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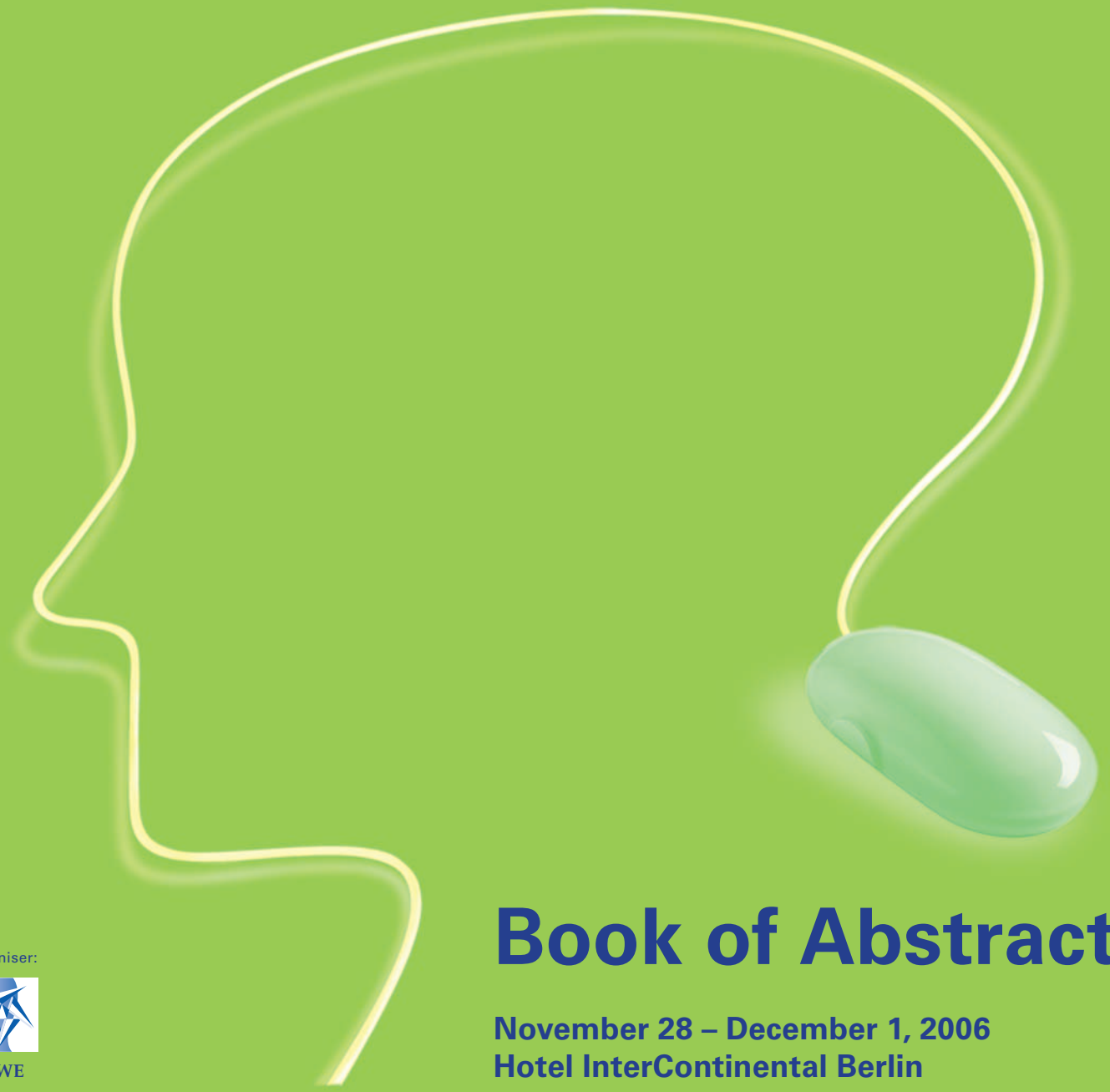

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The TEL Open Archive, the Ideal Arena for a Productive Competition Between Practical and Scientific Knowledge

Dr. Nicolas Balacheff, Kaleidoscope NoE/CNRS Director Laboratoire Leibniz-IMAG, France

Scientific Open Archive, the rationale

The economical and scientific benefits of Open Archives (OA) are now well understood: to offer free access to scientific publications for everybody from everywhere in the world, provided that the web is accessible and that the machine is equipped with a browser and a standard document viewer (these tools being themselves freely available). Moreover, unlike most of the personal "home pages" on which many scientists make available their publications, OA repositories are created within sustainable environments ensuring the access and the integrity of the resources as the technology and the standards evolve in time. Most OA conform to the Open *Archive Initiative Protocol for Metadata Harvesting* (OAI-PMH) which gives a framework for their interoperability.

Physics, mathematics, biology and computer-science have been the first disciplines to use the OA and develop systematic policy for their use. The situation is rather different in human and social sciences, in particular in the Technology Enhanced Learning (TEL) research area. There exist some regional OAs, but no international movement. Among the reasons for this, I would like to emphasise three that researchers often mention: fear of plagiarism, a misconception about citation indexes and an unclear view on copyright issues. Luckily, the answers are very simple:

- OA is a best weapon against plagiarism because all publications are easily accessible and initiatives are developing methods for their automatic comparison (e.g. using LSA based tools),
- from the experience of disciplines which have had an OA for a long time, it is demonstrated that the impact of a paper uploaded on an OA is three to four times its impact without it,
- most major publishers are supportive to the OAI, as it is witnessed by the long Sherpa-Romeo list of the "green" publishers who allow the archiving of pre-print and post-print, or "blue" or "yellow" publishers who allow to publish either post-print or pre-print.

What may be more serious, because it is a problem even with the classical publishing media, is the fear that good papers can get lost in an ocean of less than average ones. But communities can organise themselves to create specific quality stamps to identify high value papers, or to provide open access journals with classical editorial boards, or open forums attached to publications or clusters of publications. More generally, tools can be developed on top of the OA—even with profitable business models—to provide additional services but without creating a "toll gate" to access the raw material. Thus, the issue of quality control and building a strong scientific reference has a solution, which is in the hands of the research communities.

In line with the OA movement, Kaleidoscope has developed and recently launched an Open Archive, fully compliant with the OAI, for the service of the whole TEL community and beyond.

The Telearn Open Archive

One characteristic of research on TEL is that it is fragmented scientifically because of its multidisciplinary nature, culturally because of the important weight of cultures and languages on human learning and strategically because of the complex relation in the field of education between science, policy and economy. An aim of Kaleidoscope, as an FP6 network of excellence, is to fight this fragmentation by stimulating and supporting the creation of an integrated TEL research community in Europe, aiming at "shaping the scientific evolution of Technology Enhanced Learning". An important obstacle to the achievement of this aim is the

Multilingual Delivery of Online Tests in Mathematics

Dr. Olga Caprotti & Prof. Mika Seppälä, University of Helsinki, Finland

Introduction

Assessment and the advice given to individual students based on quiz and test results form the most expensive part of the delivery of education. Imagine a future in which all this has been automated: students take quizzes, examinations and type their solutions to homework problems in web based systems which give immediate individual feedback. This future is already here today.

Figure 1. *An early view of industrialization of instruction. The professor chooses the content, the graduate student propels the machine, and the students learn. Today this vision is being realized by different means.*

The content, making this kind of industrialization of instruction possible, is very valuable, and the production of such content requires specific combination of expertise. In disciplines like mathematics, in which the required linguistic constructs are relatively simple, it is possible to encode the content in such a way that it can be automatically generated in many languages. Such an encoding multiplies, many times over, the value of the complicated content, i.e. question databases for automatic assessment. The WebALT project has developed such a language independent encoding for mathematical content together with tools to make it usable and editable. The WebALT multilingual software solutions target, in particular, basic mathematics areas such as calculus, linear algebra and geometry for higher education. However, the technologies used are amenable to any level of education in mathematics or in science. This project has been supported by the eContent Programme of the European Commission.

This extended abstract describes the multilingual mathematics software solutions developed by the Web Advanced Learning Technologies project and explains how to deliver effective and incisive courses in mathematics using e-Learning technologies.

Online Assessment

Online assessment systems support a variety of question types, ranging from simple multiple choice or true/false questions, to the more sophisticated kind in which the student is allowed to type the answer and the system is able to check it against the correct solution. Automatic grading of the latter type of answers is very sophisticated because the correct answer can be, almost always, written in infinitely many different ways. The system must have sophisticated computational engine to check the correctness of such answers. Such engines are available and the WebALT system offers one solution based on the use of MapleTA [6].

Adaptive Content Sequencing: Applications, Issues and Solutions

Yaroslav Egorov & Victor Zhukov, Competentum, Russia

Competentum Group presents the results of our research and development project in the field of adaptive learning. The project results are used in our learning solutions for both Russian and international market.

Adaptive learning concepts

The world's experience of using adaptive learning techniques discovers its great potential and opportunities. The concept of adaptive learning is a valuable solution for academic education, as well as business training and improving personnel skills.

Adaptability is often referred to as a possibility to automatically change course content depending on student's behavior and progress. The concept of adaptive learning is somewhat like the artificial intelligence of computer games and simulators but with strong pedagogic application. The basic idea is that software can take over routine decision making within a learning scenario and ease instructor's burden.

Putting it simplier, adaptability is pedagogic interactivity. If you plan to use it in a e-learning course, a decision has to be made about the strategy – which has to cohere with your business and learning goals.

For example, you might want your course to speak multiple languages if your institution has lots of distance students from particular parts of the world. Or, you want to present novice learner with visual stimuli before getting to theoretical explanation of phenomenon, but an experienced one to bypass the example. Or, you want to focus on particular weak skills of the learner rather than wasting his time studying what he already knew.

There's an endless number of adaptability strategies, and many of them will only be fully explored tomorrow. However, present strategies can be divided into following big groups:

1. Preferences-based strategy: activities and media are chosen according to preferences, which the learner has stated explicitly (for example, through survey forms or GUI customization functions) or implicitly (for example, by collecting page usability information). This enables engaging, personalized, and thus more efficient learning experiences. This strategy also works good on delivering content to people with disabilities.

2. Performance-based strategy: further activities are chosen based on progress indicators changing over time. These may include, but not limited to:
   a. Access to portions of learning materials
   b. Results of assessments
   c. Time it took to perform a task
   d. Attempts number and result improvement between attempts

   All of these indicators may be mapped to learning objectives, which can be aggregated and used to represent learner results in more informal and readable way. Referring to these objectives across multiple courses and knowledge domains allows for building more consistent and coherent electronic curriculum, while minimizing teacher/tutor's routine work. The teacher may now focus on more important things like building compelling learning experience.

3. Location-based strategy: media is chosen upon learner's physical location, taking into consideration issues of bandwidth and ability of rendering device. This can be used, for

The OLCOS Roadmap 2012 for the Further Development of Open Educational Practices and Resources

Prof. Núria Ferran Ferrer, Guntram Geser and Julià Minguillón Alfonso,
Universitat Oberta de Catalunya, Spain

In the last few years Open Educational Resources (OER) have gained much attention, for example, due to the extensive media coverage on the Open Courseware initiative of the Massachusetts the Creative Commons Institute of Technology (MIT), the work of ever more national organisations that promote the use of Creative Commons licenses, and the success of Open Source software based systems such as Moodle in the educational sector. However, in order to capitalise on the potential benefits of OER it will we be necessary to gain a much clearer understanding of the requirements of their further development.

Context and scope of the OLCOS roadmap

The importance of OER, which comprise learning and teaching content, tools and services, and licenses for OER, has been acknowledged by the UNESCO, the OECD and other international and national organisations that are stakeholders in the creation and sharing of such resources. For example, the UNESCO's International Institute for Educational Planning (IIEP) has established a Community of Interest in OER, and the OECD's Centre for Educational Research and Innovation (CERI) is carrying out a broad survey on various issues in OER which will be completed end of 2006.

In this context, the Open e-Learning Content Observatory Services (OLCOS) project has developed a roadmap for the further development of OER with a time horizon until 2012. It will also create and make available a related set of information packages such as tutorials. Further, the project facilitates the exchange of knowledge among a European community of practice in OER.

The OLCOS project is a Transversal Action funded under the European Union's *e*Learning Programme and will run until December 2007. The project consortium comprises the European Centre for Media Competence (Germany), the European Distance and E-Learning Network (Hungary), the FernUniversitaet in Hagen (Germany), the Mediamaisteri Group (Finland), the Open University of Catalonia (Spain) and the project co-ordinator Salzburg Research / EduMedia Group (Austria).

In the framework of the Online Educa, the project will present the major conclusions and recommendations of the OLCOS Roadmap 2012. Basically, the roadmap understands OER to be an important trigger for leveraging educational practices that help teacher teams, students and workers with the competencies, knowledge and skills to participate successfully in the knowledge-based society and economy.

Therefore, the roadmap wants to provide educational decision makers with orientation and recommendations to make informed decision with respect to OER. More specifically, the OLCOS Roadmap 2012 describes the current state of play and enablers and barriers in the further development of OER, and provides recommendations on how various challenges could be addressed.

Major conclusions

The major conclusions, which will be presented in more detail, can be summarised as follows:

The roadmap stresses that in order to see OER making a real difference in education, it is crucial to also promote innovation and considerable changes in educational practices. In the still dominant knowledge transfer model of education, open content may be downloaded, digested and reproduced by teachers and students, but little would be achieved with respect to developing competences as required in the knowledge-based society and economy.

Therefore, the roadmap emphasises open educational practices that are based on a competency-focused, constructivist paradigm of learning and promote a creative and

E-Learning Diffusion at the University of Pretoria: Usage Statistics and their Technological Implications

Dolf Jordaan & Jill Fresen, University of Pretoria, South Africa

Introduction

A key strategic driver at the University of Pretoria (UP) is quality education achieved through continuous education innovation and the enhancement of student learning. The momentum and growth in e-learning at UP over the past eight years, need to be sustained by dealing with associated technological implications. In order to monitor this progress, any institution needs to benchmark itself and plan where it aims to be with regard to worldwide trends.

Frameworks to Measure Progress

Frameworks such as Moore's (1999) technology adoption Life Cycle and the Gartner Group's Hype Cycles (see Figure 1) may be used to gain an understanding of current trends and how UP is currently positioned. Le Roux (2002) indicates that e-learning at UP followed the Gartner Hype Cycle, in that it progressed through the peak of inflated expectations, into the trough of disillusionment and was at that time on the slope of enlightenment, with the plateau of productivity in reach.

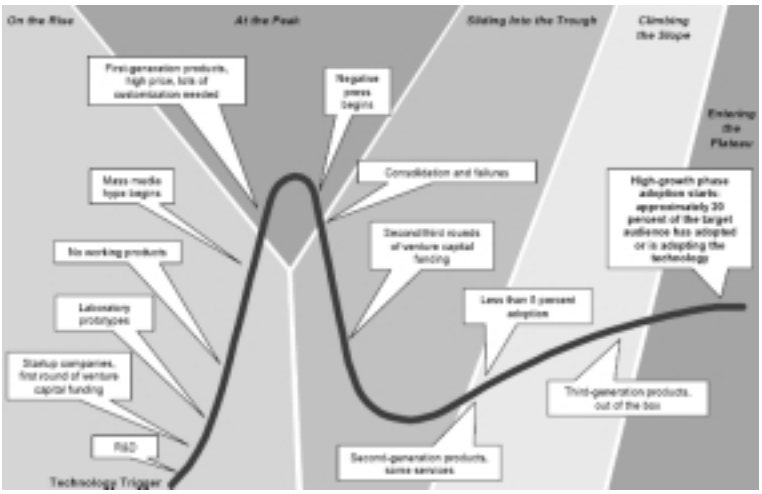

Figure 1: *The Gartner Hype Cycle*
(Source Gartner: June 2005)

Application to the University of Pretoria

In an attempt to evaluate progress with regard to e-learning at UP, usage statistics may help to illustrate the adoption and diffusion of the specific Learning Management System (LMS) in use, namely WebCT. Indications are that e-learning at UP may have reached the plateau of productivity.

In 1998 WebCT was implemented at UP and integrated with other enterprise systems into a virtual campus, which was a deliberate strategy to provide students with integrated access to learning and administrative services (Lazenby, 2003). The integration proved to be successful and WebCT has since become an integral part of teaching innovation at the University. Figure 2 indicates the growth in the number of WebCT modules at UP since its implementation and Figure 3 reflects the growth in the number of students enrolled in WebCT modules.