On-line university

a national realization for teaching science

in the first academic years

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1. A national, cooperative realization

A set of teaching resources entirely covering the early years of learning at scientific universities in physics, mathematics, chemistry, biology and technology.

The R.U.C.A. is a science academic network of self-learning centers. It organizes the resources production, their evaluation and availability.

2. History of the R.U.C.A.

1987 constitution of the R.U.C.A.

1991 as the work grew, it was distributed among disciplinary committees in Mathematics, Physics, Chemistry, Biology , etc.

1994 the R.U.C.A. decided to collectively create resources (device simulations, video films, auto-evaluation tools, etc). In spite of scattered resources, the students were to use them in their initial training.

1995 the R.U.C.A. decided to launch the P.C.S.M project, *first years made to measure* in order to cover the teaching the first two scientific academic years.

1997 the P.C.S.M project was financially supported by the ministry of Research and Education.

3. On-line university

1998 the characteristics of the R.U.C.A. graphically executed production were submitted to a specialized company to draw the common lines and to suggest a general model.

The graphical framework was discussed, amended and adopted by the network and the P.C.S.M project then took the name of *on-line university*.

Teaching structure The graphical framework reflects a rather classical teaching structure, with two entries :

— **Activities** to learn, to practice, to simulate, to observe, to evaluate.

— **Themes** with the set of activities available on a given theme.

3.1. The site

A presentation can be seen on the national site http ://www.univ-enligne.prd.fr

The ressources 600 hours of training are available and are subject to testing and evaluation by the universities. The resources contain 330 visual animations, 410 video films and 600 computer simulations and are currently occupying about 2 G bites of disk space.

A guided tour gives an example of each function. An entry under password gives access to the modules.

The progress of work is not the same in all disciplines. Work is more advanced in physics, for which the program is almost covered. It has just begun in biology.

3.2. Conditions of the contract

Flexible pedagogical structure *On-line university* is conceived as a juxtaposition of independent modules. Each unit is modifiable and modules can be reorganized by teachers for their own pedagogical needs and internal use in their university.

The choice of standards Products must be platform compatible. In 1998, the choice of standards was decided, with the use of multi-platform languages (HTML, javascript, Java). These constraints are very strong because total browser compatibility of languages such as javascript is not effective. The on-line questionnaires use language CGI - PERL language.

Further evolutions The R.U.C.A. keeps track of technological progress and further evolutions are already in preparation (XML...)

3.3. Availability

1999-2000, year of experiment

On-line university has been supplied in 25 public universities which had signed an agreement. Modules must be freely accessible for students registered in universities.

License

On-line university is a work of collaboration and a collective property of its creators ; the license will be transferred to public universities or to educational companies in exchange for financial contribution.

Maintenance and regular update   of resources are provided by the R.U.C.A.

4. A cooperative realization

A piloting committee created in 1997 organizes yearly work distribution between the R.U.C.A. eleven universities. While one of the universities designs a module, the others carry out didactic analysis, suggest complements or modifications.

Realization by plural teams While modules are produced by teams of academic teachers as far as didactic content is concerned, engineers provide technical realization ; it led to the creation of regional academic laboratories of development. A competence distribution allows technical training sessions and centers cooperation taking particular skills into account.

Link with industries of software Appeals to companies, at a national level for the model, and at a regional level for specific computer problems are done.

5.   Validation of the contents

An internal Observation of Practices Committee   piloted by the R.U.C.A. insures a follow-up of the experiment.

Two questionnaires   are integrated into the software packages which allow to make a follow-up of uses

– one questionnaire stands upon immediate remarks on the consulted pages
– the other concerns the whole studied module.

An external committee for the Evaluation   guarantees the scientific methods of the observation.

6. Modules in mathematics

Modules are shared according to the previous researches and experiences of integration of computer tools in the education in each university.

Three modules are already finished
- vector space in Bordeaux,
- calculus (sequences and functions) in Paris 6
- logic and sets, arithmetic and analytical geometry in Lille .

New modules are scheduled   differential equations, Cn functions, linear algebra, integration, experimental mathematics (algebra and arithmetic).

Problems linked to mathematics

Problems linked to the mathematical symbols

which are not yet implemented in the browsers ; these problems are treated at present with different techniques by the teams.

Problems of writing

exploiting the possibilities of multimedia which is not a part of the current culture of the authors. The use of animations and the possibilities of visualization bring profound changes in the conception of the creation of resources. As with formal computation, the possibility of experiments in mathematics is still in its initial phase.

7. Interest of the multimedia tool

For the students,

this tool means
– work in their own rhythm,
– an easier discovery of concepts, with the possibilities of visualization and simulations in mathematics,
– the development of a better intuition,
– individualized tutorial session for personal work.

8. Problems

Problems of the integration of technologies in a classical curriculum.   When the teachers give precise personal work to do with the resources, these ones are more effective and are more useful for all the students.

Problem of guides

How to give to the students the effective help adapted to their various learning strategies ? How to reconcile guides and develop the autonomy of the student ?

Personalized services to the students   should also be conceived.

9. Futur

Problem of the integration of resources

Platforms of education allow eventually to combine the work in presence with the teachers and an remote access to resources for the personal work.

Problem of friendly tools

necessary for the individualization of education and a better success of the students by helping them to understand the sense of the scientific methods.

10. Conclusion

The wealth of the experience for the producers incites them to pursue their work in spite of the problems met in the conception and the realization of the products as well as in their integration in education.

At the same time, they are conscious of being at the beginning of a long process of work in common with teachers who are not specially interested in the multimedia.