

PEN – Physics Education Network

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This initiative is an internet service for the virtual tutoring of in service physics teachers. Since several years the teaching material (traditional and multimedia material) is numerously exploded and – via internet – worldwide accessible: e.g. $> 10^3$ applets for physics. A teacher at school cannot follow this development. According to our opinion such an internet service must contain only evaluated material; it takes too much time to check all the available material for one topic/lesson: for example there exist about 10-20 versions of the double-slid experiment as a simulation. The content of this internet service is such that we offer support for the teacher in all kinds of his work: to prepare a lesson (to buy suitable instruments, to choose suited transparencies ...), to teach a lesson (to offer teachware, problems for a lesson ...), to coach pupils (to render information for a project, to answer questions ...), to study further (to suggest books for self-studying, information about colloquia at physics departments ...).

This initiative started in 1999 and offers now a website (<http://pen.physik.uni-kl.de>) with daily growing content.

The general aims are:

- virtual support of physics teachers at school
- answering special questions by members of the department
- service and support for practical lessons
- discussion between teachers via newsgroups
- cooperation of schools and physics departments
- collecting, evaluating, distributing multimedia
- information about important experiments or noble prize winners (news-ticker)
- database, mailing lists, etc.

Features and functions are:

Information section

- education server and databases
- schools and internet
- publishers of school book
- teaching aids manufacturing firms
- science magazines and science in TV
- universities and physics departments
- ministries (education, research)
- training courses in the federal state
- Java-applets / simulations
- teaching material
- internet, HTML, Java etc
- soft- and hardware
- FiPS-mediaserver
- didactics, educational science

Discussion

- newsgroups

- mailinglist

Service for schools

- experimental equipment
- technical support
- special literature resources
- visits at the physics department

Appointments & actual informations

- teacher training courses, e.g. multimedia in physics teaching, see atoms (scanning tunneling microscope)
- pupils' day, e.g. science and technics for female pupils 2002 (university of Kaiserslautern)
- competitions in science for pupils

Our experiences during the last 3 years are: The acceptance within the first year was negligible and frustrating, because we could not reach the teachers, the teachers had no internet access, or were not willing to pay privately. Since 2 years we offer teacher training courses (twice a year, for ~ 30 teachers) about the use of multimedia in physics teaching, where the PEN initiative is part of the course. The running costs for PEN are about 25% of a permanent researcher (a physics teacher who is working at university), a special server dedicated only to PEN and the willingness of this whole group in Kaiserslautern to cooperate. The annual questionnaire to physics teachers shows us that we achieve now much better acceptance. But it is absolutely mandatory that this internet service is always updated (at least weekly) and maintained on very high level of quality.

Some examples how physics teacher work with PEN. 1. Recently, a physics teacher posted a question in the newsgroups looking for information material of the company concerning a specific instrument, which was lost. Another teacher answered and sent him a copy. 2. A teacher asked about details of an experiment (CO₂ climate change – Ozon), immediately several colleagues answered electronically having the same experiences like him and offered a solution. 3. A teacher wanted to demonstrate in a lesson how electrons are moving in an electric field, but the equipment was not available at his school. He asked our department via PEN for lending such an equipment.

In the future we plan to offer the first virtual course in further training courses: topics are nanoscience or magnetism. We will establish a small group of referees to evaluate all the material from new instruments to videos of experiments and new physlets. We ask physics teachers at school to work with us on that matter to guarantee that the content of PEN is suited really for teachers. We plan to export this initiative into other countries (help to translate and to adapt). We are open and willing to cooperate with similar initiatives and to take benefit for a better physics teaching from such a synergy effect.

Please contact us for cooperation or questions: pen@physik.uni-kl.de