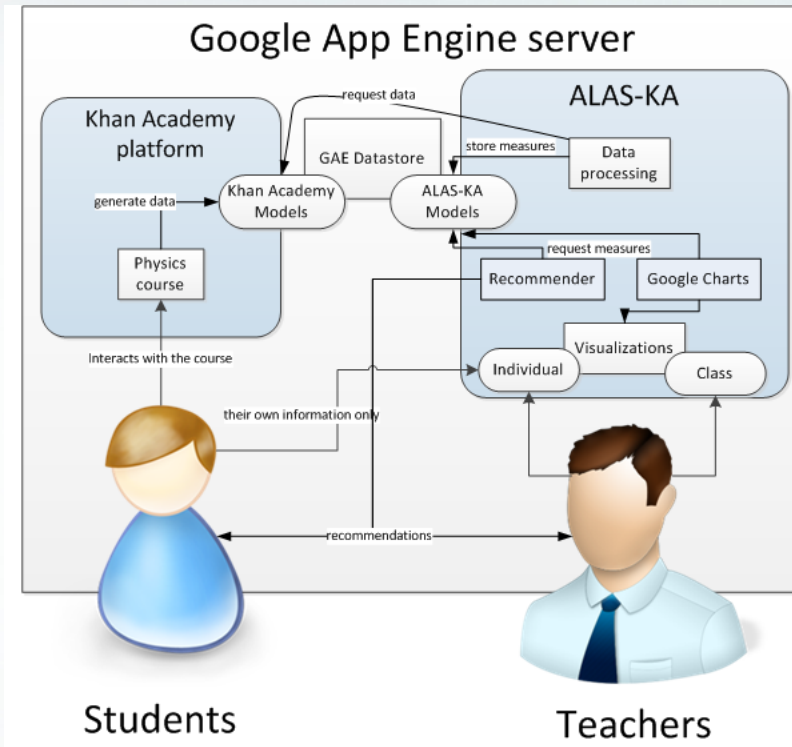
José A. Ruipérez-Valiente, Pedro J. Muñoz-Merino, Derick Leony, Carlos Delgado Kloos, "ALAS-KA: A learning analytics extension for better understanding the learning process in the Khan Academy platform", Computers in Human Behavior, vol. 47, pp. 139-148 (2015)

Visualization Dashboard: ALAS-KA (III)

❖ **Very successful results!** ☺

- Use of ALAS-KA to evaluate results and as support for instructors and students in the 0-courses
- Many publications, invited talks, etc.
- Several awards at a national level
- More info at http://www.joseruiperez.com/my-research/

❖ **But Khan Academy was no longer open source** ☹

- Then edX was open sourced as Open edX project
- We started researching on this in the meanwhile
- We have joined edX consortium and selected Open edX for SPOCs → More interest!

The beginnings of ANALYSE…

People involved in the development

❖ **We try to be resourceful**

❖ **Current release of ANALYSE**

- ▪ UC3M researchers
    - • José A. Ruipérez Valiente, Pedro J. Muñoz Merino, Carlos Delgado Kloos
- ▪ UC3M students → Master thesis
    - • Héctor J. Pijeira Díaz, Javier Santofimia Ruiz

❖ **Already developed, but no released**

- • Jaime Alzola, Javier Orcoyen Chaves

❖ **More projects are coming!**

Visualization Dashboard: ANALYSE (I)

Add-on of the learNing AnaLYtics Support for the open Edx

- 12 new visualizations for instructors and students

- Embedded as a new Django app in the LMS

- Directly mines both databases with a scheduler and store results

- Google Charts API for visualizations

Santofimia Ruiz, J. Pijeira Díaz, H.J. Ruipérez-Valiente, J.A. Muñoz-Merino, P.J. Delgado Kloos, C. Towards the Development of a Learning Analytics module in Open edX. *Second International Conference on Technological Ecosystem for Enhancing Multiculturality, Salamanca, Spain, 2014*

Visualization Dashboard: ANALYSE (II)

- Overview of the architecture and functionality
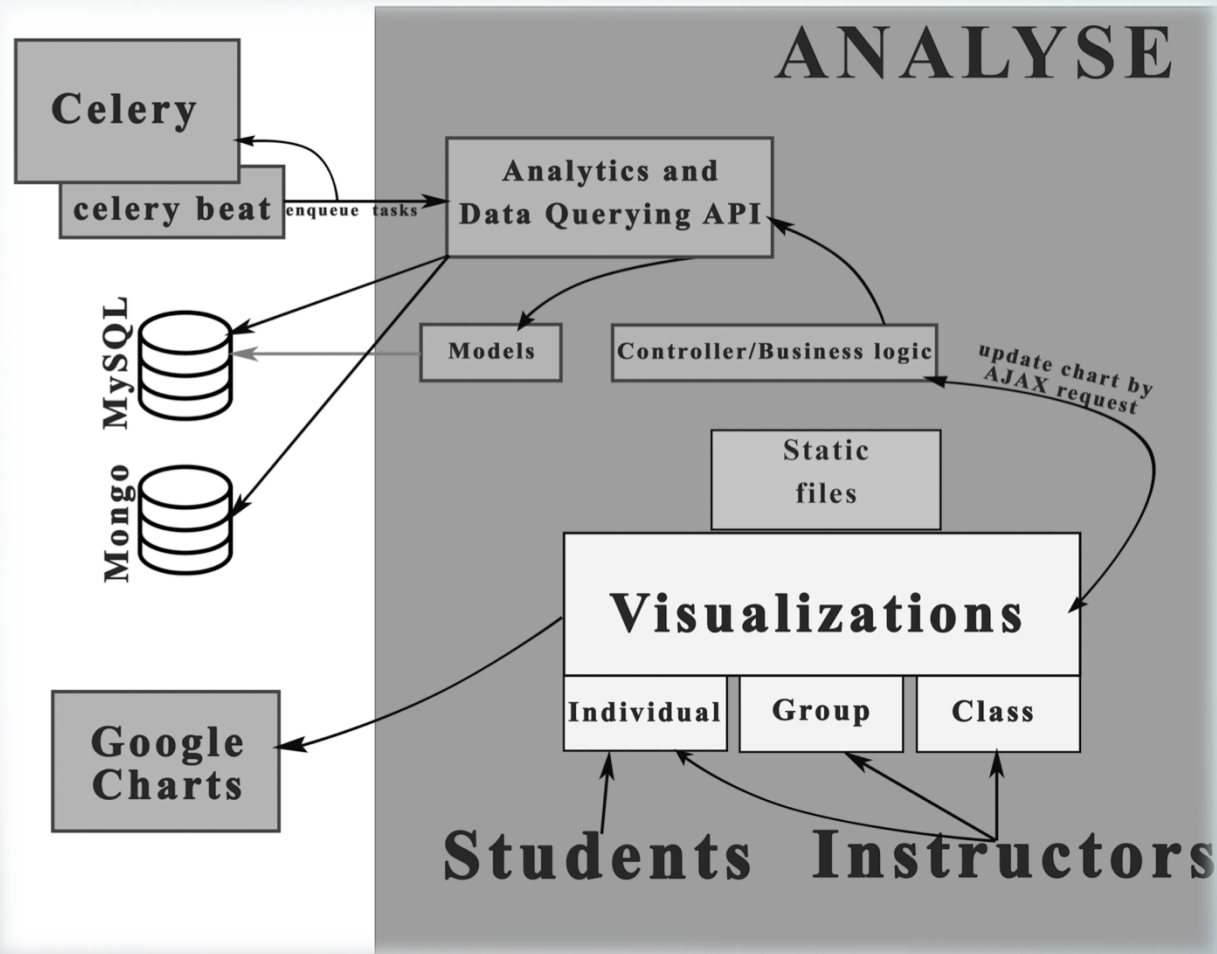
Visualization Dashboard: ANALYSE (III)

- General information and GitHub

  ➢ http://www.it.uc3m.es/pedmume/ANALYSE/

  ➢ https://github.com/jruiperezv/ANALYSE

- Evaluation and accesibility survey

- Demos

  ➢ https://www.youtube.com/watch?v=3L5R7BvwlDM&feature=youtu.be

Héctor Pijeira, Javier Santofimia, José A. Ruipérez-Valiente, Pedro J. Muñoz-Merino, Carlos Delgado Kloos, Using Video Visualizations to Understand Students' Interactions in Open edX, EC-TEL 2015. 2nd place in the Best Demo Award

MOOC of maths

- MOOC of maths:

  - Available at: http://ela.gast.it.uc3m.es

  - Topics: Units of measurement, algebra, geometry

  - High school education for adults

  - Generation of educational materials: CEPA Sierra Norte de Torrelaguna: Diego Redondo Martínez

  - 28 videos, 32 exercises

  - Configuration, support, ANALYSE and personalization of the MOOC platform at Univ. Carlos III de Madrid

  - Flipped classroom methodology

- Pedagogic Innovation Award at UC3M

ANALYSE in the MOOC of maths

- Uses of ANALYSE in the experience
    - ➤ Self-reflection for students
    - ➤ Support for the flipped classroom
    - ➤ Evaluation of students
    - ➤ Evaluation of educational materials
    - ➤ Evaluation of the course

Diego Redondo Martínez, Pedro J. Muñoz Merino, José A. Ruipérez Valiente, Carlos Delgado Kloos, Héctor Javier Pijeira Díaz and Javier Santofimia. Combining Learning Analytics and the Flipped Classroom in a MOOC of maths. Workshop on Applied and Practical Learning Analytics: In proceedings of the 10th European Conference on Technology Enhanced Learning, EC-TEL 2015, Toledo, Spain, September 2015

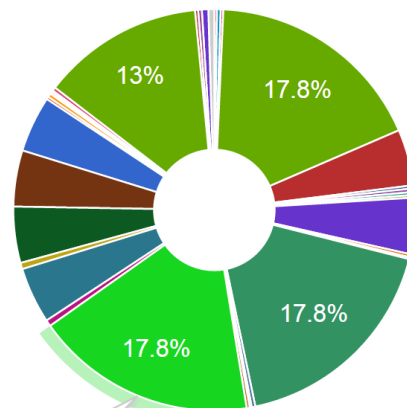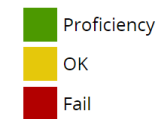# Example I: Self-reflection

Example II: Evaluation of students
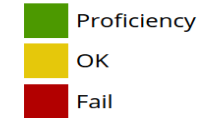
Students Grades

This visualization shows the average grade in each category of resource in the course. You can filter by all the students, each student individually or by students' groups (by grades). Click on a bar in order to see the results decomposed in each item within the category.

Options
Select student
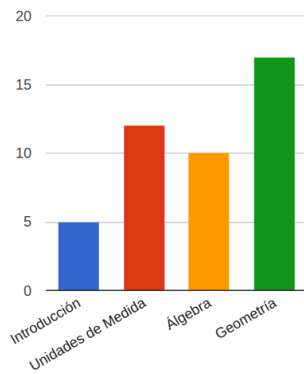Student A

Grade categories
- Proficiency
- OK
- Fail
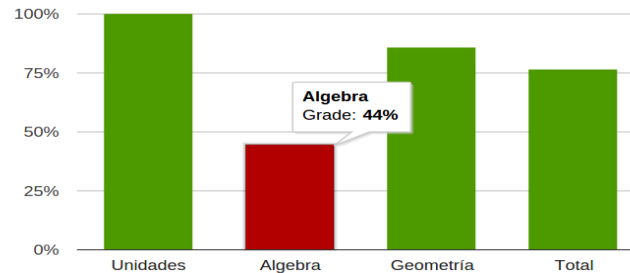
Course Accesses

This visualization shows the number of accesses in each chapter of the course. Click in one chapter in order to decompose these accesses into their respective subsections. You can filter by all the students, each student individually or by students' groups (by grades).

Options
Select student
Student A

Chapters accesses
- Introducción
- Unidades de Me...
- Álgebra
- Geometría
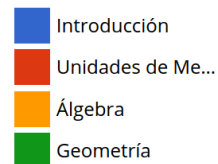
Chapter Time

This visualization shows the time elapsed in each chapter of the course. Click in one section in order to divide it in graded, ungraded and chapter time. You can filter by all the students, each student individually or by students' groups (by grades).
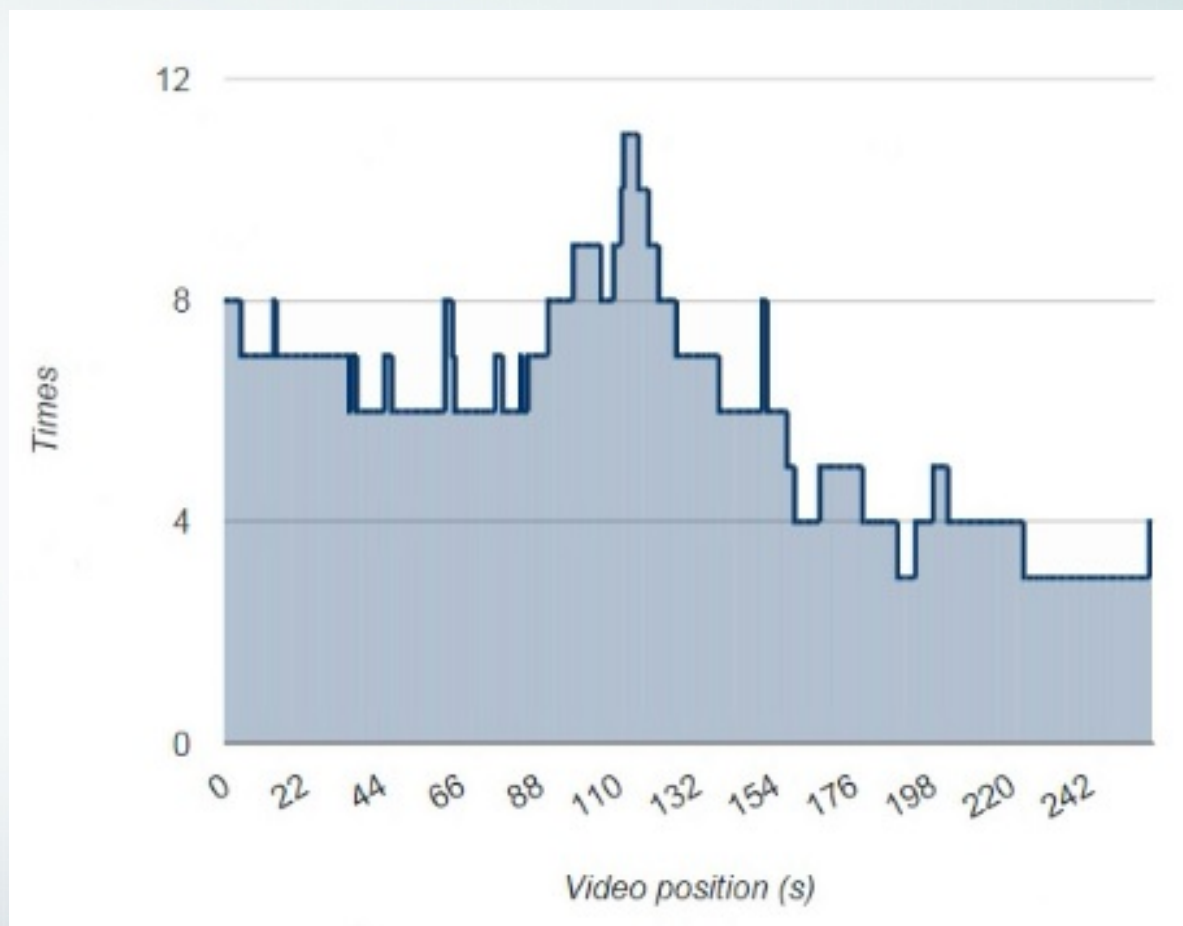
Options
Select student
Student A

Chapters spent time
- Introducción
- Unidades de Me...
- Álgebra
- Geometría
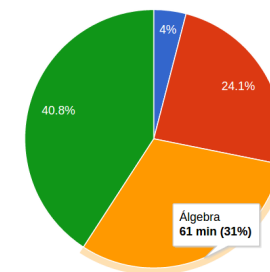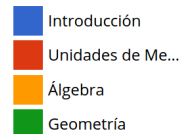
# Example III: Evaluation of resources

Example IV: Evaluation of the course

Video Time Watched

This visualization shows in dark blue the percentage of different video watched (it does not count if the same parts are watched several times, the max. is the 100% of the video) and in light blue the percentage of total video watched (total amount of time spent compared to the length of the video in percentage). You can filter by all the students or each student individually.

Options
All students ▾
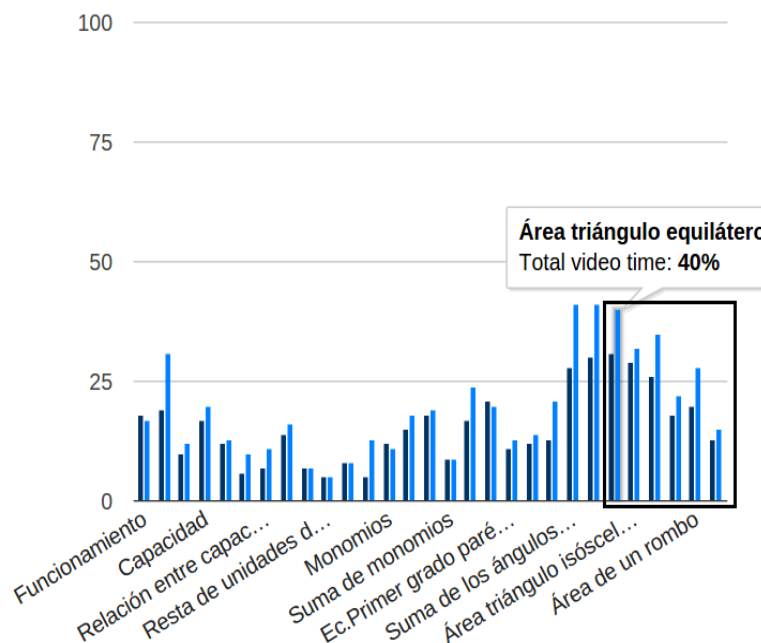
Video Time Watched

■ Different Video Time

■ Total Video Time

Área triángulo equilátero
Total video time: **40%**

Videos which belong to the "Area calculation" sub-section

Present of ANALYSE

- Learning analytics dashboard embedded in the LMS with 12 new visualizations

  - Lots of institutions and researchers have contacted us with interest → But we do not have the manpower

- Can be used by instructors and students for several actions to enhance the learning process

- Limitations:

  - It does not scale well in the current release

  - We have only tested within a case study

  - Need to update to newer release of Open edX

  - There are minor bugs a lots of thing that could improved

Future of ANALYSE

- Main objective: Provide a new stable release

  - Scales decently well for "small" courses

  - Adapted to newer Open edX release

  - Fixed bugs and improvements

- Design and implementation of higher level learning indicators and their correspondent visualizations

- More learning experiences. SPOCs, blended courses

- Behavioural recommender system for Open edX based on previous data analysis → clustering, prediction, relationship mining

Next incoming session

- "Deploying SPOCs in an university institution with Open edX: What do we need?"
  - How is UC3M institutionally managing MOOCs in edX, SPOCs in Open edX, etc
  - 10:40-11:10
  - Ballroom West (Alumnae Hall)

Thank you!

Presenting:
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