KULEUVEN AND eCOMPETENCE

Jef Van den Branden & Wim Van Petegem, AVNet K.U.Leuven

Introduction

The notion of "eCompetence" can be considered in various ways, limited to individuals or institutions[1], restricted to competencies of teachers or widened to all actors in the teaching-learning processes, connected to e-learning or valid for all learning and its support. Within K.U.Leuven, eCompetence has clearly the double notion of individual and institutional competencies, as it has been linked to the institution's pedagogical concept of "guided independent learning" (GIL).
To demonstrate this institutional aspect, this paper will firstly situate K.U.Leuven's innovation through the use of educational technology in the historical evolution of teaching machines, computer assisted learning, e-learning; will then describe the concept of GIL and its implementation; thus situating the institutional eCompetence approach of the university. In a final section, devoted to professional development, the measures are described that affect the individual eCompetence of its staff. As the "digital chalk" training is one of the more important elements for the professional development of the teaching staff, it is paid extra attention. The paper is concluded with some discussion items.

Introduction

Back in the early 1920's, Sidney L. Pressey produced one of the first real learning machines (Ysewijn, 1993). Earlier machines for instruction (especially for learning to read) missed a feedback function, and were hardly based on instructional principles. The formal beginning of modern instructional technology is nevertheless usually traced to Skinner (Rieber, 2000). His famous articles "The Science of Learning and the Art of Teaching" (Skinner, 1954) and "Teaching Machines" (Skinner, 1958) mark a shift from philosophical concepts about learning to scientific ones (Percival and Ellington, 1988). The "Skinner box" and its derived teaching machines used programmed instruction that was based on behavioural psychology. As Heinrich (1970) indicated: *"Programmed instruction has been credited by some with introducing the systems approach to education. By analyzing and breaking down content into specific behavioral objectives, devising the necessary steps to achieve the objectives, setting up procedures to try out and revise the steps, and validating the program against attainment of the objectives, programmed instruction succeeded in creating a small but effective self-instructional system—a technology of instruction. (p. 123)."* The Skinnerian programmed instruction forced the learner to a linear process of going through the learning content, not allowing to skip or to repeat specific parts. A more flexible format of programmed instruction was created by Crowder. His "branched programmes" could adapt to the learner's prior knowledge and specific abilities, by branching to remedial sections if the learner provided wrong answers to multiple choice questions that were put on the end of each learning unit (Trindade, o.c.). Crowder used for his "learning machine" 35 mm film and audiotapes with sequences that could be individually addressed through the system. Greater flexibility was provided by computers, and some companies like CDC (with the famous PLATO system) and IBM invested in (mainframe) computers that could provide computer assisted learning (CAL). Such systems were developed during from the late 1959's onwards. It would however last until the mid 1980's, with the breakthrough of PCs, before CAL took really off.

[1] See the definition of eCompetence as used in the EU[eComp]Int project http://www.ecompetence.info/index.php?id=44&L=1.

K.U.Leuven and ICT

K.U.Leuven's position

K.U.Leuven was a relatively latecomer in this evolution. Although K.U.Leuven created in 1974 an Audiovisual Service for production, distribution and support of audiovisual instructional materials, and gradually developed in the late 1960's and early 1970's an Educational Unit to support teachers, it was only around 1980 that the university got involved in CAL applications through individual forerunners of its teaching staff. At the beginning these applications were mainframe based (applications for the students of the Faculties of Medicine and Engineering), but soon they were transferred or directly produced for use on PCs and MACs (especially the ones that were developed in the field of language learning). However, the use of educational ICT remained rather marginal to teaching and learning.

Changes in the attitude of the university towards the use of technology for education were triggered by two events. The first one has been the organisation in Leuven of an Advanced NATO Research Seminar in 1991 on "Design of constructivist learning environments: Implications for instructional design and the use of technology" (Duffy et al. 1993). It marked the breakthrough of constructivist principles in computer applications for learning in the (Western) world, and stimulated innovation in K.U.Leuven's education. The second was the election of a new Rector, who recognised the strategic potential of innovation through educational technology to respond to future demands on quality of education and on the need for lifelong learning (Dillemans et al., 1998). He introduced his policy concerns in K.U.Leuven's Mission Statement, which states that "*Special attention is paid to the steady evaluation of its teaching in order to enhance the student's capacity for independent study, to provide intensive individual guidance and an adequate evaluation system, to ensure high didactic qualities of the teaching staff and the use of new teaching methods and technologies"*[2].

Implementation of innovation

To realise the implementation of these "new teaching methods and technologies", various measures were taken with respect to infrastructure, user support and training, and awareness raising incentives.

Infrastructure

The whole university was interconnected by a campus wide information system (KULeuven-net) that connects the various campuses of the university within and around the cities of Leuven and Kortrijk (a distant campus, situated some 120 km from Leuven) with a high speed fibre network (up to 2 Gbit). The installation of 500 PCs in 3 PC classes on the main campuses of Leuven and of about 50 PCs in 2 PC classes in Kortrijk enable students to use PCs free of charge 24h a day and 6 days a week. Each student room in all dormitories of students were connected to the KULeuven-net, providing access to the university's intranet as well as to Internet. This "Kotnet" (the word "Kot" is student slang for the student room) is extended to all rooms which students rent on the private market and is accessible through ADSL, cable (Belgium being very densely cabled for cable TV, this is an option in most private houses), ISDN or conventional PSDN telephony modems. The university negotiated with providers of the telephony and cable networks for student and staff flat rates that are approximately 50% of the usual commercial rates in the Belgium. Students are offered to buy their PCs very cheaply via the university or lease an up-to-date multimedia PCs from the university for "a beer per day"; if they decide after some time to buy the leased equipment, a large part of the instalments is subtracted from the price. An important element has been as well to develop the common digital platform "TOLEDO" (TOetsen en LEren Doeltreffend Ondersteunen, Dutch for "effectively support testing and learning"), which combines Blackbord™ as the (content) learning management system, Question Mark Perception™ for testing, ARIADNE for storage and reuse of learning and teaching materials, and the necessary in-house developed middle ware to enable communication of these tools with each other and with the university's ERP system's databases (Truyen & Van Rentergem, 2005). The impact

[2] http://www.kuleuven.ac.be/english/about/mission_statement.htm, dating from 16th March 1990.

of this measure can be noticed in the steeply increasing number of courses that have at least partly been put into the Toledo platform.

Support

Support measures are provided by various central units of the university in a coordinated action. LUDIT, the IT service unit maintains, manages and provides the necessary developments of the network, the PC classes, campus licences, the PC leasing programme, the technical aspects of Toledo. Its IT-helpdesk provides technical support to students, staff and faculty network managers on installation of equipment, software and courseware. Included in this LUDIT support is "technical" training in the use of equipment and tools (general software, Toledo tools). The educational ICT support group (ICTO) supports users for technical aspects of courseware development, whereas the University Education Support Office (DUO) supports the development of the overall Educational Policy of the university, provides the teacher training (in collaboration with the other support units) and looks after the pedagogical/didactical aspects of the development of teaching and learning tools and materials as well as their implementation in the university's education. AVNet provides support for (multi-)media production of educational materials (to be used in classes or embedded in TOLEDO materials) and for international networking within education. Finally, a number of Faculties and Schools have their own support units that limit themselves to users (students and staff) of the own Faculty. All these support units and offices provide more general support (information, general resources, FAQs) as well as custom-made support for individual users or user teams. Coordination of these actions is maintained by the Coordinator for Education, member of the university Management Board.

Incentives

A special funding action was set up to raise awareness and create incentives for innovation in education. This action, formerly known as OOI (Onderwijsgerichte Ontwikkelings- en Implementatieprojecten, Dutch for "Education oriented Development and Implementation projects") and nowadays called OI (OnderwijsInnovatie, Dutch for "Innovation in Education") has been initiated in 1997 and provides since then every year an internal funding to selected projects. Proposals can be submitted, but need to respond to several criteria. Only didactical teams or (groups of) teachers can apply, on condition that the Educational Board(s) of their Faculty/Faculties support(s) their application. This support guarantees a multiplicator effect within at least their Faculty/Faculties. The project must address an innovative approach to a concrete element of the education (teaching, learning) for which they are responsible, and cannot last longer than 2 years. A maximum of 60.000 euro is granted per year and project. Outcomes must be sustainable and have a generic character (e.g. generate know-how that can be transferred to other subjects). Selection is done through peer reviewing. While preparing proposals and after selection, projects can get help from central support units and are encouraged to use this support. On average, about 13 to 14 projects have been selected each year for funding out of about 60 proposals. However, a number of not selected proposals have realised their project without funding, which makes the impact of this initiative the more important. Since Higher Education in Flanders was recently restructured to cope effectively with the Bologna implementation process, by clustering a number of Colleges around each Flemish university – the so-called "Associations" – the Leuven Association has now set up a common financing mechanism to promote similar innovation within its associated institutions through inter-institutional collaboration. Results of these projects are regularly disseminated through colloquia annex demonstrations of the products.

Guided Independent Learning

The higher quoted phrase of K.U.Leuven's Mission Statement pays explicitly attention to the enhancement of the student's capacity for independent study and to the provision of individual guidance. Both elements are expected to contribute to the quality of K.U.Leuven's education. An in depth discussion on quality issues related to this university can be found in Elen (Elen, 2003), in which the author provides an overview of elements that constitute the actual consensus about the

notion of "quality" in education and how it can be brought about, and in the OECD/IMHE document (Bellefroid and Elen, 2003), in which the quality approach in the university is situated in an international, national and institutional context, with special emphasis on the evaluation of educational quality.

A few years ago, the Academic Board, as the final decision level for academic affairs, adopted the suggestion of the University Educational Council, i.e. a central advisory body on educational affairs, for a new approach to the university's education based on "guided independent learning"[3] (Onderwijsraad, 1998). The choice of this concept has been argued by the University Educational Council on:

- changed concepts on knowledge and scholarship, laying emphasis on the importance of methods;
- new insights about learning and instruction;
- the demand for "useful" and "efficient" education
- the potential of information and communication technologies for education; and
- the harmonisation of European education.

GIL is a total concept. It not only determines the objective of K.U.Leuven's education, but also the roles and responsibilities of students and teachers, and it shapes the learning process in the successive years and levels of its education. It reaffirms that university education must build on and be underpinned by scientific research; and that university education is characterized by participation of students in research, as this participation is the best way to achieve important educational goals and the most adequate teaching strategy.

In the perspective of this close connection between education and research, GIL puts both the learning of the student – under full responsibility of the student – and the necessity of guidance by teaching faculty members– under full responsibility of the teacher – in the centre of each educational process. Each course should encourage students to become independent and critical thinkers, able to make well-founded judgements and contributions to the development of knowledge, thus becoming valuable professionals. It does not imply the choice for one specific pedagogical scenario like auto-instruction or group work or project work, but provides more space for creativity and flexibility in providing adapted support and guidance to large groups of students, e.g. through the use of technology. Providing the student with responsibility for the own learning will however stimulate reflection on objectives, contents, scientific methods, learning style and learning strategies. It also promotes deep level learning and understanding, the use of learning resources from outside the specific course context, (self-) evaluation and is aimed at critical as well as creative thinking.

Six concrete aspects can be identified within GIL, more or less in a hierarchical order. The first aspects get emphasis at Bachelors level, the last ones during Master studies and postgraduate specialisations.

- becoming familiar with scientific concepts and knowledge;
- getting insight in how research results are obtained, including the development of a scientific attitude of sound criticism;
- learning to find, analyse and structure new information;
- being able to contribute to the development of knowledge;
- obtaining societal skills, and being able to apply them in a functional way;
- being able to take up a societal role in correspondence with scholarly traditions.

Independent learning should be guided. Teachers must support this development by supporting the students. They must act as much as facilitators than as instructors or as media of knowledge transfer.

[3] https://www.kuleuven.be/duo-icto/bz/brochuregil.pdf

The implementation of GIL required additional actions, as teachers and students were expected to take up roles for which they were not prepared. At Faculty level, the concept needed a faculty-specific, programme-specific and discipline-specific elaboration. At central level, three categories of initiatives were taken: structural regulations (e.g. empowerment of chairs of programme committees, evaluation of teaching achievements as elements of career development, financial support for implementation projects as stimulus for change); instruments development (e.g. for quality monitoring and assurance, for course description, for curriculum revision; see Clement et al., 2001); and professional development. For more details on the GIL concept and its implementation, including a discussion of its outcomes, see Elen, 2003 and Buelens et al., 2003.

Professional development

The professional development activities are aimed at different target groups: new faculty members, teaching assistants, members of educational innovation teams, faculty members at large, but GIL remain in each of these the guiding principle (Laga & Elen, 2001). It fits in a longer tradition of teacher training by the University Education Support Office, in which new faculty members were offered (on a voluntary basis) an intensive residential training in lecturing and testing (especially for use of multiple choice tests), partly based on deficiencies that were identified through a student evaluation of their teaching. In preparation of the Toledo implementation, and benefiting from an innovation fund for universities that was offered by the Flemish Government, this training programme was experimentally enlarged to the preparation of materials that made use of ICT to support lecturing and the student's learning. The topics of this training covered a large area, ranging from learning theories, principles of instructional design and theoretical/practical considerations about the process of materials development, over theoretical aspects of interaction and the provision of information, the selection of digital platforms, and even aspects of policies and management, to practical questions like the evaluation of ICT materials and their use, intellectual property and copyrights, how to provide feedback, various tools to develop materials. The reader that supported the training was afterwards published under the title "Muizen in het auditorium" (Mice in the lecturing theatre, Elen & Laga, 2002). The training had also a practical component that existed in the development of learning or/and teaching materials that made use of ICT and had to be implemented in the teaching (environment) of the participants. An extensive support group of experts and tools were brought together for the purpose, and participants received support that was customised to their individual needs.

Digital chalk

The introduction of GIL and the implementation of the Toledo platform changed the situation: the concept of earlier training was not fit for the number of people that might need support, and it was also too labour-intensive. A new training programme was set up, called "The Digital Chalk". This training consisted originally of four elective modules: an introductory module, a design module, a module about information delivery and one about communication facilities (Laga et al. 2002). The focus of the training was put on the development of particular insights and competencies that are essential to use the Toledo platform (namely information delivery and communication) in relation to their effect on learning. The introductory module gave insight in the features of the platform, whereas the design module helped to integrate the different functionalities of the platform into each other and into the global learning environment, and to make sound decisions. Each module took 3 hours and consisted of a mix of demos, assignments that forced the participants to use the platform, and reflection on the own teaching in relation to students' learning. Participation in the first module was a prerequisite for participation in (one or more of) the others.

Evaluation of the training revealed that participants had the necessary basic computer skills, and that their questions were instrumental ("How to…", "Which solutions to this concrete problem") and teaching oriented. Participants were glad to discover that others had similar questions and experiences. The complexities of the Toledo platform, with three independent parts that can exchange elements, but have different user interfaces and functionalities led to the necessity of more extensive training. Also the fact that only the design module paid explicit attention to the educational practice of

the participants was experienced by the trainer as a point of attention. It was noticed that most participants remained designing after the training from a mere teacher perspective. Participants reacted nevertheless very enthusiast.

In its actual stage the training (which no longer has the name "The Digital Chalk" because this could raise the wrong impression it is only all about e-learning or worse, about virtual reality) provides a series of modules, that each last half a day, and each pay attention to specific issues such as "coaching assignments", "using adobe software", "embedding audio-visual materials in Toledo", "communication tools", "online evaluation" etc. Specific sessions are also designed for advanced users.

eCompetences

The analysis of the necessary competencies for *faculty members* to use an e-learning platform brought up two main competencies:

- to be able to use the platform in an instrumental way, and
- to be able to reflect systematically upon one's own educational practice.

The first competency implies necessity of awareness of the different functionalities of the platform, ability to use its main functions, and understanding of the structure and operation of it.

The second competency is more complicated. It encompasses a number of competencies:

- to have insight in how learning occurs;
- to know and have insight in the teaching concept of the institution one is teaching at;
- to be able to design different educational learning environments; this implies:
  - to know and have insight in the different components of a learning environment: students' characteristics, goals, students' learning activities, content, support material, evaluation, context;
  - to understand the interdependency of those components;
  - to have insight on the influence of the structure and different forms (symbol systems) of information on the learning of students;
  - to understand the influence of communication on learning;
  - to understand the influence of formative evaluation on learning;
  - to be able to translate the above insights to one's own educational practice in order to facilitate learning;
  - to be able to analyse and (re)design one's own educational practice.

When growing in these individual competences all teachers contribute to the overall eCompetence of the entire university organisation. Having an umbrella pedagogical framework (GIL), having a university embedded digital learning environment (Toledo), and having ample support measures developed and resources allocated, is necessary although not sufficient for competence growth as an institute. Continuous reflection upon own practice, bench marking with other and similar institutions, involvement in relevant European wide research, development and implementation projects and systematic evaluation procedures on both individual base and on organisational level, need to accompany individual professional development procedures, like explained above.

Conclusions and discussion

The e-competence development is grafted on the pedagogical concept of "Guided independent Learning". This concept within K.U.Leuven fits in a larger approach of institutional as well as personal eCompetence development. The latter is not only directed towards faculty members, but also

to other staff (teaching assistants and other members of educational innovation teams) and even to students.

Although GIL has been adopted by the university at large, it has been noticed that such adoption is a slow process that needs not only *conceptual change* of participants in the adoption process, but also *emotional acceptance* (Laga et al., 2002). Convincing examples of good practice can contribute, but need good dissemination. As essential are the varied, just-in-time and needs tailored support facilities that are provided to the actors (Laga & Elen, 2001).

The implementation of GIL and Toledo as one of its main support devices is not finalised: it is clearly not yet general or stable. Although the majority of courses are represented already on the platform, the concrete products vary considerably: some offer hardly more than an electronic version of lecturing notes, while others are very sophisticated in the use that is made of the platform for facilitating independent learning. One of the observations that must be made is the large difference between the number of faculty members in the university and the number of people that takes up training and uses the provided support. The implementation of GIL and Toledo is of course interfering with the implementation of the Bachelor-Master structure (and its implied curriculum reforms), which needs very much effort and time, but resistance to change of the traditional role of teacher *and* student is not to be neglected as well.

Increasing acceptance of GIL is however backed up with a growing believe that the university took the right decision in embracing the concept to provide high quality and future oriented education. In a time where accreditation is no longer granted automatically, it can only contribute to create confidence in the own (e-)competences of both teachers and the institute in itself.

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Author(s):

Jef Van den Branden
Wim Van Petegem
AVNet
Kapeldreef 62
B-3001 Heverlee
Jef.VandenBranden@avnet.kuleuven.be
Wim.VanPetegem@avnet.kuleuven.be