E-Learning in Process and Chemical Engineering – Trends and Challenges

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Abstract

In the poster, the European Network for E-learning in Process and Chemical Engineering (EuPaCE.net) is introduced. EuPaCE.net is a special interest group that has been set up by seven European Universities to exploit synergies in the field of e-learning for Process and Chemical Engineering (PaCE) education. The poster includes the results of an international survey about trends and challenges of e-learning in academic PaCE education, which was conducted with students and faculty members at the EuPaCE.net partners. Results show that the use of information and communication technologies in PaCE education is still evolving.

1. The EuPaCE.net community

In the European Union, there is a great number and variety of e-learning activities in the domain of process and chemical engineering education. Efforts range from single personal initiatives (“lone rangers”, Bates, 2000) to cooperative projects on regional, national or international level. After a time of pioneering and expansion, the lack of coordination between the various initiatives is an outstanding problem, which leads to isolated applications and an insufficient transfer of know-how. Harmonisation, shared standards and communication about best practices and promising approaches is urgently needed to achieve synergies at an international level. Therefore, the following seven European universities have joined together in a special interest group (SIG) to establish of the European Network for E-learning in Process and Chemical Engineering (EuPaCE.net): Technische Universität Berlin (Germany, coordinators), University of Barcelona (Spain), Lappeenranta University of Technology (Finland), UMIST Manchester (UK), University of Oxford (UK), Ecole Nationale Supérieure des Mines de Saint-Etienne (France), University Politehnica of Bucharest (Romania). EuPaCE.net has the following objectives:

• Develop guidelines and identify best practices for e-learning in PaCE education,
• Provide a platform for dialogue to exchange experiences and ideas,
• Set up a network for sharing resources,
• Promote national and international cooperation between higher education institutions, industry, professional organisations, and schools.

The consortium operates the internet portal www.eupace.net, that provides a platform for building an international online community. The portal is based on the socialware approach and the technology of useworld.net (Leuchter et al., 2003).

2. E-learning survey

As a basis for the work of the consortium, a survey about trends and challenges of e-learning was carried out at the EuPaCE.net members’ faculties in April 2004. The survey comprised the two different groups of faculty members and students. Participants were 16 faculty members and 179 students at six academic departments in five European countries (Finland, France, Germany, Spain, UK).

2.1. Faculty members survey

The faculty members survey was conducted in two rounds. In the first round, a questionnaire was applied, containing 13 questions about computer usage, attitudes towards computer based learning, experiences and opinions about e-learning. About half of the questions were ratings, the other half of the questions had open answers with free text (e.g., “What are the
major advantages of e-learning in your opinion?”). In
the second round, the results of the questionnaires
were subject to a group discussion during a meeting of
the EuPaCE.net consortium. In average, the
participating faculty members were 41 years old and
had a teaching experience of 13 years. The most
important results of the faculty members survey are
summarised in the following. The general observation
of “continuity and diversity” for the introduction of e-
learning into academic education (Leppori et al., 2003)
also applies to the PaCE education sample. Instead of
provoking revolutionary changes, the integration of e-
learning applications into the curricula is a slow,
incremental process. At the moment, only one of the
EuPaCE.net partners offers complete online study
courses, the others are still traditional campus
universities. The most widely used ICT application is
offering learning materials for download, and
communication via e-mail. Web-based interactive
learning modules and virtual courses are still rare.
Accordingly, the rationale behind the introduction of e-
learning is in most cases the enrichment of face-to-face
learning scenarios to improve the quality of learning.
The survey revealed a considerable diversity in the use
of e-learning within and between different faculties of
PaCE. For a staff member’s engagement in e-learning,
individual preferences are more important than
organisational (not to mention national) culture.

2.2. Students survey

The student questionnaire comprised 54 items,
divided into four sections: (1) personal data, (2)
computer experience, (3) attitudes towards computer
based learning, and (4) motivation for studying. In
average, the surveyed students (34% of which were
women) were 24 years old and had been studying
PaCE for 2.5 years. At their homes, 97% had access to
a computer, 90% had access to the internet. They used
a computer for 29 hours per week in average, about
half of the computer time (15 hours) was used for
studying, 6 hours of computer study time were online.
The differences in computer use time were stronger
between different faculties than between women and
men. While men still spend considerably more time
with computers in total (31.3 vs. 24.5 hours/week),
gender differences of computer time for studying are
much smaller (men: 15.9 vs. women: 15.0
hours/week). At least for learning PaCE, students’
gender does not seem to affect the use of ICT.
Currently, the most widely used ICT application for
studying is the download of materials (used by 82% of
the students), followed by communication by e-mail
(54%), web-based learning modules (35%) and virtual
courses (10%).

2.3. Synopsis and conclusion

Faculty members and students were both queried
about their attitudes towards computer based learning.
Measured with 3 items on a scale from 0=very
negative to 3=very positive, average staff members’
attitude was more positive than students’ attitude (2.0
vs. 1.6). Regarding the judgment of different
applications, both groups rated download of materials
as most important (staff: 2.4 vs. students: 2.3). While
staff members gave higher ratings than students for the
importance of web based learning modules (staff: 2.1
vs. students: 1.6), students gave slightly higher ratings
for communication with ICT (staff: 1.8 vs. students:
2.0).

Summing up, results of the survey show that the use
of ICT in PaCE education is still evolving. Virtually all
students are already using computers in their daily life
and for their studies. Students’ attitudes towards e-
learning are slightly positive, but there seems to be no
urgent demand for new applications from their part.
So, the driving force for innovations will be the faculty
members. The great challenge for EuPaCE.net consists
in building a community that bundles the efforts and
makes sure that the “lone rangers” do not get
annihilated in the academic wilderness.

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