

# e-Learning by comparing in higher education: using Wikipedia in the student's learning process

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**WIKIPEDIA AND UNIVERSITY: RESEARCH AND TEACHING EXPERIENCES**

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# Introduction

- It is well known among professors that the complete understanding of a concept or topic commonly arises when one **has to explain** that concept or topic to its students
- Active use of **Wikipedia**, through a guided discovery learning strategy
- A pilot was carried out during **two semesters** in the framework of the **Master Program** in Information and Knowledge Society at the IN3 Institute of the UOC.

# Introduction

- It is difficult to find courses in Higher Education that give to Wikipedia a **central role** in the learning process
- Students are asked to answer different questions related to the **quality perception** of Wikipedia **compared** with the **standard academic learning materials** of the course
- Students have to give **evidences** (examples) about the level of **completeness, reliability, update** and **utility** of Wikipedia, in order to support their answers

# Introduction

- Two types of analysis are performed:
  1. *To test the (positive) influence of the active use of Wikipedia in the **academic performance** in the framework of the learning by comparing methodology*
  2. *To analyze the **quality perception** of Wikipedia and its relationship with the learning process of the students.*

# Learning by comparing

- Research in **analogy** shows that comparing two instructional examples facilitate knowledge transfer *students gain a **robust learning** when the analogical reasoning is promoted*
- **Analogical reasoning** framework:
  - *One of the main objectives of education is to **facilitate** the ability to **apply knowledge to different situations**, which is central to learning of abstract concepts*
  - *Students are required to develop the ability to **find underlying structural similarities** among corresponding objects*
  - *Comparison between analogs yields **stronger solution schemas***

# Learning by comparing

- Two **open questions** in educational research:
  - *how **comparison** should be facilitated?*
  - *which is the appropriate **level of direct instruction** to optimally work that comparison?*
- **Constructivist learning theory:**
  - ***guided discovery learning** is the optimal solution to those questions: **few instructions** are given to the students*
  - *balance between the **pure constructivist** perspective and the **instructional** approach*
  - *in the case of **e-learning**, this is the most adequate option*

# Application of the methodology

- **Course description:**

- ***Master Program** in Information and Knowledge Society at IN3-UOC: “Advanced Quantitative Methods in Knowledge Society Research”*

- ***advanced quantitative course** that complements statistical knowledge developed in previous basic courses*

- *the course is divided into four units: **Sampling methods, Topics in econometrics, Structural equations modeling (SEM), and Neural Networks (NN)***

- *it is a **practical course**, where each technique is applied to particular cases, with **real data**, and basic references are given in both, web format and recommended bibliography, to understand the **theoretical foundations** of each technique..*



# Application of the methodology

- **Course methodology:**

- *it is based on the activity it has to be developed in the **continuous assessment activity***

- *this activity is a learning strategy **integrated** in the learning process, conceived as a mechanism to learn and give reciprocal feedback.*

- *it becomes the most appropriate strategy in the **constructivist learning methodology** within the framework of **e-learning***

- *there are **4 assessment activities**, one per each part of the course: **theoretical part** & **applied part***

# Application of the methodology

- **Course methodology:**

Theoretical part:

- **Wikipedia:** this free encyclopedia is used to introduce different theoretical concepts.
- **Learning materials:** basically some parts of books, or other web materials. They are used to give to the students the foundations of each statistical technique. These materials also introduce the student to the basic concepts that are associated to each technique.

# Application of the methodology

- **Course methodology:**

Applied part:

- **A research article:** a research article is given to the students in order to show how the statistical technique is used in order to prove the hypothesis. The discussion of the article, through the questions stated in each problem set, is the centre of each assessment activity, and will permit to learn its benefits, and also its disadvantages.
- **A statistical package and data:** Since this course is oriented to the application of the proposed techniques, statistical packages are needed in order to do computations. Different statistical packages are used (such as *Gretl*, *MX* and *JavaNNS*), depending on the characteristics of each topic, to analyze the data that and to complement the discussion of the reference article.

# Evaluation of the methodology

- **Data sources:**

1. *Perceptions of the students about Wikipedia through the following four **quality** aspects:*

**Question 1.** *Compared with the other learning materials, do you think that Wikipedia gives a **complete** introduction to this statistical technique?*

**Question 2.** *Compared with the other learning materials, do you think that Wikipedia gives **reliable** information about this statistical technique?*

**Question 3.** *Compared with the other learning materials, do you think that the information about this statistical technique in Wikipedia is **updated**?*

**Question 4.** *Has it been **useful** to use Wikipedia to introduce you into this statistical technique?*

*Likert scale with 5 possible values (“1” for “completely disagree”, and “5” corresponding to “completely agree”)*

# Evaluation of the methodology

- **Data sources:**

2. ***Academic performance of the students:***

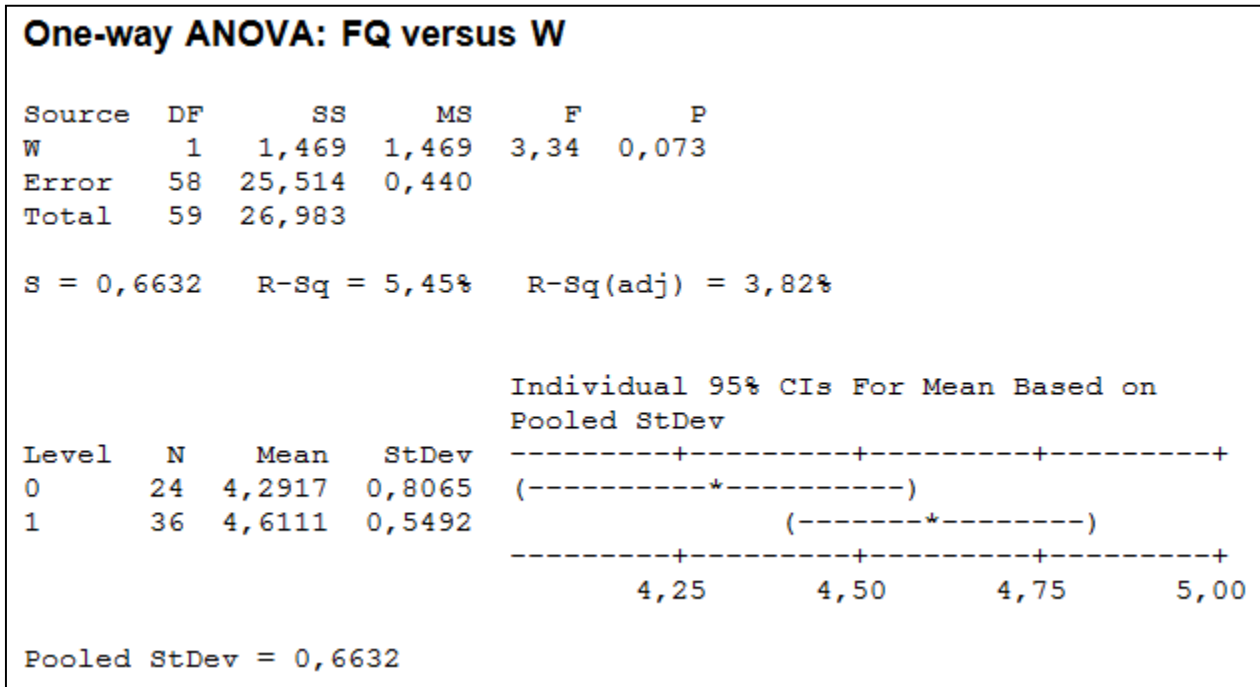
- ***Academic qualifications of the students in each assessment activity***
- ***Final qualification of the course.***
- ***Qualifications rank from 1 (D, bad qualification) to 5 (A, excellent qualification)***
- ***Three different semesters: 71 students***

2011-2	2012-1	2012-2	
28	22	21	71

# Evaluation of the methodology

- Results:**

- there is a **positive** effected of the active use of Wikipedia on the academic performance of the students:



# Evaluation of the methodology

- Results:**

- there are **not significant differences** between the results in the assessments when using Wikipedia.

- qualifications are quite **homogeneous** and there are not evidences that some of the units are more difficult than the others.

	AA1	AA2	AA3	AA4
AA1	-	-1,53 (0,13)	-1,26 (0,21)	-0,97 (0,34)
AA2		-	0,22 (0,83)	0,42 (0,67)
AA3			-	0,21 (0,83)
	<b>3,83</b>	<b>4,28</b>	<b>4,20</b>	<b>4,12</b>

Data in each cell: T-Value (P-Value)

# Evaluation of the methodology

- **Results:**

- *the perceived quality of Wikipedia is (**appropriately**) measured through four different factors: the perception on its **completeness**, its **reliability**, its **update** and its **utility**.*

- *item analysis:*

Item	Cronbach's alpha	Item-total correlation	Factor loadings
Complete	0,76	0,67	0,80
Reliable		0,62	0,79
Updated		0,60	0,62
Useful		0,70	0,81



# Evaluation of the methodology

## Results:

- students agree with the idea that Wikipedia has a **good quality level**:

	Completeness	Reliability	Update	Utility
AA1	3,80	3,85	4,23	4,08
AA2	3,80	4,03	4,26	3,80
AA3	3,61	3,94	4,15	3,67
AA4	3,27	3,61	4,15	3,42
<b>Aggregate</b>	<b>3,63</b>	<b>3,86</b>	<b>4,20</b>	<b>3,76</b>

- compared with the classic academic resources, the students clearly have the perception that **Wikipedia is updated**, containing recent information and recent references.

- this result does not coincide with the opinion of **faculty members** from different knowledge areas. Only **14%** of respondents agree that Wikipedia is updated (preliminary conclusions of **WIKI4HE project**, <http://oer.uoc.edu/wiki4HE/about/>).

# Evaluation of the methodology

- Results:

- the **quality perception** does not depend on the **qualification** of the student:

	Completeness	Reliability	Update	Utility
AA1	2,05 (0,14)	2,24 (0,12)	0,39 (0,68)	1,95 (0,13)
AA2	0,73 (0,49)	1,85 (0,17)	0,17 (0,84)	0,67 (0,52)
AA3	0,16 (0,85)	0,18 (0,84)	0,05 (0,95)	1,08 (0,35)
AA4	0,59 (0,63)	0,88 (0,46)	0,96 (0,43)	1,50 (0,24)

Data in each cell: F-Value (P-Value)

- the measurement of the perception of each factor is **robust**: there is a **strong effect** of Wikipedia in the improvement of the **academic performance**.

# Limitations and further research

- This analysis has been conducted in a **specific type of course** (on-line Master course in statistics).
- It has been addressed to **small groups of students**.
- It would be really interesting to develop **further research** in this line of investigation to apply this learning methodology...

... to **other knowledge areas**, and

... to **bigger groups of students** from different higher education levels

**Thanks for your  
attention!!!**

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