

E-ASSESSMENT IN ONLINE MATHEMATICS THROUGH WIRIS QUIZZES: A KEY FOR ENGAGEMENT

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Ramon Eixarch at ELAM, Eindhoven June 7

Summary

- Open University of Catalonia, UOC
- Mathematics distance learning
- Piloting a new learning methodology
- The technology (WIRIS quizzes)
- Pilot test
- Results

Universitat Oberta de Catalunya

- UOC was born in 1995
- Teaching in Catalan and Spanish
- Printed material + web campus
- Key components of methodology
 - Communication tutor-student (internal e-mails)
 - Communication in group (forums)
 - Permanent Evaluation Tests (PAC) sent by PDF

Mathematics at UOC

- Average age 32 years (86.7% men)
- 90% combine learning with work
- Often with previous low level of mathematics
- Inability to apply to their line of work

Turns into

- Little motivation
- Lack of confidence
- High drop out rate

Introduction to Mathematics (Bridging course)

Recommended subject for starting students.


Used as pilot subject for new methodology.

- Learning materials paper → [web](#)
- Evaluation pdf → quizzes
- Communication
 - equation editor in e-mail
 - Verbalization of formulas in web content

Learning workflow





- Close integration with LMS moodle
- Random variables and graphics
- Mathematical evaluation of the students answers
- Formula editor for the students
- Syntax control of the answers



- Teacher is able to easily modify existing questions

DEMO www.wiris.com/demo-moodle/

Some existing questions

- WIRIS collection

<http://collection.wiris.com/quizzes>

Pilot figures


- 10 units in 2 blocks
- 1 practice test per unit
- 1 evaluation test per unit
- 1 summary practice test per block


- 200 students
- >700.000 questions previews


PILOT - Figures


Persones 


 [Participants](#)

Activitats 

 [Bases de dades](#)

 [Qüestionaris](#)













Administració 

 [Perfil](#)



Esquema per temes

-  [Enquesta inicial](#)
-  [Actituds envers l'aprenentatge de matemàtiques i l'ús de tecnologia](#)

1 Àlgebra

-  [Nombres PRÀCTICA](#)
-  [Nombres AVALUACIÓ](#)
-  [Equacions PRÀCTICA](#)
-  [Equacions AVALUACIÓ](#)
-  [Sistemes PRÀCTICA](#)
-  [Sistemes AVALUACIÓ](#)
-  [Polinomis PRÀCTICA](#)
-  [Polinomis AVALUACIÓ](#)
-  [Matrius PRÀCTICA](#)
-  [Matrius AVALUACIÓ](#)
-  [Qüestionari de Síntesi](#)
-  [Primera Prova de Síntesi SIN](#)

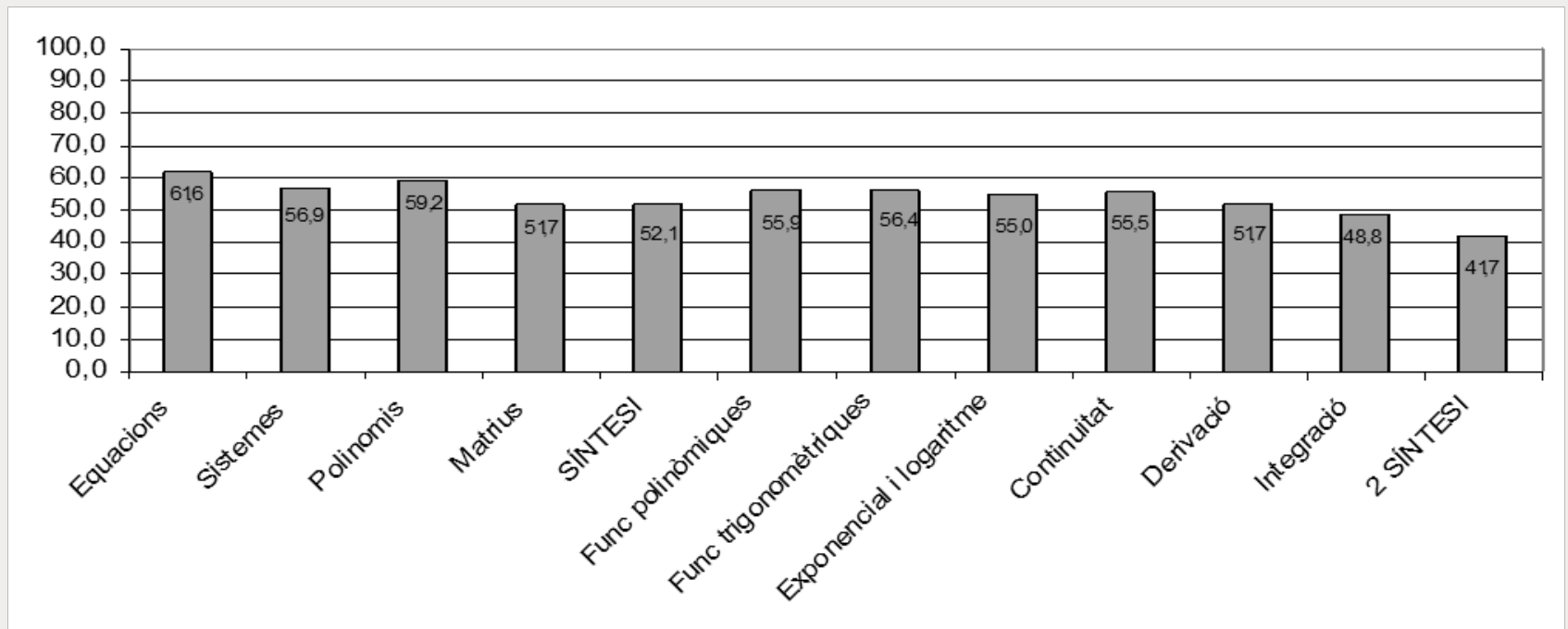
2 Anàlisi

-  [Funcions polinòmiques PRÀCTICA](#)
-  [Funcions polinòmiques AVALUACIÓ](#)

| | PRACTICE | EVALUTION |
|----------------|----------|-----------|
| Questions | 10 | 6 |
| Attempts | ∞ | 1 |
| Open time | Ever | Limited |
| Time | ∞ | 48 hours |
| Essay question | No | Yes |

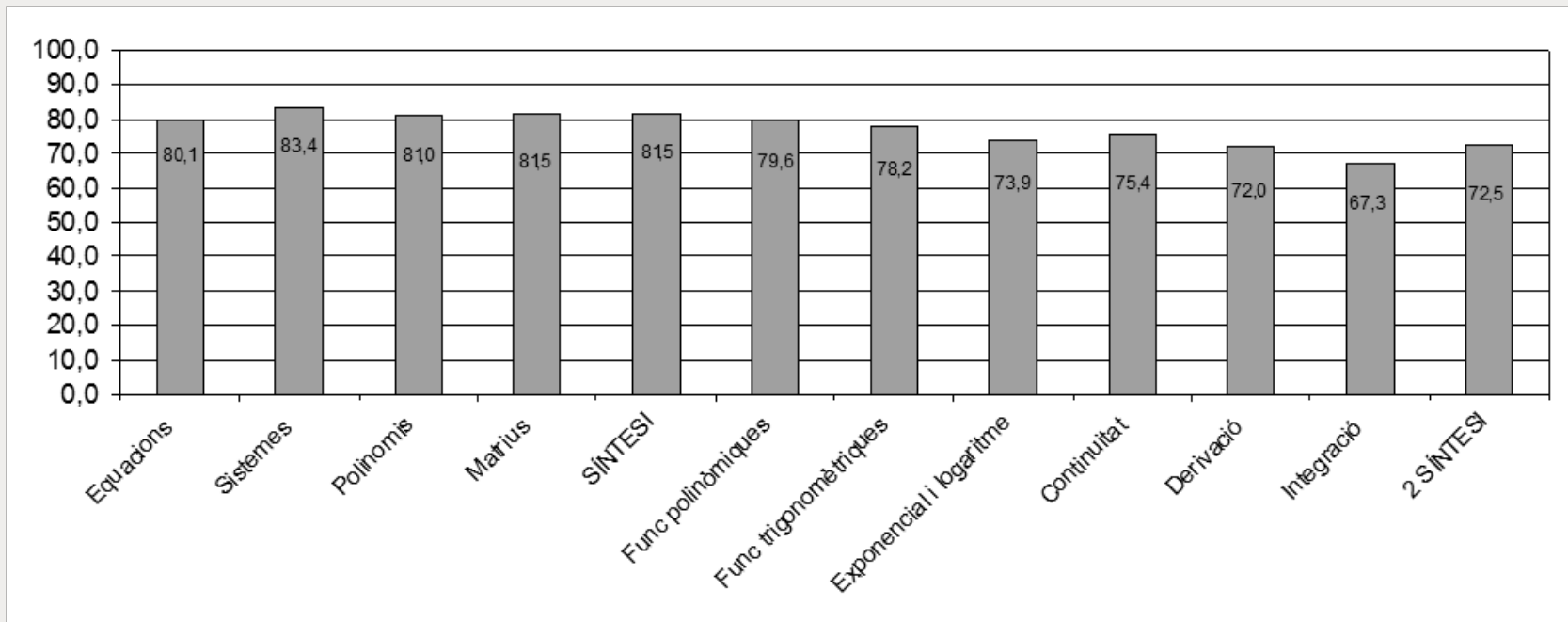
Pilot figures - USAGE

Students who worked on the PRACTICE test



Pilot figures - USAGE

Students who attended the EVALUATION test



Pilot figures - GRADES

| | Historical | 2006-2 | 2007-1 | 2007-2 | 2008-1 | 2008-2 | 2009-1 | 2009-2 | 2010-1 | 2010-2 |
|------------------|------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Attempted | 65,5 | 66,1 | 67,05 | 59,38 | 67,82 | 68,66 | 71,43 | 73,24 | 78,64 | 86,26 |
| Excel·lent | 46,18 | 44,87 | 43,86 | 50,88 | 40,68 | 47,83 | 54,29 | 28,85 | 39,51 | 46,15 |
| Notable | 22,69 | 23,09 | 22,81 | 15,79 | 23,73 | 15,22 | 22,86 | 26,92 | 27,16 | 34,62 |
| Aprovat | 10,17 | 8,97 | 12,28 | 10,53 | 16,95 | 8,70 | 8,57 | 17,31 | 6,17 | 6,59 |
| Suspès (alt) | 5,56 | 6,41 | 12,28 | 12,28 | 6,78 | 10,87 | 0 | 17,31 | 7,41 | 4,40 |
| Suspès (baix) | 15,39 | 16,67 | 8,77 | 10,53 | 11,86 | 17,39 | 14,29 | 9,62 | 19,75 | 7,14 |
| Total aprovats | 79,05 | 76,92 | 78,95 | 77,19 | 81,36 | 71,74 | 85,71 | 73,08 | 72,84 | 87,36 |
| DROP OUT | 34,5 | 33,9 | 32,953 | 40,63 | 32,18 | 31,34 | 28,57 | 26,76 | 21,36 | 13,74 |

Pilot figures - GRADES

Difference grading between PRACTICE and EVALUATION

| | | | | | | | | | | | |
|-----------|---------|-------------|----------|---------|-----------------|----------------|--------------|------------|-----------------|-------------|-----------|
| Equations | Systems | Polynomials | Matrices | SUMMARY | Polynomial Func | Trigonom. Func | Exp and Logs | Continuity | Differentiation | Integration | SUMMARY 2 |
| 2,36 | 1,58 | 1,80 | 2,24 | 1,97 | 1,58 | 1,58 | 2,00 | 2,15 | 2,25 | 2,18 | 2,02 |

Pilot figures - COMMUNICATION

Has communication in the course improved?

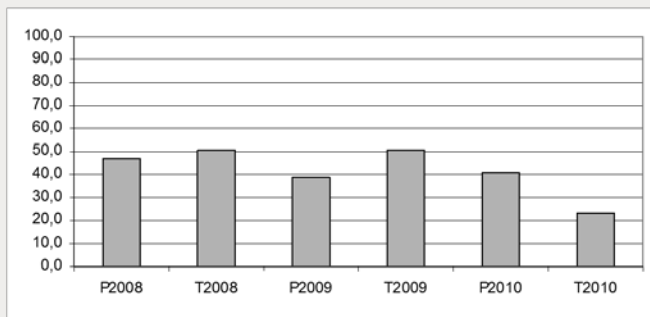
FORUM figures

| Course | Students | Messages | Message / student | Math messages | % math messages |
|------------|----------|----------|-------------------|---------------|-----------------|
| 2009/10(1) | 71 | 345 | 4.9 | 95 | 27,54 % |
| 2009/10(2) | 103 | 517 | 5 | 224 | 43,33 % |
| 2010/11(1) | 211 | 1826 | 8.6 | 584 | 31,98 % |

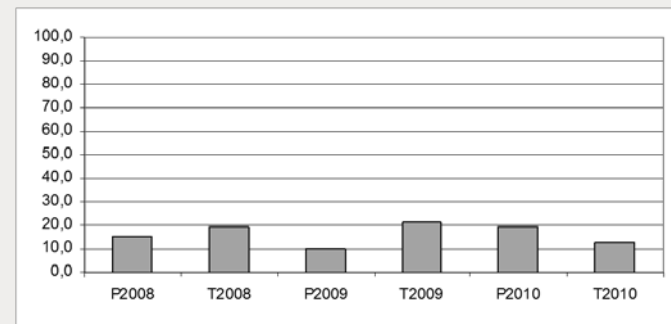
Drop-out figures

Students who attended the EVALUATION test

Drop out %



DO before Analysis



Results

A teaching methodology based on

- regular and intensive activity
- with automatic feedback

Contributes to

- Noticeable decrease of drop-out
- Consolidates learning

Next steps: Adaptive QUIZZES

The screenshot shows the WIRIS Adaptive Quizzes edit interface. The browser address bar is www.wiris.com/demo-moodle/mod/adaquiz/edit.php?cmid=83. The page title is "WIRIS" and the breadcrumb is "WIRIS > adaquiz > Adaptive Quizzes > Derivada". There are tabs for "Info", "Results", "Preview", and "Edit".

Nodes in this adaptive quiz

| | Question | Type | Jump | Grade | Action |
|-----|----------------------------|------|-----------|-------|----------|
| ↓ | 1 Derivada d'un polinomi | ☐ | 1, 2 | 10 | 🔍 📄 🗑️ 🔄 |
| ↑ ↓ | 2 Derivada d'una suma | ☐ | 2, 3 | 10 | 🔍 📄 🗑️ 🔄 |
| ↑ ↓ | 3 Derivada d'un producte 1 | ☐☐ | 3, 4 | 10 | 🔍 📄 🗑️ 🔄 |
| ↑ | 4 Derivada d'un producte 2 | ☐ | 3, 4, End | 10 | 🔍 📄 🗑️ 🔄 |

Maximum grade: 10

[Save changes](#)

Question bank

Category: Default for Adaptive quiz (4) ▾

- Display questions from sub-categories too
- Also show old questions
- Show question text in the question list

The default category for questions shared in context 'Adaptive quiz':

Create new question: Choose... ▾ ?

Sort by type, name ▾

| Action | Question name | Type |
|----------|--------------------------|------|
| 🔍 📄 🗑️ 🔄 | Derivada d'un producte 1 | ☐☐ |
| 🔍 📄 🗑️ 🔄 | Derivada d'un polinomi | ☐ |
| 🔍 📄 🗑️ 🔄 | Derivada d'un producte 2 | ☐ |
| 🔍 📄 🗑️ 🔄 | Derivada d'una suma | ☐ |

[Select all / Deselect all](#)

With selected:

Delete [Move to >>](#) Default for Adaptive quiz (4) ▾

[Add random question](#) ?

More information at www.wiris.com/moodle

maths for more

Windows taskbar: 10:11

WIRIS

Thanks! Gràcies!

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$$\frac{\partial}{\partial \theta} M T(\xi) = \frac{\partial}{\partial \theta} \int_{\mathbb{R}_n} T(x) f(x, \theta) dx =$$
$$\frac{\partial}{\partial a} \ln f_{a, \sigma^2}(\xi_1) = \frac{(\xi_1 - a)}{\sigma^2} f_{a, \sigma^2}$$
$$\int_{\mathbb{R}_n} T(x) \cdot \frac{\partial}{\partial \theta} f(x, \theta) dx = M \left(T(\xi) \cdot \frac{\partial}{\partial \theta} \right)$$
$$\int_{\mathbb{R}_n} T(x) \cdot \left(\frac{\partial}{\partial \theta} \ln L(x, \theta) \right) \cdot f(x, \theta) dx = \int_{\mathbb{R}_n} T(x) \cdot$$
$$\frac{\partial}{\partial \theta} M T(\xi) = \frac{\partial}{\partial \theta} \int_{\mathbb{R}_n} T(x) f(x, \theta) dx =$$
$$\exp \left\{ -\frac{(\xi_1 - a)^2}{2\sigma^2} \right\}$$