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Delta 3 – A Strategic E-Education Project Creating Added Value from Complementarity

Franz Reichl

Vienna University of Technology, Austria
reichl@elearning.tuwien.ac.at

Gottfried S. Csanyi

Vienna University of Technology, Austria
csanyi@elearning.tuwien.ac.at

Ilona R. Herbst

Vienna University of Technology, Austria
herbst@elearning.tuwien.ac.at

Andreas Hruska

Vienna University of Technology, Austria
hruska@elearning.tuwien.ac.at

Eva Obermüller

Vienna University of Technology, Austria
obermueller@elearning.tuwien.ac.at

Johannes Fröhlich

Vienna University of Technology, Austria
jfroehli@pop.tuwien.ac.at

Claus R. Michalek

University of Natural Resources and Applied Life Sciences, Vienna, Austria
claus-rainer.michalek@boku.ac.at

Andreas Spiegl

Academy of Fine Arts, Vienna, Austria
A.Spiegl@akbild.ac.at

Abstract: In the project Delta 3, three entirely different universities in Vienna (a University of Technology, a University of Natural Resources and Life Sciences, and a University of Arts) joined forces to co-operatively develop, implement and evaluate their e-learning and e-teaching strategies. The partners differ not only in their scientific disciplines, but also with respect to structures, cultures, specific strengths, and attitudes towards e-education. The inter-university co-operation between the 3 partners addressed 3 different target groups (teachers, students/learners in initial and continuing education, and the general public) by dealing with 3 areas of competencies (technology, didactics, and design & usability). Internal and inter-university co-operation as well as trans-disciplinarity generated public awareness for science and arts.

The Project Delta 3

Three significantly different universities in Vienna – Vienna University of Technology; University of Natural Resources and Applied Life Sciences, Vienna; Academy of Fine Arts, Vienna – collectively developed, implemented and evaluated their e-learning and e-teaching strategies during the project Delta 3 (<http://www.delta3.at>, Csanyi et al. 2006, Fröhlich et al. 2005a, Henkel et al. 2006) which was carried out from October 2005 to September 2007 and

was co-funded by the Austrian Federal Ministry for Education, Science and Culture during the tendering for e-teaching/e-education at universities and Fachhochschulen (<http://strategie.nml.at/>).

An inter-university co-operation between the 3 partners which differ not only in their scientific areas (technology, sciences, environment, arts) but also with respect to structures, cultures, specific strengths, and attitudes towards e-education, was able to demonstrate a high potential for synergy; overlapping curricula enable the common production and use of learning material.

The project partners addressed 3 different target groups (teachers, students/learners in initial and continuing education, and the general public) by dealing with 3 areas of competencies (technology, didactics, and design and usability). Internal and inter-university co-operation as well as trans-disciplinary processes aimed at providing targeted information on the universities' activities to the public, at improving the relations between universities and the public, at addressing future students, and at evoking trans-disciplinary questions. An inter-university internet portal ("public and junior academy for science and arts") generates "public awareness of science and arts".

In general, the project Delta 3 created an innovative climate at and among the partner universities and started a process which shall lead towards the integration of e-learning elements as something to be taken for granted by all teachers involved.

Background, Motivation

During earlier years, pioneering teachers and researchers at all three partner universities had already carried out many successful projects and activities in media and technology enhanced learning, e.g.:

- iChemEdu (Fröhlich et al. 2005b, <http://www.ichemlab.at/>):
iChemEdu aimed at the development of an internet-based laboratory information and management system, iChemLab, (in connection with an e-book based e-content pool, iChemLecture, and an e-self-assessment tool, iChemExam) to preserve knowledge and to maintain data, thus to supply a sustainable solution;
for iChemLab an ever growing database application initially containing more than 450 detailed synthetic experimental protocols has been developed by extracting and revising information (procedures, chemical and physical data, literature, spectra, etc.) from some 8600 student work reports collected over the last years;
- MODULOR (<http://modulor.tuwien.ac.at>) and virtual campus for architecture:
to adequately support face-to-face learning, the faculty for architecture of Vienna University of Technology started to implement a virtual campus, consisting of a learning portal, a media database, and groupware and courseware tools;
- Virtual EuroLaser Academy (<http://www.argelas.org/>):
supported by EU LEONARDO funding, learning software has been developed to simulate laser material processing (different materials, different processes, different types of lasers);
- and many others, e.g. Media Nova Naturae (<http://medianovanaturae.themenplattform.com/>), MathSpace (<http://math.space.or.at>), blended learning with active facilitation (Reichl et al. 2005), etc.

These projects applied e-learning and e-teaching far beyond self study. They were able to demonstrate that immense benefits can be achieved by media supported learning, and they helped the actors involved to develop relevant qualifications. But, such projects and activities were based solely on the initiative and commitment of outstanding persons, and thus project achievements often had not sustained.

After the new University Law came into effect in 2004, Austrian universities reacted to the challenge to develop e-learning and e-teaching strategies and created the organisational means for consolidating such initiatives and thus make the experiences and developments sustainable and applicable for a wider group of users.

The universities described in this paper took into account that a sustainable implementation of e-learning can only be achieved by embedding development of media based teaching and learning into organisational and administrative structures. Delta 3 thus followed a holistic approach for implementing e-learning strategies, dealing with strategic, organisational, administrative, financial, and legal aspects, didactics and curricular integration, competence and expertise, acceptance and incentives, public relations and marketing, and quality assurance (compare Kleinmann & Wannemacher 2004).

In mathematics, “Delta” denotes the difference value – in our context, it means the overall value differences can have or produce. The partnership for the project Delta 3 explicitly aimed at making use of differences among the partners. Joining forces was thus not based on similarities, but aiming to make use of significantly different experiences, structures, corporate cultures, emphases in research and teaching, and especially strengths of these three different universities located in Vienna. Such a trans-disciplinary approach sheds light on different viewpoints on e-education and forces the partners to actively deal with aspects they would otherwise not have taken into account – and so the partners learn from each other.

Moreover, the aim of the co-operation within “Delta 3” was to work together on all levels of the universities – with rectors, deans, teachers and students. Although such a process requires the investment of more resources into planning, design, and implementation, the results of such a complementary co-operation are far more sustainable than just re-acting on short-term needs would have been.

E-Learning and E-Teaching Strategies

The three universities aim at improving the quality and efficiency of their study offers by significantly increasing the number of learning provisions supported with new media. The application of new media shall intensify learning processes, improve learner’s perception of complex subjects, and it shall enable particular groups of students who so far have been disadvantaged to participate in courses.

The project Delta 3 aimed at consolidating such initiatives, at making experiences and expertise available to a wider group of teachers, and at developing the necessary structures within the universities’ organisation to sustain and further develop strategies, skills and tools by building an “inter-corporate learning community of practice” among teaching professionals at the partner universities.

The partners’ medium to long term aim is to support each basic course in initial studies by means of e-learning. The partners experienced a phenomenon already known from other universities: Integration of e-learning boosts discussions about higher education didactics and about ways to support curricula as effectively as possible by blended learning scenarios.

The partner universities’ aim is not to replace the face-to-face courses, but to establish blended learning as the standard in learning and teaching and to apply a blended learning strategy which step-by-step uses more and more of the functions of learning management systems. In parallel, learning provisions are improved with respect to quality management, including a focus on addressing target groups, gender mainstreaming, and diversity. Establishing quality standards follows state of the art processes as defined by ISO 9000 and ISO 9126 and described by various publications (see e.g. Ehlers et al. 2005)

During the whole project, a low threshold usage of the centrally maintained learning platform was solicited, aiming at first increasing quantity of e-learning provisions; later on, every course shall use the centrally supported learning management system and apply those of its functions (administration, content-presentation, organisation of learning activities, communication, feedback, assessment) which are relevant for the specific course. The project partners correctly expected that awareness for problems and quality would rise at a later stage – after teachers experienced frustration from errors they made on their own. Provisions for improving the quality of learning management system based courses were offered early on, but actively promoted only at this later stage.

Delta 3’s blended learning strategy incorporates courses of all curricula of all partners, thus taking into account that the optimum intensity of the use of new media can vary widely.

The common strategy is developed bottom-up and top-down: the initiative has been started by the partner universities’ e-learning centres and the partner universities’ rectorates have been involved as driving forces; since the application of e-learning influences institutional organisation, middle management (deans, heads of departments) have become an important target group. The partner universities opted for developing “emerging strategies”, i.e. their strategies are periodically updated and improved, based on experiences. The project Delta 3 strives for making use of

differences of institutions, management, and staff, at all levels. Complementarity between diverse approaches is deliberately accounted for to create synergies.

As mentioned, the project Delta 3 also demonstrated that implementation of media based learning can boost the discourse about academic instruction and quality in education generally. Students are not only an important “indirect” target group (as final users of media supported courses and as evaluators), but they can also become a driving force for increasing the quantity and quality of technology enhanced courses. In addition, specific activities aimed directly at students, e.g. needs analysis, training for e-tutors.

Implementing Organisational Frameworks

In 2004, Vienna University of Technology has established an E-Learning Centre which supports teachers (and students) in all departments and all fields of study and maintains and improves e-education tools. At the same time, an e-learning advisory board was established to support the centre and provide a link between the university management and the E-Learning Centre. Most members of the advisory board were teachers who had pioneered in e-learning projects before. The board has become an important actor pushing strategic development. A discussion on performance and quality based allocation of resources has been started, and – as a first step towards an incentive system to stimulate excellence in technology enhanced teaching – the rectorate has initiated an award for outstanding achievements in teaching with new media.

The University of Natural Resources and Applied Life Sciences, Vienna, installed an e-Learning Centre under the roof of its Centre for Education. This university concentrated on creating and moderating an e-learning community among teachers and other stakeholders. Practitioners in teaching learn from each other – in face-to-face meetings as well as in virtual forums. This peer-to-peer model has proven to be an effective means for the motivation of others in starting with applying e-learning. Staff members of the E-Learning Centre were invited to contribute to the reform project “curricula for the future”.

At the Academy of Fine Arts, Vienna, e-learning activities are controlled by the vice-rector for education and research. For this university, digital media are not only applied, but form an important subject for research. This university thus contributes to Delta 3 with know-how in artistic and cultural context and developed a specific focus on gender-sensitive e-learning, gender and digital culture, as well as experiments with trans-disciplinary playgrounds. An EU research project was initiated to investigate the inter-dependency of knowledge and education with digital media in the context of university education policy.

The different partners’ models serve also as “prototypes” for the other partners as well as for other universities. Different approaches cross-fertilise the development of institutional strategies at different institutions.

Integrated context-sensitive support

A successful blended learning strategy requires comprehensive offers for support, consulting, and qualification of university teachers, students and managers. Efficient and effective use of a complex learning management system requires competencies for users in many areas, e.g.: learning psychology, didactics, technology, communication, organisation, legislation, management, quality. Thus, the partners developed a portfolio of information and qualification offers that can be rapidly adapted to different needs and demands of users at the partner institutions.

Support for teachers is extremely important for reaching the goal of (both quantitatively and qualitatively) increasing the proportion of online learning and teaching offers. Faculty support is thus a central strategic element and an important factor for improving quality (compare Schönwald et al. 2004, Kubicek et al. 2004, Pfeffer et al. 2005).

The project Delta 3 implemented a multi-level support-network aiming at reducing obstacles for teachers against applying e-learning. In 2006 and 2007, the E-Learning Centre of Vienna University of Technology provided courses to two persons of (nearly) each department who further on act as multipliers and provide first-level support for the department’s teachers. Second level support is provided by the university’s E-Learning Centre’s staff members who in turn act within a support network with staff of the other partner universities.

Delta 3 created integrated support structures for teachers at the three partner universities which were problem oriented (or rather solution oriented), individualised, and with low threshold. A wide spectrum of support services should be adequate for any need and any amount of time available, e.g.:

- online FAQs, short explanations, online articles;
- helpdesk (available by telephone and e-mail);
- consultancy about the application of the learning management systems, efficient organisation of online courses, educational design of courses and learning material, and production of learning material;
- information events:
in "e-learning impulses", external experts discuss with university researchers and teachers about new trends in media based education and about chances for implementing new developments at the partner universities;
"community meetings" exchange experiences among (e-)teachers of the 3 partner universities; these meetings contribute to building an e-learning/e-teaching community at the partner institutions, and they demonstrate that the problems discussed at the institutions resemble each other and that a co-operative process for solving some of these problems can generate synergies;
- workshops, qualification for teaching staff:
a modular programme available free of charge qualifies the staff of the three partner universities at different levels (from basics to complex projects) in different areas (application of the central learning management systems, content creation, didactic aspects, course design, e-assessment, motivating and activating students, diversity and gender mainstreaming);
- coaching:
teachers are supported and guided during different stages of developing technology enhanced courses.

The project Delta 3 initiated the generation of a complementary support network at various levels (the three partner universities, their e-learning service units, as well as the individual schools and departments), thus allowing to make use of specific knowledge and skills otherwise not available in the immediate organisational neighbourhood.

Technology, Learning Management Systems

Before the start of the project Delta 3, one of the partner universities had experimented with a commercial platform, while different departments at the partner universities used different learning management tools. During the project, the partners decided on using the open source system Moodle (<http://www.moodle.org>), and each partner university implemented Moodle (under a university specific "brand name", with specific adaptations towards the university's corporate design, and with specific features and functions) as its central learning management system.

Development of specific extensions and additional features has been oriented at educational requirements and based on users' needs and requirements, e.g.:

- display of mathematical and other formulas, molecular rendering, syntactic highlighting of programme code;
- multi-media plug-ins;
- specific possibilities for splitting into groups of learners;
- "versioning" and history for file uploads;
- specific assignments for exercises.

In 2005, a usability test of the platform (especially of functions used by teachers) resulted in an adaptation of the German language pack with a more homogeneous terminology. The language pack was also improved for more gender sensitive wording and adapted towards specific terms applied by partner universities. During recent months, several experiments had been carried out successfully with online examinations and tests for lectures with large audiences using the Moodle based learning management systems. A usability test focusing especially on the learning platform's interface for students is currently outlined within the framework of a diploma thesis.

To avoid duplicating data entry, the learning management systems had to be integrated into the universities' existing administration systems; interfaces have been designed and implemented to allow the import of teachers' and students' data into Moodle courses, and to export data from assignments, tests, and grades from Moodle to the

administration systems. In addition, interfaces have been implemented to connect the already existing e-learning tools (e.g. iChemLab) to the Moodle based learning management systems.

A “learning quality management system” has been implemented as a specific module of the Moodle platform to support the evaluation of the quality of technology enhanced courses: a quantitative statistical tool on the use of course materials allows to anonymously contact learners who have not yet made use of a specific learning resource, and short questionnaires combined with this statistics on the use of learning material allows immediate reporting and enables the teacher(s) to react on such feedback already during the ongoing course.

In general, the use of a centrally managed and maintained learning platform significantly increases the efficiency for teachers and students and leads to a more homogeneous presentation of learning provisions. The application of a learning management system and the availability of support and training has encouraged the partner universities’ teachers to deal with educational questions and thus fostered the development of innovative solutions.

Diversity and Transdisciplinarity

One of the main focuses of Delta 3 is gender mainstreaming, to ensure that e-learning will not discriminate against women. Lectures and workshops with gender specific and inter-disciplinary contents aimed at strengthening and enlarging gender-competent “islands” at the partner universities and at raising the awareness among multipliers in workshops. More generally, Delta 3 is striving towards appreciating, involving, and encouraging diversity of staff members and (future) students.

Delta 3 also started a “sub-project” where students from various disciplines co-operatively developed a web portal for “Arts and Sciences”. The aim was to create a fascinating presentation for future students of the partner universities to facilitate their choice of study and to inform the general public about academic achievements. The main focus during the development of the portal was not predominantly on the final product, but on the didactic design of the whole process – the collaborative process of authoring with the support of new media. This process of social learning itself represents a new and unusual, but valuable form of e-learning with hypertext as a developmental tool which, in this context, serves as a catalyst for an intense and personal dialog between students from different disciplines. The web portal for “Arts and Sciences” will specifically address young women to become interested in a scientific or engineering field of study (Krameritsch & Obermüller 2007, Krameritsch & Obermüller 2008).

The Project’s Path of Evolution

According to Hagner’s characterisation of adaptors of technology, we distinguish early starters, second wave, reward seekers, and reluctant (Hagner 2001). As with many other institutions, e-learning at the partner universities had been started by “pioneering” early adopters, while a large number of teachers and university managers still expressed doubts about the usefulness of technology enhanced education.

The project Delta 3 aimed at changing this situation by supporting practitioners at applying e-learning/e-teaching and to deal with the reasons behind the denial by sceptics. To rapidly gain a critical mass of teachers, the project first activated the “entrepreneurial” and “second wave” faculty. Specific offers for reward seekers (e.g. Vienna University of Technology’s e-learning award) have only been started by the project.

Specific events – e.g. “exchange meetings” among practitioners in teaching to discuss about their experiences – could demonstrate the many different ways to apply e-education successfully and were able to create a positive attitude among teachers. Such meetings also contributed to establishing an inter-institutional community of practice among teachers. In addition, especially individual consulting and coaching by the e-learning centres’ staff helped teachers to start with applying e-learning/e-teaching in an efficient way.

For teachers, e-learning is often associated with the anxiety that it may aim at replacing face-to-face courses. The process leading towards insight that technology supported education and training can increase efficiency and quality

– if methods are carefully selected and applied in a suitable way – can be a long and tedious one. Teachers have to understand that e-learning alone cannot effectuate improvements; advancements are linked to educational innovation.

Once started, such a process acts as a catalyst facilitating the awareness for quality in education and initiating processes for the (further) development of quality in education. A push-pull-strategy (including incentives, stimulation, support, communication, and networking) is able to increase the number of teachers interested, and rising satisfaction of practitioners who already apply e-learning / e-teaching can decrease the number of sceptics.

Efforts by the universities' support units to start such processes have been successful – which is shown by several indicators:

- an increasing number of teachers uses the learning management tools for an increasing number of courses;
- the demand for workshops dealing with educational aspects of e-teaching was slowly increasing (although still on a relatively low level);
- teachers' questions about e-learning shift from “why” to “how”.

Countless events about gender and diversity in the context of e-education have also sensitised teachers to the importance of gender mainstreaming as one of the quality criteria in technology enhanced education.

Sustainability

From Delta 3, the partner universities created the following synergies:

- better quality of the qualification, consulting, and support offers by combining expertise from all three universities,
- creation of an inter-university e-learning community and easier access to other partners' networks,
- co-operative improvement of the Moodle-based learning platform,
- widening of the horizon from the variety of different backgrounds, experiences, and strategies,
- cross-fertilisation for (further) development of each university's own strategy.

The project Delta 3 was very successful to start strategic processes in e-teaching and e-learning among the partner universities. Encouraging and promoting low-threshold use of media in education and learning management systems led to increasing awareness for problems and solutions; gaining experiences with technology enhanced learning and teaching led to a focus on increasing educational quality.

However, 2 years were not enough to complete all the tasks started by the project Delta 3. Like at many other universities, the centrally supplied learning management system is used by approximately 15% of the teachers. However, many learning activities applying new media have evolved in parallel (see e.g. Csanyi et al. 2008). The E-Learning Centre of Vienna University of Technology has started research (with evaluation of statistics, comparisons of e-learning offers with participation in qualification activities, and interviews with stakeholders) about challenges of technology enhanced education and demands from different curricula.

The project Delta 3 enabled its partners to make a “jump start” in developing e-education strategies – but the process had just been started and will have to continue. Implementation and funding of the E-Learning Centre at Vienna University of Technology as a central unit for support and development after the end of the project funding signal that the development started by Delta 3 will continue. Based on the development process started by Delta 3, Vienna University of Technology was able to allocate additional budget to continue with this process.

The Delta 3 project consortium entered the project for the MEDIDA-PRIX Award 2007, the most prestigious e-learning award in German-speaking countries, sponsored by the ministries of education of Austria, Germany, and Switzerland. The project had reached the “final round” of the competition.

Conclusions

Working on a common understanding of issues and developing the ability to critically but respectfully deal with the heterogeneity among the partners was the first and central process of the Delta 3 project; it turned out to be an important way of generating knowledge. The Austrian scientist Helga Nowotny has labelled this process “Modus 2” of knowledge generation (Nowotny 1999, p.67f): As “Modus 1” basically operates within the borders of disciplines with clear organisational, methodological and hierarchical structures, “Modus 2” is inter-disciplinary and includes different fields of research. Problems are not pre-fabricated and often arise during practical work. It is a network-like interplay of various competencies¹.

In this context, difference provides a high potential for learning (see also Welsch 1994). The essential presupposition for such a process is the mutual respect of the partners involved. Stereotypes and prejudices have to be avoided. Of course, a close co-operation with equal rights is essential for the success of the whole effort.

In the context of our project, “Delta” (the mathematic symbol for difference) denotes the overall value that differences can produce. Moreover, the aim of Delta 3 was to co-operate at all levels of the universities – with rectors, deans, teachers and students. The project was a necessary catalyst to start the sustainable processes of developing, implementing and evaluating common strategies for e-learning and e-teaching at the partner universities.

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[1] „Modus 1 ist aus der Suche nach allgemeingültigen Erklärungsprinzipien hervorgegangen. Er ist typischerweise das Organisationsprinzip innerhalb wissenschaftlicher Disziplinen, die durch disziplinierte kognitive und soziale Hierarchien gekennzeichnet sind. [...] Während Modus 1 nach disziplinären Kriterien operiert, ist die Forschung nach Modus 2 meist transdisziplinär organisiert. [...] Modus 1 kennt klare Hierarchien, und meist wacht eine disziplinär organisierte, hierarchisch strukturierte wissenschaftliche Elite über die Einhaltung der gesetzten Qualitätsstandards. Modus 2 erstreckt sich über mehrere Forschungsfelder, ist heterarchisch organisiert und wechselt häufig die konkrete Form oder Konfiguration seiner Zusammensetzung. [...] Die nach Modus 2 bearbeiteten Problemstellungen sind daher weit weniger von vornherein vorgegeben, sondern werden von einem erweiterten und heterogenen Kreis von Praktikern in einem jeweils spezifischen und lokal verankerten Kontext gemeinsam definiert. Während „Modus 1“ vom Ideal eines anzustrebenden allgemeingültigen Erklärungsprinzips getragen wird, betont Modus 2 das auf den jeweiligen Kontext abgestimmte, netzwerkartige Zusammenspielen von Herangehensweisen und Problemlösungskompetenzen.“

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