

Report from the 7th European Workshop on Multimedia in Physics Teaching and Learning

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Aims of the Workshop

Following the tradition of the previous Workshops on “Multimedia in Physics Teaching and Learning” (MPTL), this seventh edition (7-th MPTL, September 22-24, 2002, Parma University, Italy) focused on new trends and research results as well as on the presentation of review talks illustrating experiences gained while developing, testing and applying devices in multimedia and computer aided physics teaching and learning in various European countries.

Special attention was given to standardization and exchange of resources between the different projects running in different European countries, so discussing about the importance of transportability and the multilingual translation of multimedia products.

One of the main topics was the presentation of multimedia in teaching Quantum Mechanics. An important goal was testing the efficacy of a multimedia poster session.

Contributions

The workshop was organized at Parma University by the local Research Unit (Public Awareness and Didactics Group) of the “Istituto Nazionale per la Fisica della Materia” (INFN).

The workshop in Parma (September 22-24, 2002, <http://informando.infn.it/MPTL/>) belongs to a series of workshops of the European Physics Society (EPS), Educational Division, devoted to the topic “Multimedia in Physics Teaching and Learning”. The scientific and organizing committee was composed by Hans Jodl (leader of the MPTL workshop series), Urbaan Titulaer (member of EPS), Roberto Fieschi and Silvia Merlino (local organizers). It was attended by almost 50 participants representing more than 12 countries, with 22 active contributions and 5 invited speakers.

Mario Belloni (Davidson College, USA), first invited speaker, gave an overview of recent developments and experiences accomplished in the USA, focusing on multimedia based curricular materials and new distribution mechanisms at digital libraries. In his talk on “Using Physlet to Teach Quantum Mechanics”, Belloni presented the interactive Physlet-based curricular materials produced to support the understanding of both quantitative and conceptual difficulties encountered by many students in this subject.

Multimedia in Quantum Mechanics was the subject of all discussion periods during the morning of the first day of workshop, as proposed by the scientific committee.

Oreste Tommasi (INFMedia srl, Italy), second invited speaker, faced one of the most important aims of the workshop. His talk on “Design of educational multimedia products in several languages”, stressed the importance of multilingual issues in designing a multimedia product, from the points of view both of production and manageability. Tommasi discussed, with a particular attention to the educational aspects, the most common problems that arise in designing a multilingual product, showing some strategies to minimize implementation efforts as well as to optimize effectiveness on the user side.

Roberto Roncaglia (INFMedia srl, Italy), third invited speaker, presented an introduction to the Intelligent Tutoring Systems, educational interactive tools that use Artificial Intelligence to organise the learning environment according to the user's needs. ITS can assess knowledge, skills, and expertise of the learner and consequently provide explanations, hints, examples or demonstrations. Roncaglia illustrated the main structure and functionalities of “Virtual Tutor”, a tutoring system designed to train students in solving college level physics exercises, a system that INFN and Infmedia are currently developing.

The last two invited speakers, Theodor Duenbostl (BG/BRG Ettenreichgasse, Austria) and Leopold Mathelitsch (Inst. Theor. Phys., Graz, Austria), gave an overview of the ways multimedia could be used in teaching physics in schools. Examples were taken from topics like computer-based experiments, simulations, games, virtual classrooms, multimedia-supported textbooks. In addition they tried to give a survey on the actual implementation of these ideas in the real school situation, the experiences been gained mainly within the Austrian school system.

Most participants presented newly developed material and their experience with the implementation. The representatives from the Eastern European countries such as Hungary, Poland, Czech Republic,

Ukraine and Russia showed their respective quite extensive multimedia projects. The availability of computers and the internet is improving every day, which implicates that students become more and more confident with multimedia. The issue of how these tools are used becomes a very important one in physics education research, as a lot of participants emphasized. The level of the multimedia presented was spread over a wide range, covering all the teaching degrees, from compulsory school to the University.

Discussions

A lot of topics were mentioned and discussed during the workshop and the final discussion. It was unanimously agreed that presentation good quality is increasing year by year, showing the validity and the importance of these workshops and their formula.

This year, for the first time, the poster session was organized in a twofold way: the classical posting and the interactive session with multimedia computers and internet access, which allowed every participants to take a closer look at different multimedia products in real time.

This combination was welcome very enthusiastically by the participants and represented one of the winning features of the workshop. In our opinion, starting next year it could become one of the characterising aspects of MPTL workshops.

One of the main aims of seventh workshop was the review talks session, intended as a chance to focus on new trends and research results as well as on the exchange of experiences gained while developing, testing and applying tools in multimedia and computer aided physics teaching and learning in various European countries. Participation was not so widespread as hoped, nevertheless had some important contributions from many countries. We hope this will be an increasing trend in the future editions.

Furthermore, all the oral presentations were video recorded, to make them available on the web.

Today, the modern multimedia technologies have shown their potential, in terms of promoting a big step forward in the teaching of scientific subjects. Modern multimedia attract students' attention, enabling an easier and more rapid process of learning, as compared to the traditional one based on textbooks. Indeed, despite their empirical origin, the subjects of physics and technology often considered hard and very abstract, as compared to other studies; this is mainly due to the reason that it is not easy to introduce empirical laws and dynamical phenomena through textbooks. Instead, interactive multimedia tools, with simulations and movies, are particularly effective in giving an intuitive idea of such concepts and introducing phenomena concerning, for example, the microscopic and atomic world, of which nobody can have a direct experience.

Furthermore, scientific and technological knowledge are essential prerequisites for Europe to succeed in the competitive environment of international research and scientific development.

Moreover, since a higher mobility of people will take place in the near future, a strong common scientific and technological background will be essential. Thus it is highly advisable for European educational Institutions to use these novel possibilities in order to raise the average educational background.

For multimedia products, translating materials into different languages becomes an important issue and the language problem (transportability) should already be well considered from the very beginning.

In the last few years, university institutions and national research centers in different European countries have been actively engaged in projects concerning the advance of scientific education. Hough being individual efforts, they are giving very encouraging results. We are firmly convinced that everyone could benefit from the union of these singular experiences but, at the same time, the present status of e-learning shows that further improvement must be made, in order to facilitate the access to knowledge through the multilingual learning contest, and through functionally rich and easy-to-use learning systems. It is our intention, therefore, to involve in the network other European countries, which do not have a tradition in multimedia, so to extend public awareness in the scientific and technological issues.

The major target audience for such systems is still concentrated in higher education, including teacher training, but it is very important to extend these benefits to other subjects, including basic education and general public, so to make science and technology more appealing and oppose, above all, the scientific vocation crisis of young people.

The final discussion delineated a guide line for the future editions of MPTL workshops, as to:

1. improve the interactive poster sections
2. give suggestion for next MPTL's principal topics: optics, thermodynamics, solid state physics or statistical physics.

3. strongly encourage people from different countries to present a status report on the MM situation in their universities and educational research centers
4. form a "referees group" for MM-material (for example, members of EUPEN and WORKING GROUP 5)
5. encourage people to present original work as regards the already existing material that it is possible to find on the web, for example, non standard physics applets and simulations and so on.
6. new projects should be organized in a modular form, suitable for different levels of application (University, School, in-service training, personal study)
7. choose a "target group" for school products, in order to compare the existing multimedia material devoted to this "age group"
8. take care of the "language transportability problem" while projecting multimedia material.

Detailed information about the 7th edition of the workshop on "Multimedia in Physics Teaching and Learning" can be found at <http://informando.infm.it/MPTL/> where all contribution abstracts are available.

In 2003 the 8th workshop will be held at the end of September in Prague, Czech Republic (<http://lucy.troja.mff.cuni.cz/~tichy/MPTL8>). Principal topic could be:

Optics,

Interested people can find more information about this series of workshop on the web address:

http://pen.physik.uni-kl.de/w_jodl/mmeuro.htm