

## *How to optimize the use of available OCW resources?*

C. Fernández; L. Hernando

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Cambridge, Massachusetts, USA. May, 2011

# CONTENT

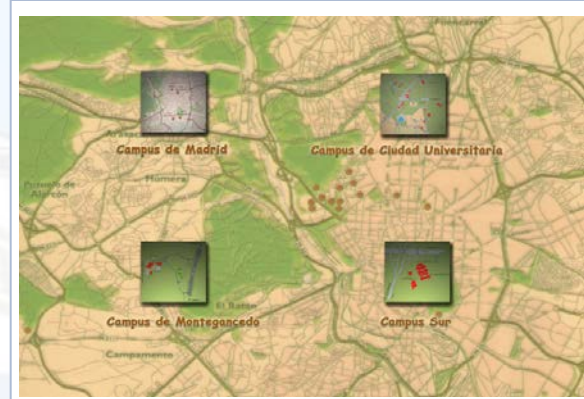
- Context*
- Motivation*
- Desing and development*
- Use and discussion of results*
- Conclusions*

POLITÉCNICA

# CONTEXT

## The Universidad Politécnica de Madrid (UPM)

- *Focused on technological degrees*
- *Scattered campus*
- *Traditional methodology*
- *Graduates highly valued*
- ***Difficult degrees***



POLITECNICA

# CONTEXT

## Introduction from 2010 of the European Higher Education Area

- *New academic degrees*
- *Deep methodological update*



*In these times of transition  
both educational models coexist*



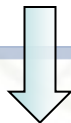
**Old Syllabus**

**New Degrees**

# CONTEXT

## Extinction procedure:

- *When a new degree starts old syllabus teaching finishes*
- *Students with pending subjects are entitled to do an exam, **but not to a formal teaching***
- *Except in the case of subjects with a high number of students, to whom it has been organized special teaching groups*



***Subject: Mechanics-I***

# CONTEXT

## Subject Mechanics I:

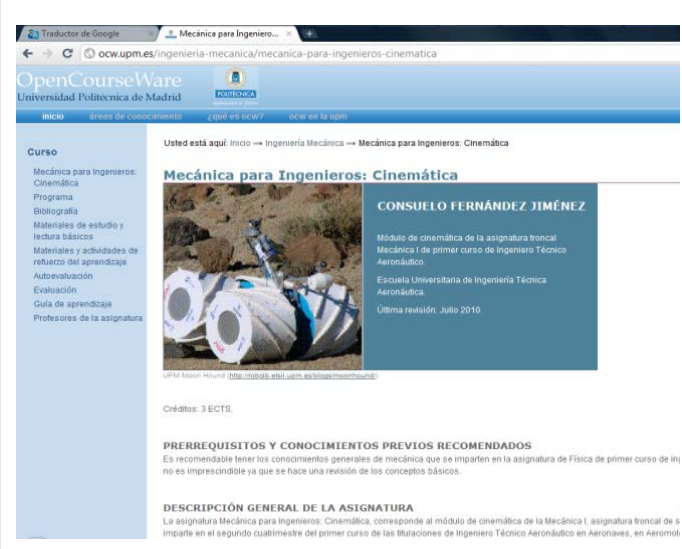
- *It is a **first-year course of the extinguished syllabus** of a degree of Aeronautical Engineering at the UPM*
- *It is a common subject to three specialties (Aircraft Vehicles, Aircraft Engines, Aerospace Equipment and Materials)*
- *Number of **students enrolled** each year is about **500***
- *Number of **students who do not pass** it is about **200***
- *It has been scheduled a **special teaching group** for these students*

***What is the problem?***

**They attend second year classes because this is their last chance**

# MOTIVATION

## Publishing “Engineering Mechanics: Kinematics”



The screenshot shows the OpenCourseWare website interface. The browser address bar displays 'ocw.upm.es/ingenieria-mecanica/mecanica-para-ingenieros-cinematica'. The page title is 'Mecánica para Ingenieros: Cinemática'. The author is listed as 'CONSUELO FERNÁNDEZ JIMÉNEZ'. The course is described as a module of kinematics from the first course of the Bachelor's degree in Aeronautical Engineering. The page also includes a list of materials, a syllabus, and a list of professors.

### Objetives:

- *Dealing with new needs by developing materials\* which facilitate learning in a manner:*

✓ **Flexible**

✓ **Autonomous**

*Offering them in OCW in order to be shared, used or reused for all those people who might be interested*

\* Materials were developed during 2009/10 academic year and the subject was published in September 2010

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# DESIGN AND DEVELOPMENT

## Remarks on the course design:

- *Users are students with a maturity level and responsible enough to work in an autonomous way.*
- ***The lack of guidance** on how to use these materials may **diminish their usability.***
- *University experiences evidenced the importance of **feedback and continuing work** as meaningful learning facilitators.*



*To implement all these aspects as far as possible into e-learning OCW*



# DESIGN AND DEVELOPMENT

## Criteria taken

- ✘ This aim require to go beyond the mere selection and temporal organization of materials

- Including several tasks designed to facilitate the understanding and reflection on the contents
- Providing solutions or answers for all tasks, problems and proposed activities so that the student may self-assess his learning (feedback)
- Incorporating at the beginning of each topic, a ***Learning Student's Learning Guide***

# DESIGN AND DEVELOPMENT

## Student's Learning Guide

Introduction

Objectives

Activities

Resources

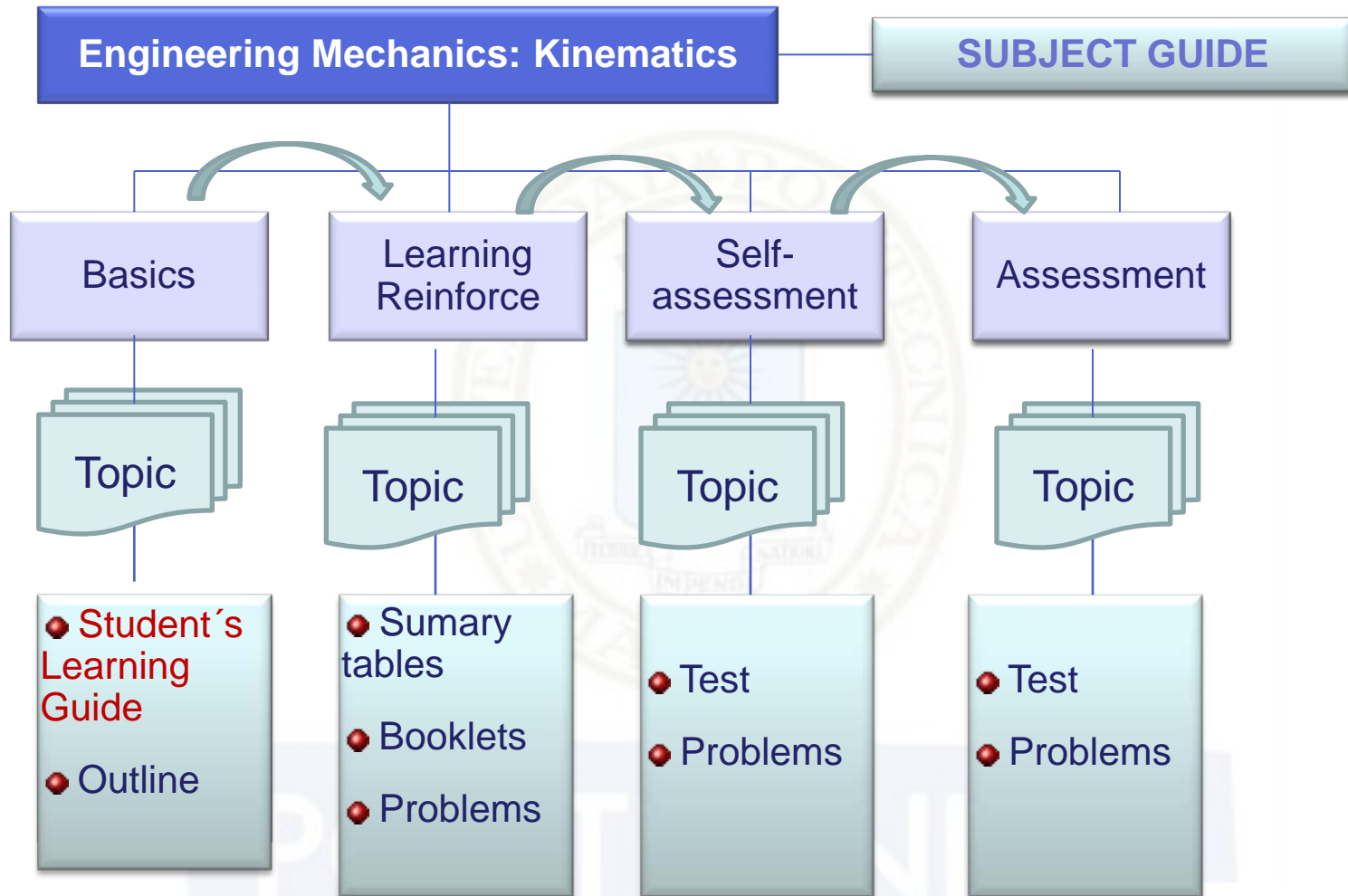
Evaluation

The image shows three overlapping pages from a student learning guide. The pages are titled 'Cinemática de la partícula' and 'GUÍA II PARA EL ALUMNO:'. The pages contain the following sections:

- Evaluación:** La calificación de esta unidad representa el 25% de la calificación obtenida en:
  - Tareas o actividades
  - Prueba presencial de las distintas unidades
- Recursos:**
  - Bibliografía recomendada:
    - Bedford, A., F. Education. Mé.
    - Boicoba Ruigó. Disponible en Internet: [teoria-de-estados](#)
    - James Stewart
    - Meriam, J.L., .
    - Prieto Alberca Estéfano, ADI
    - Shames, Irvin
    - Riley, W.F. y St
  - Materiales:
    - Desarrollo teórico
    - Enunciado y solución
    - Enunciado y solución de coordenadas
  - Páginas de Internet:
    - [http://descargas/Coord\\_est\\_esfericas](http://descargas/Coord_est_esfericas)
    - <http://server.esfericas>
    - <http://server.polares>
    - <http://es.wiki.cilindricas>
    - <http://dicums> (Coordenadas)
    - <http://es.wiki.esf%C3%A9ricas>
- Objetivos:**
  - Revisar los conceptos fundamentales de la cinemática de la partícula: sistema de referencia, posición, movimiento, velocidad, aceleración, etc.
  - Conocer las coordenadas cilíndricas y esféricas y sus vectores unitarios.
  - Obtener las relaciones geométricas entre ellas y con las coordenadas cartesianas.
  - Realizar conversiones entre los tres sistemas de coordenadas.
  - Expresar los vectores de posición, velocidad y aceleración en los tres sistemas de coordenadas.
  - Justificar la utilidad de estas coordenadas.
  - Formular las coordenadas polares como un caso particular de las coordenadas cilíndricas.
  - Obtener la relación entre las derivadas respecto del tiempo de vectores respecto de distintos sistemas de referencia.
  - Aplicar los conocimientos a la resolución de problemas.
  - Usar el lenguaje matemático adecuado.
- Actividades:**
  - Utilizar la información de clase y el documento "Cinemática de la partícula" disponible en la plataforma para realizar las siguientes actividades. Se recomienda seguir el orden propuesto ya que están organizadas para facilitar de manera progresiva la comprensión y aprendizaje de los contenidos.
    - Lee detenidamente hasta el apartado 3.2 del documento *GUÍA II\_Cinemática de la partícula* y realiza los ejercicios 1,2, y3 del Cuadernillo *I\_Cinemática de la partícula*.
    - Utilizando la información de los apartados 3.3 y 3.4 del documento *GUÍA II\_Cinemática de la partícula*, dibuja en tu cuaderno las coordenadas y vectores

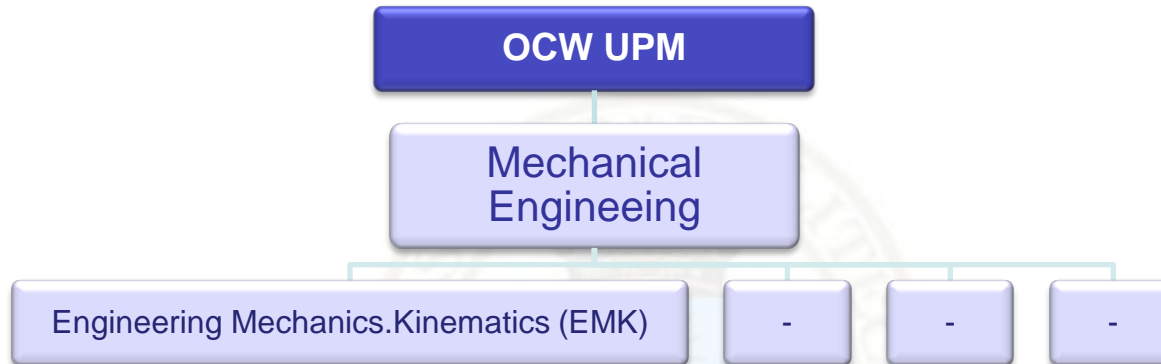
# DESIGN AND DEVELOPMENT

## Subject general outline



# USE AND DISCUSSION OF RESULTS

## Used data (Google Analytics)



	OCW UPM	EMK
Visits	182,358	1,643
Bounce %	60.24	31.41
Pages/access	4.95	18.88
Duration (minutes)	3.13	14.33

# USE AND DISCUSSION OF RESULTS

## Success indicators

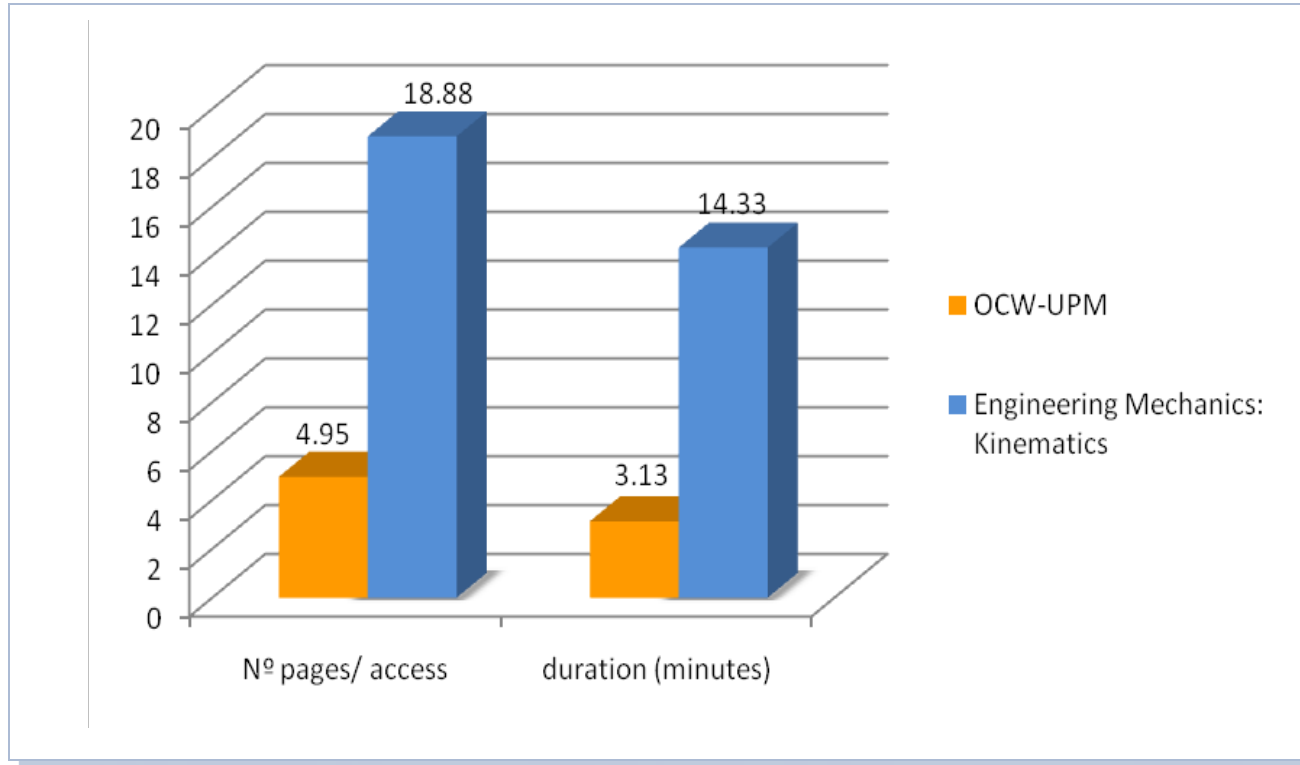


Figure 1. Number of pages visited per access, visit duration and bounce rate in Engineering Mechanics: Kinematics compared with OCW-UPM (Source. Google Analytics)

# USE AND DISCUSSION OF RESULTS

## Success indicators in Mechanical Engineering category

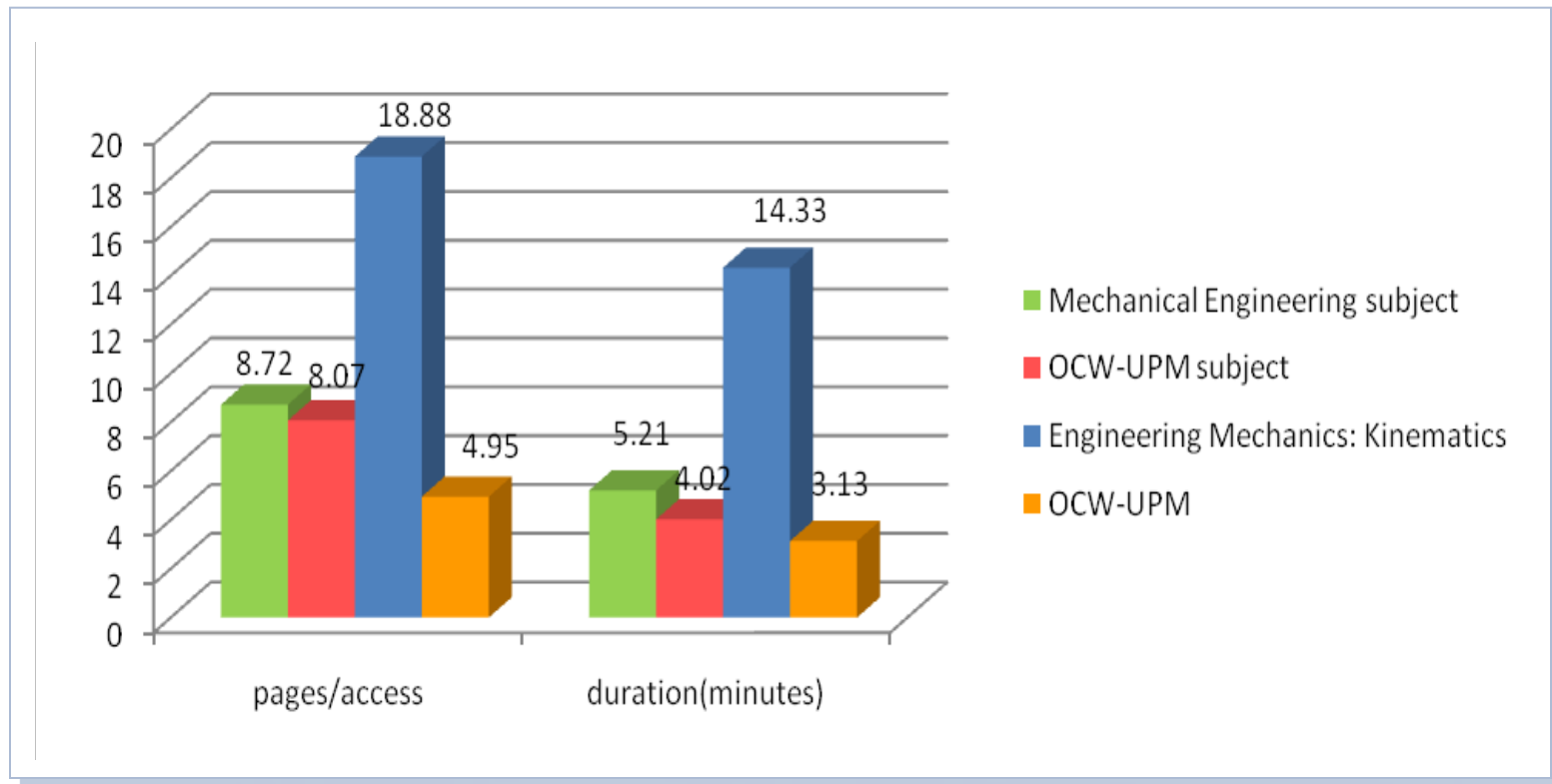


Figure 2. Number of visited pages per access and duration of visits disaggregated by subject (Source. Google Analytics)

# USE AND DISCUSSION OF RESULTS

## Geographical origin of visits

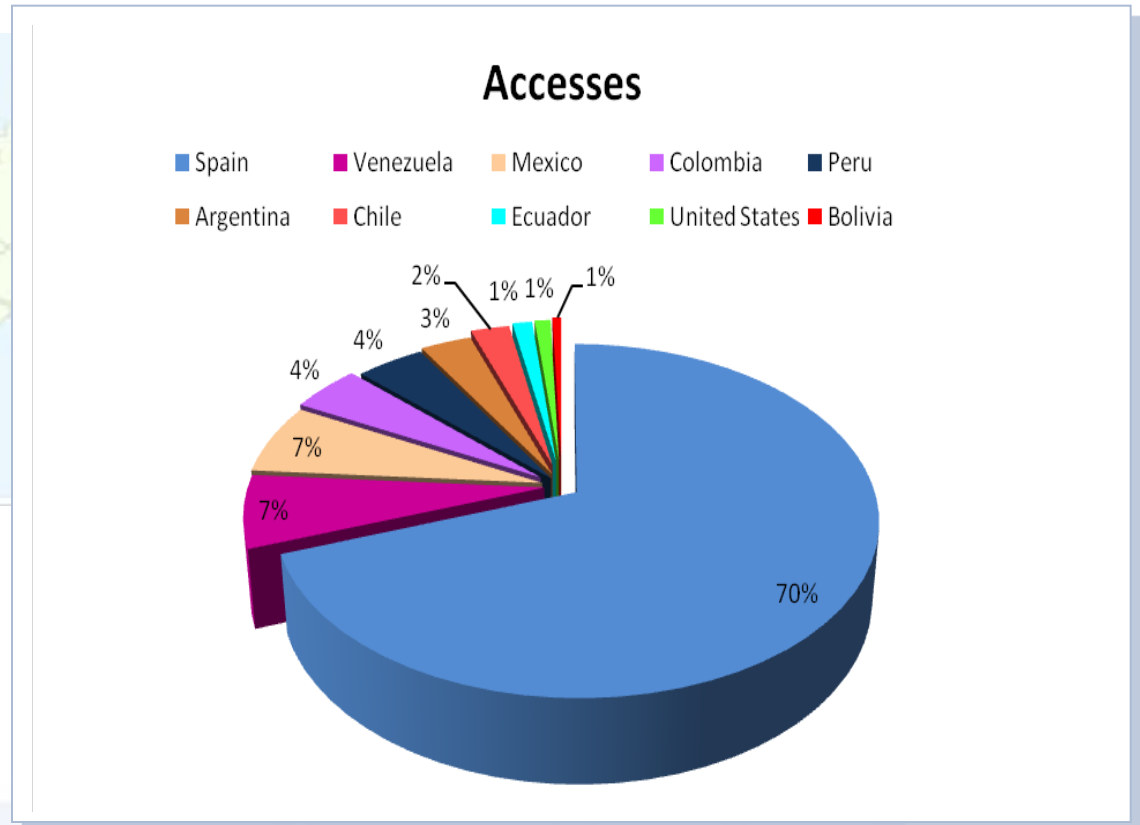
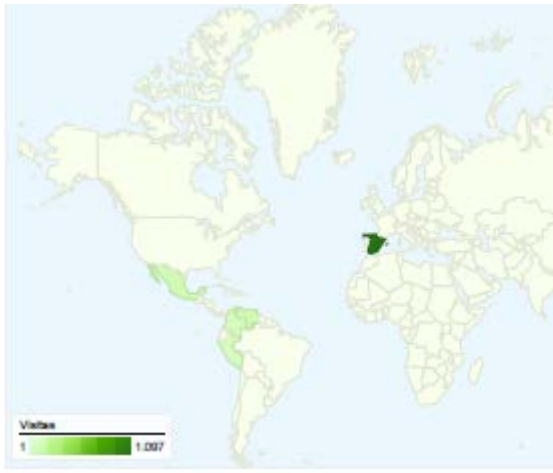


Figure 3. Visitors' origin countries (Source. Google Analytics)

## Use regarding different countries

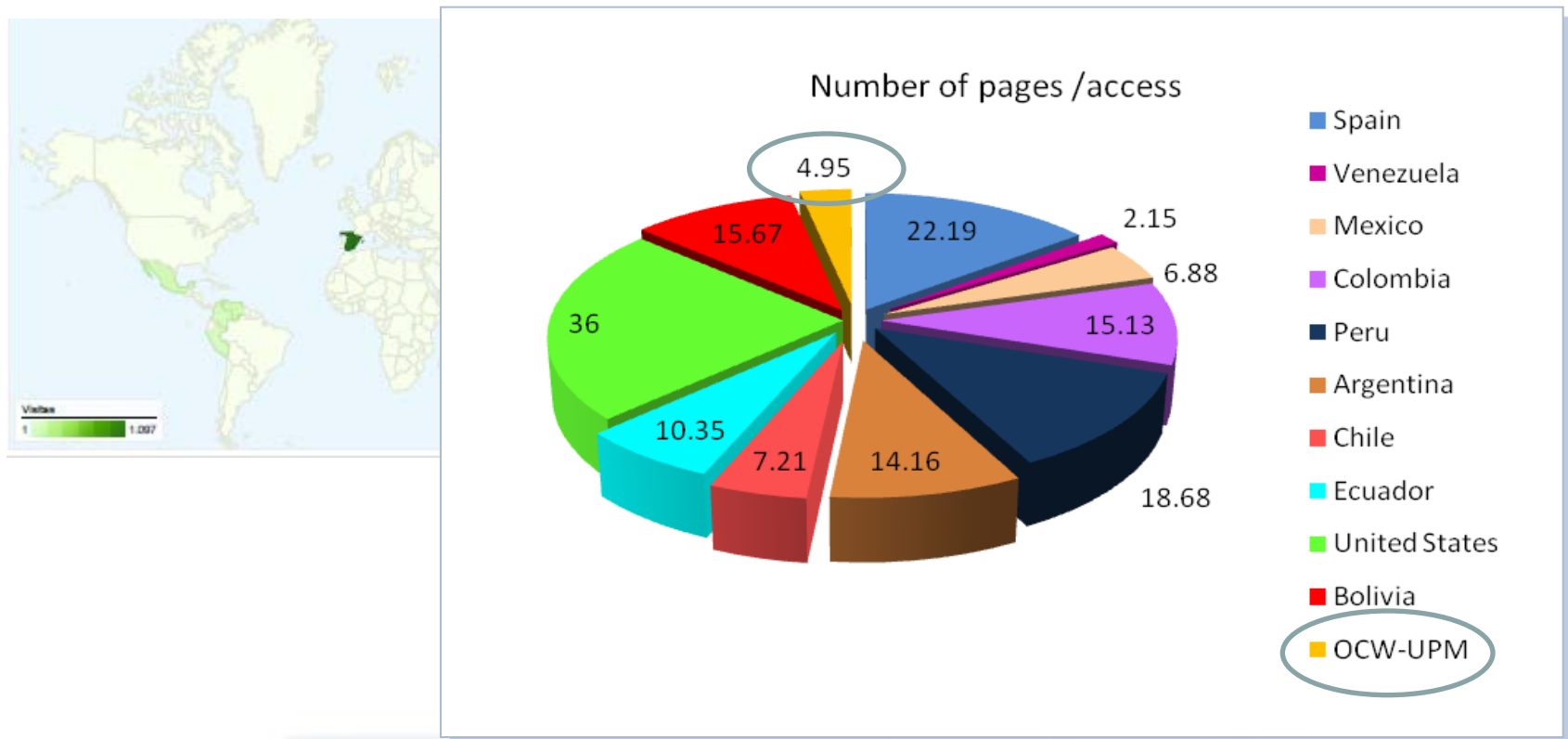


Figure 4. Number of page visited per access disaggregated by countries and compared with OCW-UPM (Source. Google Analytics)



# CONCLUSIONS

- *This way of organizing and presenting resources favors their use*
- *Their main characteristics are:*
  - *Complete materials, with different tasks that are solved so that allows student self-assessment*
  - *Learning Guides which shows how to use these materials*
- *Providing aid that guides their learning adds value and quality to materials, optimizing its use*

POLITECNICA

# Thanks for your attention

[consuelo.fernandez@upm.es](mailto:consuelo.fernandez@upm.es)

OpenCourseWare  
Universidad Politécnica de Madrid

inicio áreas de conocimiento ¿qué es ocw? ocw en la upm

Curso

- Mecánica para Ingenieros: Cinemática
- Programa
- Bibliografía
- Materiales de estudio y lectura básicos
- Materiales y actividades de refuerzo del aprendizaje
- Autoevaluación
- Evaluación
- Guía de aprendizaje
- Profesores de la asignatura

Usted está aquí: Inicio → Ingeniería Mecánica → Mecánica para Ingenieros: Cinemática

## Mecánica para Ingenieros: Cinemática

**CONSUELO FERNÁNDEZ JIMÉNEZ**

Módulo de cinemática de la asignatura troncal Mecánica I de primer curso de Ingeniero Técnico Aeronáutico.

Escuela Universitaria de Ingeniería Técnica Aeronáutica

Última revisión: Julio 2010.

UPM Moon Hound (<http://roboto.etti.upm.es/blog/moonhound/>)

<http://ocw.upm.es/ingenieria-mecanica/mecanica-para-ingenieros-cinematica>

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