Technologies in the University Mathematics Schools

Sebastian Xambó

Universitat Politècnica de Catalunya

Impact of ICT on the Teaching of Mathematics and on the Mathematics Curriculum
26-27 November 2008
Finnish Institute, Paris

Index

- ICT and new secondary curricula in Catalonia
- New curricula for the BM at UPC
- ICT and the Mathematic Curriculum
- Ways forward

Facultat de Matemàtiques i Estadística
Promoció 2004
Universitat Politècnica de Catalunya

LOTERIA NACIONAL - SORTEIG DE NADAL

El portador interessa la quantitat d'UN EURO
al número

31.416

del sorteig que se celebrarà a Madrid el dia 22 de desembre de 2008.

Donatiu: 0,50 euros

Dipositari: Alumnes de Matemàtiques i Estadística de la UPC

En cas de resultar guanyador cal dirigir-se a:
Banc Santander, oficina 4746
C/ Francesc Carbonell 21-23, Barcelona

1920

Facultat de Matemàtiques i Estadística
Promoció 2004
Universitat Politècnica de Catalunya

LOTERIA NACIONAL - SORTEIG DE NADAL

El portador interessa la quantitat d'UN EURO
al número

27.182

del sorteig que se celebrarà a Madrid el dia 22 de desembre de 2008.

Donatiu: 0,50 euros

Dipositari: Alumnes de Matemàtiques i Estadística de la UPC

En cas de resultar guanyador cal dirigir-se a:
Banc Santander, oficina 4746
C/ Francesc Carbonell 21-23, Barcelona

1289

ICT and new secondary curricula in Catalonia (11-14)

ICT promotes interaction of students with mathematical objects and their relations

The ability to construct geometrical figures fosters problem solving

Immediate and effective feedback favors learning from errors

ICT and new secondary curricula in Catalonia (11-14)

Use of facilities for computations that would be too cubersome by other means

Stimulator of collaboration and of comunication of experiences

ICT and new secondary curricula in Catalonia (15-16)

Goals

Use tools such as

- spreasheets,
- computer algebra systems
- graphics programs

that elicit understanding of concepts and mathematical procedures through

- exploration
- simulation
- representation

ICT and new secondary curricula in Catalonia

Competences

To search for information through a variety of sources

To recognize situations in which mathematics are necessary to

organize and interpret

to make informed decisions

ICT

eases access to such situations

frees students from cumbersome manipulations

New curricula for BM at UPC

Frameworks

White book on the BDM

Ministry of Education and Science (2007)

ANECA protocol for “verification”

Internal regulations of UPC

New curricula for BM at UPC

ANECA "Verifica"

1. Description
2. **Justification**
3. **Goals and competences**
4. Access and admission
5. **Curricula and Syllabi**
6. Academic staff
7. **Resources and services**.
8. Expectet results
9. **Quality system**
10. Implanting scheme

New curricula for BM

Remark on Justification

Teaching and Research

Finances and Consulting

Informatics and Telecomunications

New curricula for BM

Remark on Goals

O-4. Being able to use the theoretical and practical knowledge in defining, planning and solving problems in academic and **professional contexts**.

New curricula for BM

Remarks on Competences

Basic (5), Generic (5+7) and Specific (6)

B-4. Being able to transmit information, ideas, problems and solutions from the mathematical and **scientific-technological** domains to audiences of any kind.

G-5. Being able to learn autonomously new knowledge and new techniques

New curricula for BM

Remarks on Competences

G-7. Being able to manage
acquisition
structuring
analyis
visualizing
data and information in the speciality field and
evaluate in a critical way the results

New curricula for BM

Remarks on Competences

S-3. To be able to use sofware for

statistical analysis
numerical and symbolic computations
graphical visualization
optimization
…

for problem solving and experimentation

New curricula for BM

Remarks on the curriculum

Physics (15 cr)
Mathematical engineering (9 cr)

Mentions

Mathematical engineering (30 cr)
Statistics (30 cr)

Strong encouragment of teachers to use any software or ICT technology that can contribute to a more effective teaching.

New curricula for BM

Resources

PC/laptop labs (160)
PC+Beamer in each lecture room
Wide range of software tools
Atenea (Moodle platform)
Intranet (online grading, project managing environment, ...)
Skype, Wikis
e-mail
Star boards
Online registration

New curricula for BM

Resources

PC/laptop labs (160)
PC+Beamer in each lecture room
Wide range of software tools
Atenea (Moodle platform)
Intranet (online grading, project managing environment, ...)
Skype, Wikis
e-mail
Star boards
Online registration
Library (digital books, online catalogue, Creative commons, digital video, ...)
Managing the quality system

ICT and Mathematics Curricula

Abstract

Teachers and students at universities surrounded by diverse technologies

Average profit is not very high [at least at UPC] and in addition it presents great variability too.

The effects of technology on the curriculum seem rather peripheral.

For most people it is not clear, at least in the case of Mathematics, how curricula could be modified to optimize learning with the help of the available technologies.

Ways forward

Foster networking

- it is of the utmost importance for education
- virtual networks are real

Promote cooperation

- in problem solving
- in project assignments

Watch the interface secondary / university

Avoid cloning other systems

A personal note on my class

Thank you!