



WIMS at the University of Milano-Bicocca

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Petit historique IT-WIMS

September 2000: first Italian translation of WIMS

In a short, in the whole system, you should translate each file or subdirectory terminating with an .en or a .fr into an additional file/subdirectory terminating with an .it. [...]

To know what in the file is language-dependent (so should be translated) from what is not (for example the commands), you can compare visitor.html.en with visitor.html.fr, to locate the places where the two files are different.



Petit historique IT-WIMS

October 2002: wims.matapp.unimib.it listed as a WIMS mirror site

Sporadic work on the translation, as teaching to no class suitable for the use of WIMS (no more linear algebra course) and no time/not enough experience to write down my own exercises.



WIMS
• Petit historique
IT-WIMS
Teacher training
Testing students'
proficiency
E-learning

Teacher training



WIMS



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Petit historique IT-WIMS

December 2000: first use with "real" students

Linear Algebra for students in computer science.

Use of the ready available exercises on the topic (mostly by Xiao Gang), in English (very few translation into Italian).

Used both for self study and ("selectively") for exams; 145 registered users.



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Petit historique IT-WIMS

November 2004: colleagues in Florence start using WIMS.

Milano-Bicocca takes care of the translation of the core/adm modules, while Florence starts to translate the exercise modules.



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Petit historique IT-WIMS

October 2003: I was enrolled by the *Facoltà di Scienze della Formazione*

Teaching activity mainly in the pre-service primary school teacher training programme.

Courses not suitable for the use of WIMS

- no computer labs available for the students
- pedagogical concerns

Petit historique IT-WIMS



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Future teachers needs to acquire abilities that go beyond computational skills: they need to be able to formulate abstract mathematical definitions or statements and to write simple proofs.

In the academic year 2005/06 computer labs were made available, so we could really start using WIMS with our students. The use of WIMS was also stimulated by the will of the faculty to start experimenting "e-learning".

Maths for primary school teachers



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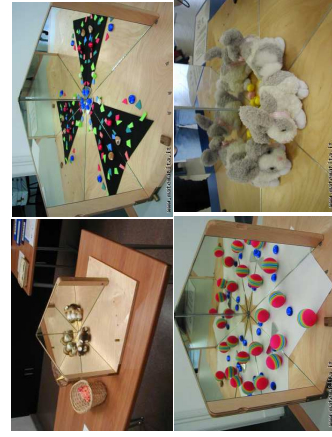
The pre-service teacher training university degree course is a four years program. Future teacher have the following math courses

- "Istituzioni di matematiche I" (Elements of mathematics, first part): arithmetic (first year)
- "Istituzioni di matematiche II": geometry (second year)
- "Didattica della matematica 1B" (mathematics education: probability and example of good teaching practice (third year)
- "Didattica della matematica 2": more teaching practice (fourth year)

Manipulatives



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... contratto didattico



When mathematics is concerned

- a few things are a must know
 - being able to do the computations (with integers and with fractions),
 - being able to convert between square meters and square centimeters, cube meters and cube centimeters,
 - being able to tell a square from an hexagon
- but future teachers also need to be able to "talk" about maths

Testing students' proficiency



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- Maths for primary school teachers
- Basic computational skills
- Manipulatives
- ... contratto didattico
- must know
- you do not really know if you cannot tell
- Geometry
- E-learning

Basic computational skills



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The easiest thing to do is to use WIMS computational capabilities in order to test students' basic computational skills at the very beginning of their course of study.

All the first year students (about 400/450 every year) has to take the WIMS test.
10% of the students fail the test
(Academic years: 2006/07, 2007/08, 2008/09 and 2009/10).

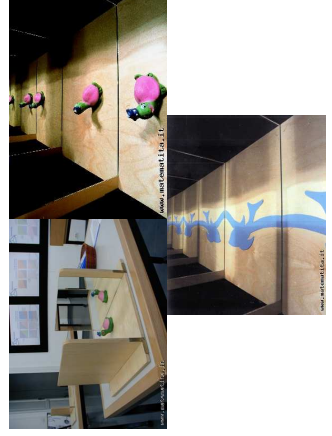
But with students in their second and third year, we need to go beyond testing basic computational skills.

Manipulatives



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must know



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Somma di frazioni

Esercizio.

$$\text{Calcolare } \frac{8}{3} + \frac{6}{5}$$

Analisi della risposta.

Numeratore = 14 : si veda più sotto.

Denominatore = 8 : si veda più sotto.

numeratore e denominatore sono corretti: **NO**

Questo è l'esercizio numero 1 di una sessione di 4 esercizi.

Passare all'esercizio successivo o Un'altra sessione. (È necessario terminare una sessione per ottenere un punteggio.)

you do not really know if you cannot tell

In my "Didattica della matematica 1B" course (third year), the exams consist in a WIMS test, a written test and an oral examination. The written test partly consist of giving a full explanation of one of the question already answered in the WIMS test.

Rispondere al seguente quesito WIMS, dando una piena giustificazione (**NOTA BENE**: in questo esame sarà valutata la capacità di argomentare e dare una giustificazione e non semplicemente il raggiungimento di un risultato corretto in quanto quest'ultimo aspetto è già stato verificato con la prova preliminare informatizzata) 

Geometry

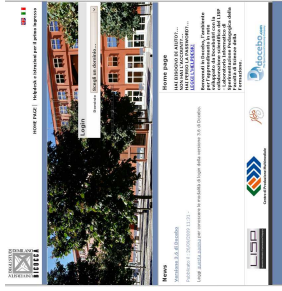
During this academic year for the first time we are experimenting WIMS activities for the "Istituzioni di matematiche II" course (second year). 

- big effort in collecting (translating + creating) suitable exercises
- still think part of the final exam should consist of exercises in which the students have to "give explanations" (i.e. still need for a written exam)

E-learning project at Bicocca



The university funds a project with the aim of experimenting e-learning on a vast scale. In particular the Facoltà di Scienze della Formazione (*Faculty of education*) the faculty has 37 courses taught in e-learning)



Manipulatives



you do not really know if you cannot tell

Vero o falso (riepilogo)

—Esercizio.

La seguente affermazione è **vera**^[1] :

se ho un evento E_1 che ha probabilità $\frac{1}{3}$ e un evento

E_2 che ha probabilità $\frac{2}{3}$ allora la probabilità che almeno uno dei due eventi avvenga è $\frac{2}{3} + \frac{2}{3}$

Analisi della risposta.

[1] risposta errata.

Questo è l'esercizio numero 1 di una sessione di 6 esercizi.

E-learning

How to teach in an e-learning course?

Which tools and which activities are suitable for e-learning?



- Didattica della matematica (master)
- Didattica della matematica 1B (2005/06)
- Didattica della matematica 1B (rec-2006/07)
- Didattica della matematica 1B (2008/09)



Active learning

What the teachers says in the classroom is not unimportant, but what the students think is a thousand times more important. The idea should be born in the students' mind and the teacher should act only as a midwife.¹

Problems and mathematics



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• Problems and mathematics
• Problem-based learning
• The "problem"
• Role of the teacher

... there is a grain of discovery in the solution of any problem. Your problem may be modest; but if it challenges your curiosity and brings into play your inventive faculties, and if you solve it by your own means, you may experience the tension and enjoy the triumph of discovery. Such experience at a susceptible age may create a taste for mental work and leave their imprint on mind and character for a lifetime.²

3?

Problem-based learning



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Problem-based learning (PBL) is a constructivist learner-centred instructional approach based on the analysis, resolution and discussion of a given problem. It can be applied to any subject, indeed it is especially useful for the teaching of mathematics.

PBL "is an instructional (and curricular) learner-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem".³

3?

Problem-based learning



Typically a PBL session follows these steps ⁴:

- pupils are given a problem they have never seen before;
- they discuss the problem and/or work on the problem in small groups, collecting information useful to solve the problem;
- all the pupils gather together to compare findings and/or discuss conclusions; new problems could arise from this discussion, in this case
- pupils go back to work on the new problems, and the cycle starts again.

4?

The "problem"



Nella revisione del testo vi chiedo in particolare modo tener conto dei seguenti aspetti:

- che cosa è una corrispondenza?
- saper dare esempi di corrispondenze (oltre a quelli contenuti nel testo)
- data una corrispondenza, saperla rappresentare in diversi modi

Docente



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Infine vi chiedo di leggere con attenzione i "Quesiti", che costituiscono una ricca fonte di esempi, e di scrivere qui di seguito gli eventuali dubbi che vi sono sorti e che non siete riusciti a risolvere nel lavoro di gruppo.

Docente

The "problem"



- Read the textbook
- try to understand definition, explanations, examples&exercises given in the textbook
- discuss about them with your colleagues in your group using the forum
- practice with WIMS exercises completing the assigned worksheets
- write down an explanation of your findings for the teacher

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The assignment emphasized the need of "active participation" by all of the students: only after going through the steps above the students could ask for help from the teacher.

One of the main themes of the course was combinatorics, with respect to "counting correspondance, permutations and functions", so it was easy to implement WIMS exercises corresponding to the exercises given in the textbook

Note: in the spirit of "discovery" the students were asked to find out the formulas by themselves.

The "problem"



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Role of the teacher

As the aim of the course was indeed “teach to teach”, the actions of the teacher where ment to stimulate metacognitive reflections

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Secondo voi perché gli esercizi [del test di autovalutazione] vi costringevano a lavorare con numeri anche piuttosto alti?

(Why do you think WIMS poses exercises with quite big numbers?)



Role of the teacher

It was good to discover that some students did get the point

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mi viene da pensare che usare i numeri alti è stata una strategia per “costringerci” a trovare una generalizzazione e forse anche una giustificazione, che, a pensarci bene, con numeri piccoli non è necessaria.

(I sort of think that big numbers force us to find out a generalization ad a justification of our procedure, justification we do not feel the need for with lower numbers)