Contributions to the Workshop Multimedia in Physics Teaching and Learning November 22 and 23 1999, AMSTEL Institute, University of Amsterdam

Frank Schweickert. Kaiserslautern.
FiPS - Physics and Distance Learning
Abstract:
The FiPS project supplies about 100 off campus students with lectures from first year physics major studies. This presentation explains the general set-up of this distance learning program and emphasizes its telematic aspects, i.e. tutoring via the internet. The employment of multimedia in a narrower sence - such as video, computer simulation and other techniques – were also discussed in further detail by Daniel Roth in a separate talk. http://www.fernstudium-physik.uni-kl.de/

Wolfgang Christian. North Carolina, USA.
"New Techniques for Authoring Interactive Curricular Material"
Abstract:
It is still not common to find computer-based interactive curricular material incorporated into mainstream physics texts. The rapid pace of hardware and operating system development has made it difficult for text and software authors to produce curricular material that was not obsolete shortly after publication. Internet technologies are likely to change this situation by providing standards based on virtual machines and meta-languages. Adopting these technologies may also improve the teaching of the underlying physics. This paper describes a set of Java applets, known as Physlets, which make use of these technologies. Physlets are designed to communicate with browsers by employing a scripting language such as JavaScript, thereby allowing one applet to be used in many different contexts. But this is not enough. Curriculum authors usually want to process the data and to present it in various formats. Over the past year the functionality of Physlets has been greatly extended through the use of inter-applet communication. This makes it possible to use a modular object-oriented approach for the design of interactive curricular material. Examples of interactive curricular material that makes use of these techniques will be presented.
Physlets are available on-line at: http://webphysics.davidson.edu/applets/applets.html

Marjon Engelbarts. Utrecht, The Netherlands.
Projects in Utrecht with LabView; the educational environment 'The Educator'.
Abstract:
The purpose of the talk will be to give the most important conditions of computer aided education. This will done using our own experience on these subjects. The projects that will be discussed are, for example, a project on developing an remote experiment for high school students. The experiment is being developed using LabView. Another project that will be discussed is the educational environment called 'the Educator'. The Educator is specially developed for a course on signal processing for second year physics students. Using the Educator it is possible for the students to work together on assignments using Java applets. In the Educator the can communicate, share applets, exchange applets, use a Whiteboard etc.

Daniel Roth . Kaiserslautern.
"Use of Multimedia in the FiPS Project"
Abstract:
"FiPS is the physics distance education project at the university of Kaiserslautern, offering the first two semesters of a physics major course. FiPS makes extensive use of the Internet and multimedia. Multimedia at FiPS means simulations (Java Applets), interactive screen experiments (IBEs) and digital videos all integrated into world wide web based study guides."

Dieter Heuer. Wurzburg.
"Learning Physics with Multimedia-experimental Supported Workshop Instruction-Experiences with a (New) Instructional Concept"
and additional give some informations about the BMBF-Project: Vernetztes Studium Chemie. In this project we shall create physic moduls concerning subjects of the first year university-level. To realise these modules we are create a tool like PAKMA in Java.

J.Lenaerts, W.Wieme, E.Van Zele, T.Van Hoecke.
Centre for Innovation and Research in Physics Education. University of Gent, Belgium
New Learningware for a Quantum Physics Course
Abstract:
We present an innovative learning environment for an introductory Quantum Physics course in a traditional large university classroom setting as part of an ongoing investigation into student's understanding of Quantum Physics and the impact of technology on science instruction and learning. An interactive teaching style, Peer Instruction, has been integrated with network-enabled instruction based on a WWW implementation. The instruction and learning model is based on content-specific research on learning and understanding and on a pedagogical model of the learner and learning processes. The term learningware should emphasize the important shift from teaching to learning. The WEB component has been specifically designed for this project and could be equally well adopted for distance learning. The learningware has been tested with a group of 200 third semester engineering students, and their understanding and performance improved significantly, indicating that the combination of Peer Instruction and the use of Information and Communication Technology (ICT) can make a real difference.

K. Kambouris, P. Dimitriadis (Science, Technology and Environment Laboratory, Pedagogical Deparment P.E., University of Athens)
Teaching Kinematics and Thermodynamics in low Secondary Education in Greece - A new technology - based learning environment"
Abstract:
The new technology practice at the physics laboratory - allowing a new perspective of teacher's role, but with no intention of replacing hands-on experiments - contributes to students' better conceptualization and perception of natural world. Especially, performing experiments using easy-to-handle measuring equipment that may provide contemporary measurement recording and graph drawing reinforces the above mentioned contribution.
Based on conclusions of research on education and instruction, we edited a curriculum for teaching linear motion and thermodynamic phenomena to Junior High School students (aged 13 - 15).
Four MBL were designed and implemented to study linear motion. The experiments were focusing on motion / immobility, uniform linear motion, accelerated motion and free fall.
The thermal expansion of solid was studied by adjusting a force sensor and two temperature sensors at a simple linear expansion apparatus. This equipment structure facilitated the contemporary measurement of length and temperature at the two edges of a bar.
At the thermodynamic didactical approach students - based on a worksheet - performed experiments and interacted with a simulation software. The simulation grounded on the kinetic molecular theory reproduces the motion of ideal gas molecules.
We believe that MBL effectiveness on didactical process will be optimized by incorporating simulation software that will aim at facilitating students' conceptualization of real-time microscopic explanation of physical phenomena.

Ulrich Harms
Titel: Report on the Workshop "New Trends in Physics Teaching", Puebla (Mexico)
Abstract:
Review of the papers presented at the workshop. Presentation of some central ideas of the contributions by

- Josip Slisko (Physics Education in the XXI. Century; Use of the History in Physics Education) - Fred Goldberg(Constructing Physics Understanding in a Computer-Supported Learning Environment) - Louis Abrahamson (Classroom Communication Systems (CCS)).

Cees Mulder. Amsterdam, The Netherlands
Computers in Investigations in Physics
Abstract:
In the upper level of secondary education investigations are an important part of the curriculum. Pupils must apply all kind of practical and inquiry skills. Computers influence the way these investigations are performed. The Internet is used for instruction, information retrieval, communication with experts and publishing, and IP-Coach for data-logging and modelling. Physics learning in these investigations is very much pupil-controlled. In our research we study the abilities of pupils in these new computer skills. Also we try to establish a good curriculum for it.

Ewa Mioduszewska, Ton Ellermeijer. Amsterdam, The Netherlands.
Coach 5: Science and Technology Learning Environment for 15 – 20 years students.
Abstract:
Presentation of Coach 5, an integrated environment with tools for Measurement, Processing, Analysis, Modeling and Video Measurement. Next to these Coach 5 has unique tools for authoring lessons and activities and management. If possible during the presentation the participants will have a hands-on in the Studio Classroom.

Piet Molenaar. AMSTEL Institute
Mechanics in a Multimedia approach.
In the Amstel Institute of the University of Amsterdam is developed Coach 5: a powerful and versatile educational software program for measurement and control. It offers many tools for investigative learning in Physics.
For Mechanics had been made recently some materials in a Multimedia approach. Students have to do some measurements with sensors, make some models and measure videoscenes. They process the measurements and combine the different tools. The materials have been demonstrated and the first results with some groups of students have been reported.

Jürgen Kirstein. Berlin, Germany
"Interactive Screen Experiments - Documentation and Presentation of Real Experiments in Physics with Standard Multimedia Technology"
Abstract:
Most multimedia extended physics courses represent real experiments as digitized videos. This timebased mediatyp has the disadvantage that students themselves are in the state of passive learners, escaping from interactions with the shown experiment. Interactivity in most traditional multimedia learning environments allows only the selection of different media, but no interactions within these media objects are available. We have now developed a new method to record an interactive image of a real experiment so that the students are able to execute the recorded experiment themselves by direct manipulation within a digital photo. That's what we call an "Interactive Screen Experiment" (ISE). The main feature of this ISE like interaction between the image of the experiment and the student is the ability to manipulate digital photographed objects with standard input devices like the mouse or still more impressively with a touchscreen. ISE don't simulate the experiment - within the digital photo, nature speaks for itself.

Heinz Oberhummer. Vienna, Austria
"Development of the multimedial learning and teaching system ESPACE"
Short summary:
ESPACE is a multimedial learning teaching system in particle and nuclear astrophysics and astronomy. The content, didactical aspects, and the multimedia and programming structure of ESPACE will be discussed. A demo-CD containing the project information and examples will be presented.

Helmut Kühnelt. Vienna, Austria
"Supporting teachers through internet"
Abstract:
1. NetScience has supported school projects about GPS including a world wide videoconference. Students and teachers at school and at university cooperate. Both institutions open their doors. A first evaluation shows an acceptable degree of success. BSCW (Basic Support of collaborative Workspace) will be used in the future.
2. The Virtual School is intended as a resource for teachers. The physics department has started a few months ago and is getting stronger. I will discuss some of the offerings and hope for feedback and information about people willing to cooperate.

Cees Mulder. Amsterdam, The Netherlands
Pupils using the Internet for science education
Abstract: At this moment we run several projects on pupil's use of the Internet. In many of these project we try to combine the facilities Coach is offering with support via websites. Some examples are:

1. The investigation of the month:
This project supports independent learning through investigations. Every month an actual question for an investigation is put on the website. Pupils can use the facilities the web is offering to work on the investigation.
2. The WebLab
First there was a physics book with additional materials on the Internet. Now the importance of additional materials is growing and becoming a curriculum on the Internet.
3. The Webcd-rom
Information and curriculum materials are not stored on a cd-rom, but on a website. The advantage is that the materials are more up-to-date than on a cd-rom.