

P R O C E E D I N G S



EADTU 25th ANNIVERSARY CONFERENCE 2012:

The role of open and flexible education in
European higher education systems for 2020:
new models, new markets, new media

Pafos / Cyprus
27-28 September 2012

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The role of open and flexible education in European higher education systems for 2020: new models, new markets, new media

Educational models are changing increasingly. More universities are embracing open and flexible learning and as a consequence, the creation of international student markets is becoming a reality. Formal learning nowadays becomes integrated with non-/informal learning and educational innovation is now both financially, technology and socially driven. Worldwide there is an awareness of the emerging role of open education en open educational resources to support educational transformation. For example, by offering better quality education to significantly larger numbers of students.

The role of open and flexible learning is becoming more important for these new models, new markets and new media.

This is the scope of EADTU's 25th Anniversary conference under the EU-Presidency of Cyprus in which we address topics like:

- how open and flexible education is organised as an organic part of European higher education systems
- implementing new organisational and educational models within frontrunner institutions, capitalizing on new opportunities created by ICT in education
- meeting new markets and learning needs, i.e. at the postgraduate level or related to knowledge alliances with the public and private sector, on top of the mission of widening participation
- developing open media like open educational resources, YouTube, iTunes U, broadcasting as platforms for open knowledge sharing
- developing European open and flexible higher education in a 2020 perspective

The Conference will in this context present most recent results of task forces and projects with regard to quality assurance in e-learning (presentation of the new version of the E-xcellence guidelines, including criteria for the quality of OER and social media), networked curricula involving strategic partnerships between universities (presentation of guidelines for networked programmes, a compendium of good practices, a toolbox for inter-institutional collaboration), on line or virtual mobility (a portal to support mobility, in the perspective of the new Erasmus for All programme), knowledge sharing with business (interfaces to meet the needs of the private and public sector; training for entrepreneurship in starting companies), etc.



Call for Abstracts

EADTU's 25th Anniversary Conference 27-28 September 2012 Paphos / Cyprus

The role of open and flexible education in European higher education systems for 2020: new models, new markets, new media

The Open University of Cyprus will be hosting EADTU's Annual Conference in Paphos, on 27-28 September 2012, under the EU Presidency of Cyprus.

Abstracts exploring the following sub-themes of the conference are welcomed before the 14th May 2012:

- Open Media
- New Markets
- Networked Curricula: University curricula and academic networks
- Virtual Mobility
- Open Educational Resources
- University strategies and business models
- University-business cooperation, knowledge circulation, entrepreneurship, virtual interfaces
- Quality Assurance in e-Learning

Detailed information on each specific strand is included in our conference website.

Practical information for submitting abstracts:

Contributions should be submitted with accompanying title, theme reference and keywords. Format specifications can be downloaded here. The Programme Committee subjects the programme and the abstracts to a process of review. Acceptance of your contribution is announced by web-publication of the finalised programme.

Deadlines:

Submission of abstracts: 14 May 2012

Web-publication of acceptance: 4 June 2012

Full paper deadline*: 20 August 2012

Submit your contribution to: angelique.roemgens@eadtu.eu

**Mind that on passing the deadlines, inclusion of the contribution in the conference 2012 proceedings cannot be guaranteed. EADTU is allowed to publish the materials in the EADTU conference proceedings. Author(s) will retain the copyright ownership of the material(s) appearing in the conference proceedings. All selected papers will be published in the EADTU proceedings available directly after the conference*

Registration:

Registration will be available soon on the conference website and will remain open until 22 September 2012, with an early bird rate applicable until 16 July 2012.

Assante D. – Caforio A. – Sepe R.: University-external world organizational interfaces and knowledge transfer models-the case of the International Telematic University UNINETTUNO and Telecom Italia

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Introduction

Information and communication technologies are at the heart of contemporary sociological mutations. The ability to access, store, manipulate, re-publish information without limits of distance, time and volume evidently materialize scenarios drawn from McLuhan's "global village". ICTs create new cultural and learning needs and simultaneously provide new resources and new solutions.

In this context the very concepts of education and training are changing. The traditional model innovation-development-growth-employment is in crisis, and thus arises the need to prepare individuals to enter constructively into a dynamic and constantly changing society and in a very flexible labour market; a labour market that not only requires new professionalism and the updating of the traditional professions, but evolves much faster than in the past by extending the need for lifelong learning to all branches of business (Garito, 2000). It is no longer possible to acquire professionalism valid throughout the whole of life. This involves the development of capacity to enter into a continuous learning process, often made in situations of self-learning, aimed not only to develop sector-specific skills, but also higher cognitive skills (reasoning skills, problem solving and action planning) and social skills (autonomy, communication and collaboration).

Knowledge is increasingly a strategic resource, both in the life of an individual and in the evolution of an enterprise. The quality of knowledge, transformed into competence, applied from the beginning to the end of a production process, determines the difference in product quality and the product success in a global market. The educational and training systems must therefore "become the laboratories of collective intelligence" (Levy 1996). The evolution of education and training systems in all areas and especially in the higher and adult education is a global reality. As the segmented rigid classical industrial production organization has evolved into new flexible models, through the use of new technologies, so education and training institutions need to evolve towards an open and flexible model (Garito, 2000).

New technologies offer the opportunity to provide distance quality academic education and to overcome the limitations of space and time and to overcome the traditional models of business education. The International Telematic University UNINETTUNO have in their relationship with

companies (along with the innovation and research in the educational and technological aspects, in the link with the traditional universities and in the propensity to internationalization) one of its guidelines for development and a point of strengths. UTIU is committed to supporting the national socio-economic development through bilateral agreements and joint projects, with both categories of labour unions and companies at both national and local level, relating to staff training. These initiatives have the aim of improving the training of personnel to support the professionalism of companies in global markets and specialization, retraining and continuous updating of workers. Companies, unions and associations represent key stakeholders in the signing of agreements that aim the professional development of members and associates. Important agreements have been signed with FIBA-CISL and UGL - Ministries; it should also be noted the agreement formalized by the Lazio Region - National Association of Regional Managers. Employees of the Lazio Region have the opportunity, according to that agreement, to access to the training offer UTIU. The common goal of the trade unions and the Lazio Region is to improve the educational and cultural development of human resources. This initiative has received the consent of employees and is an example of a successful agreement in terms of added value for the Lazio Region and UTIU.

Another practical example of the UTIU approach and its relationship with the socio-economic system is the agreement with the Culture Project Zetema srl. Zetema is the subsidiary of the City of Rome, involved in the management, enhancement and promotion of cultural heritage of the city, through the direct management of museums and cultural events. The agreement, which has as its focus on the training of about 1,000 employees, has as its objective the development of specific training projects addressing the company needs and directed to the formation of new professionals specializing in culture and tourism.

Among the various agreements and projects of this kind, the agreement between UTIU and Telecom Italia, through its management company, Human Resources, is particularly important. This agreement provides an opportunity for Telecom Italia employees to enrol in UTIU degree courses, financially supported by their company; it is an innovative example of collaboration between business companies, universities and trade unions in support of training and professionalization of human resources.

UTIU – Telecom Italia Case Study

The agreement between UTIU and Telecom Italia arises from Telecom Italia training needs; in order to improve the skills of its employees, Telecom Italia has chosen to focus on distance education technologies by identifying UTIU as a partner, for the fame and the excellent reputation that the UTIU University has managed to build both nationally and internationally over the years. Telecom Italia is one of the largest Italian company, and, with its approximately 55.000 employees, it is the first telecom operator in Italy. Meeting their special training needs Telecom Italia was looking for:

- Well qualified institution/university;
- Learning at distance;
- Flexibility in time;
- Exam centres spread on the national territory.

The innovative importance of this agreement lies in the fact that the unions and the company found, for the first time in the history of negotiation, an agreement that will provide the opportunity for employees to enrol in a degree program and the opportunity to improve their social and cultural status in accordance with the working time and duties, through the use of new distance education technologies.

Both the trade unions and the company agree that this agreement represents an important sign of attention to the issues of workers training along with the attempt to advance the level of the group industrial relations.

From February 1, 2011, 2562 Telecom Italy employees were enrolled on various degree programs UTIU. A further 350 TI employees enrolled in 900 single courses, also covering very wide scale of topics, offered by Faculties of Economics, Law, Engineering, Literature, Psychology and Communications Sciences.

Welcoming more than 2500 students from a single company with offices located throughout nationwide, avoiding impacting on business processes and working time, still ensuring the best possible learning and organizational service, has led to a series of adjustments in the student support and in logistics organization.

Due to the relevance of the agreement in terms of number of enrolled students, impact on the national territory and example of successful interaction between University and companies, the program has also been considered as case study inside the Open Educational Innovation & Incubation (OEII) project, funded inside the Lifelong Learning Program 2007-2013 and coordinated by EADTU – European Association of Distance and Teaching Universities. The project aims to conceptualise the design of a sustainable organisational interface which supports improved university-market receptiveness and improves (internal) university incubation and innovation. The project, involving 17 European partners, has started in 2010 analysing the best practices and successful models of University-external world organizational interfaces and knowledge transfer models.

Inside the project Uninettuno has analysed and presented the different aspect of the program organized with Telecom Italia, and at the same time has arranged a meeting to show the OEII results and products to the Telecom Italia HR staff.

Didactic model

UTIU didactic model is based on cognitive and constructivist theories, and is declined in a complex online model; learning environments on UTIU portal provides students a set of features and high quality didactic materials; students are supported in their learning process by professors and tutors from top Italian and international traditional Universities.

Each course in each degree involves three different teaching categories: Video professors are Full professor from Italian and international universities that designed and recorded the video course;

Teaching Professors are responsible of the course for UTIU; tutors are Ph.D. and Researchers both from Italian traditional universities and from UTIU, and are the real didactic interface between students and the online institution, providing support, motivation, real time tutoring sessions, guiding practical activities. Teaching professors and Tutors evaluate students' activity during course delivery, both through UTIU portal automated students' activities tracking and reporting system and through qualitative assessment, and decide whether or not students are admitted to final exam for each course. Students are grouped in classes made up by a maximum of 30 students in order to grant and provide them a personalized assistance from tutors and professors.

Learning environments provide students different sets of tools and materials:

- **support, orientation and planning tools**, such as syllabus, concept maps, didactic planning, exam guide, and an interactive agenda used by tutors and professors to set Virtual classrooms and chat events for their classes, provide students tools and information about courses before starting studying on the didactic materials;
- **individual study didactic materials** are the core-component of a course; video-lessons recorded by the best Italian and international professors for each subject are digitized, indexed and hyper-medially linked to support material, in order to provide students a complete customizable studying experience. Students can watch the lessons in a linear way, or can stop the teacher and make him repeat the concept again; or can jump to a sub-topic using the index box on the left; or, when a red rectangle inscribes a specific didactic material category, can open the related material in a pop-up windows, pause the lesson and go deep on the specific topic the video professor was talking about; besides the video-lessons, UTIU model provides for each course slides (used by video-professors during video-lessons recording), text, books, essays, articles, bibliographies, site-o-graphies, multimedia material related to the video-lessons;
- **learning by doing materials**, such as exercises and virtual laboratories, designed to make students test through practical activities the theoretical knowledge learned through didactic materials;
- **online tutoring tools**: chat, forum, web-based live streaming conferences, virtual classrooms, SecondLife based virtual conferences systems let students and professors meet in virtual environments and create a set up for collaborative learning activities.

Introductory mentoring sessions were conducted for new Telecom Italy students: UTIU researchers and experts have planned a total of 12 sessions (two for each of the six UTIU faculties) showed to new students the peculiarities and the characteristics of the teaching and organizational models used, and the educational objectives of the degree courses they had chosen to enrol in, in order to provide new students with an immediate and simplified approach to the new online learning experience.

Organizational Model

UTIU organizational model is designed to give students flexibility and customization in their learning paths.

- **Course delivery**: each course for each degree is delivered three times a year; each session lasts two months; at the end of each session, a final exam session with two exam days for

each course is provided. If in a traditional university missing a course means having to wait one year to enrol that course again, in UTIU model students can design their study plan according to their personal needs;

- **Classes:** students are grouped in classes made up by a maximum of 30 students in order to provide them a proper assistance. Classes are created using a geographical criterion: the whole national territory has been divided in 8 macro-areas (Nord-Ovest, Lombardia, Nord-Est, Centro, Lazio e Sardegna, Centro-Sud, Sud, Sicilia) based on the students' residence and classes have been created grouping students in the same area. In several cases students working in the same facility have meet each other in the same virtual class, naturally enhancing the interactions during the learning process.
- **Exam admission:** in order to be admitted to final exam, UTIU students must prove their course attendance. Attendance is witnessed by three factors:
 - the student must have seen the video lessons and used the teaching materials provided in the course;
 - the student must have delivered the required exercises assigned by teacher and tutor;
 - the student must have participated in collaborative activities in virtual classroom.
- Teachers and tutors verify students' attendance and admit them or not to final exam. Moreover, the agreement provides that Telecom Italia pays the fees for the successive years only for the students passing at least 50% of exams. This system incentivises students to attend courses and exams' sessions, making them more responsible of their study process.
- **Exam sites:** final examinations are conducted in person. To ensure maximum flexibility in logistics, UTIU inherits and extends the Technological Poles concept from NETTUNO Consortium. Students enrolled in UTIU are not forced to move to Rome - UTIU headquarters - for the exams, but they can take the exams at one of UTIU Technological Poles set up as examination site: UTIU professors and tutors move in various examination sites to enable all students to take exams. In addition to the 15 UTIU Technological Poles on the Italian territory (not to mention the several others international TP), the agreement with Telecom Italy has provided new examination centres located in geographically strategic points that could serve a large number of new Telecom Italia students enrolled. The list of new examination sites shows the Italian territory coverage:

Ancona

Sede di Via Miglioli, 11

Bari

Sede di Poggiofranco P.le Mater Ecclesiae, 5, 9' Piano, Aula B

Bologna

"Roveri" Via della Centralinista, 3, piano T, st. 1-2

Cagliari

Sede di Via Calamattia, 17, Sala Zappi

Catanzaro

Auditorium Sarrottino - S.S. 280, s.n.c.

Firenze

Sede di Viale Guidoni, 40/42

Rozzano (MI)

Auditorium Viale Toscana, 3/5

Napoli

Centro Direzionale Isola G1

Palermo

Auditorium U. La Malfa 99 DR6

Roma

Auditorium Oriolo Romano, 257

Roma

Sede di Via del Pellegrino, 155

Torino

Auditorium Via G. Reiss Romoli, 274

Verona

Auditorium Via Belluzzo, 12, I piano

In Fig. 1 the adopted division of the national territory for the creation of the classes and the location of the exam centres are shown. The strategic location of the exam centres, also based on the Italian transport network, ensures minimal logistic problems for the students.

- **Social networks:** at the beginning of the program Uninettuno and Telecom Italia HR staff has agreed to realize an institutional blog as communication channel for the students enrolled under this particular program. The blog is hosted by Telecom Italia and it is one of them main interaction channels regarding the organizational aspects of the program. It is also adopted by the students to ask clarifications about the program rules and to enter requests. Since the blog is a institutional discussion space, at the same time students have created several Facebook groups, about one for every degree program. The groups are closed and populated by students only, so they are free to express their opinions. They are mainly adopted to share impressions and suggestions about the exams and the professors, to collect copies of the part exams and to support each other in the study process.



Fig. 1. Division of the national territory for the creation of the virtual classes and location of the TP

Quality assurance

Telecom and UTIU have constituted a joint committee for quality assurance. Objectives of the committee, which meets at regular intervals, are:

- regularly analyze the performance of students enrolled;
- plan the actions for motivating less active students;
- analyze organizational problems emerged during courses delivery and find effective solutions.

Achieved Results

A total amount of 2562 students has been enrolled in the academic year 2010/11 under the Uninettuno-Telecom Italia agreement. In the next figures and table some statistical results are presented and discussed.

In Table 1 and Figure 2 the distribution of students in the different Faculties is shown. Communication Sciences has got a higher preference, probably due to the better exploitability of the acquired competences inside the company.

Faculty	A.Y. 2010/11 Telecom Italia Students
Economics	374
Law	235
Engineering	509
Literature	109
Psychology	537
Communication Sciences	798
Total	2562

Table 1. Number of Telecom Italia Students enrolled in each Faculty – a.y. 2010/11

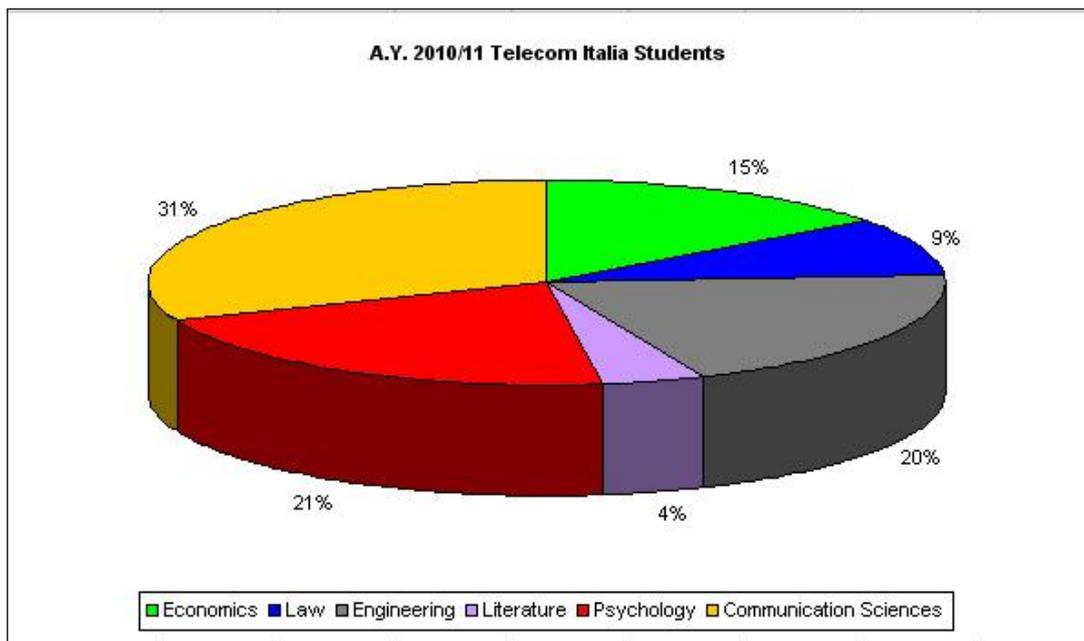


Fig. 2. Distribution of the Telecom Italia Students in the different Faculties – a.y. 2010/11

Then the exam results have been evaluated after one year.

In Table 2 and Figure 3 the average number of passed exams is shown in each Faculty. The lowest number is relative to the Faculty of Engineering.

Faculty	Average number of exams taken by active Telecom Italia students
Economics	4,5
Law	4,8
Engineering	3,3
Literature	4,2
Psychology	4,9
Communication Sciences	5,9
Average	4,8

Table 2 Average number of exams taken by active Telecom Italia students – a.y. 2010/11

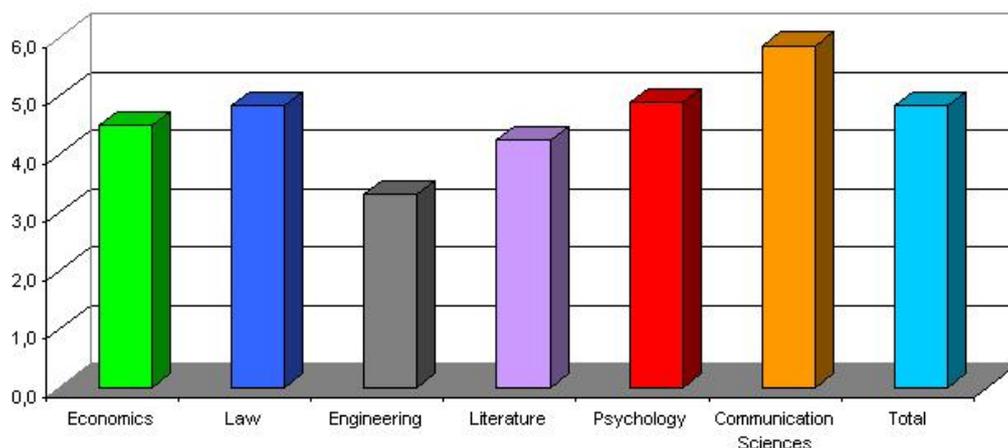


Fig. 3. Average number of exams passed by Telecom Italia students – a.y. 2010/11

In Table 3 and Figure 4 the average grade achieved by the students is shown, divided by Faculty. Again, the lowest number is relative to the Faculty of Engineering, probably these values are also connected to the high difficulty of the scientific degree program.

Faculty	Average grade achieved exams - a.a. 2010/11
Economics	25,5
Law	25,5
Engineering	24,2
Literature	26,6
Psychology	25,7
Communication Sciences	26,9
Average	26,0

Table 3 Average grade achieved by Telecom Italia students – a.y. 2010/11

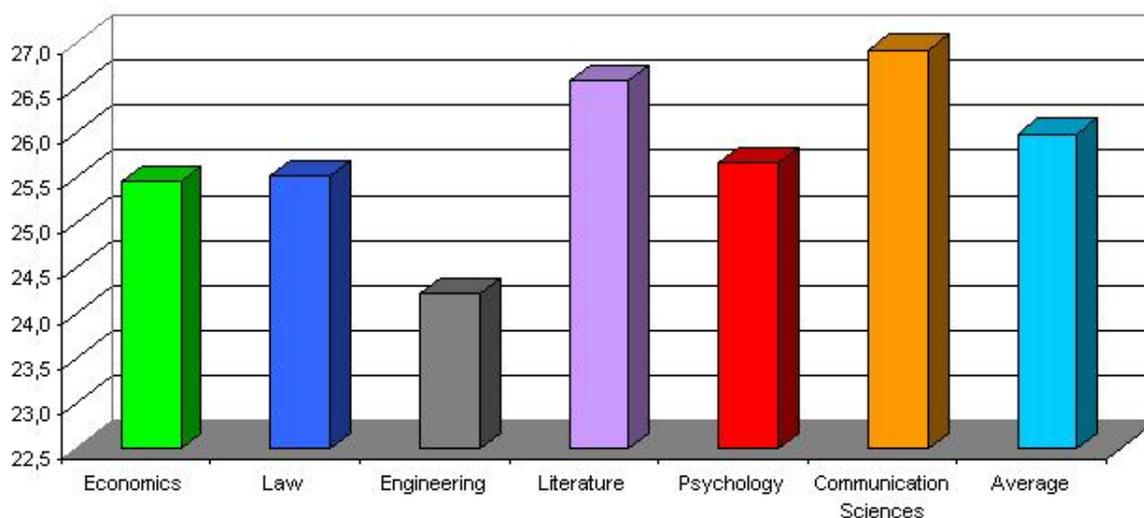


Fig. 4. Average grade achieved by Telecom Italia students – a.y. 2010/11

These data demonstrate the effectiveness of the proposed organizational and didactic model. The number of examinations achieved by students is significant, and the average grade that students have achieved is certainly important. The educational and organizational models, that "forces" students to use educational materials and to follow the online tutoring sessions, take students admitted to the examination to obtain significant results. Tutoring and mentoring provided have meant that students outweigh the initial difficulties in planning their own work and study time; they could find a suitable method to get them to get enrolled in and achieve the final exam in a number of course in line with their chosen curriculum.

Final Remarks

The case of Telecom Italia shows a sustainable organisational interface which supports improved university-market receptiveness and improves (internal) university innovation. It forces to systematically involve university management, change agents, internal & external stakeholders, multipliers and accelerators, to promote the knowledge exchange process between different parties. The agreement between the two parties, allows Telecom Italia to meet the educational needs of the firm, investing money for the employees with a direct return on the company itself.

Key aspects of the Knowledge transfer mechanism:

- More skilled e qualified people work in the company;
- More motivated people;
- Increased self-esteem and social-status improved
- Sense of belonging to the company
- Other employees may be willing to get additional training
- Employees can advance in career;
- Student-professor interactions can start new scientific cooperation between the University and company branches.

Key success factors were identified as follows:

- Quality of didactics and research
- Flexibility of study programmes
- Students-professor relationship
- Richness of content
- Capability to reach a wider audience
- Convergence of interests in University and Company

The agreement provides that Telecom Italia pays the fees for the successive years only for the students passing at least 50% of exams. This system incentivises students to attend courses and exams' sessions, making them more responsible of their study process.

Recommendations

Although the Uninettuno and Telecom Italia agree on the success of the program, some recommendations have been point out for the future:

- A constant monitoring of the activities is required to perform a long-term analysis, in order to verify that the program is achieving the expected objectives and outcomes. For this reason, further meetings have to be arranged with periodical frequency.
- A stronger and more formal management structure is required, in order to better plan all the activities and to enhance the communications with the students. This is essential to properly coordinate such a number of students with a unified didactic planning.
- The welcome service for newcomers has to be improved, to efficiently introduce them to the functionalities and the services of the web platform. This is useful to avoid an initial confusion caused by the new learning system, sometimes observed in students not so skilled with computers.

Acknowledgements

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Barry-Murphy C., Sheridan I. - CIT's Extended Campus - an Exemplar of supported Engagement in Higher Education Ireland

Strand: University-business Cooperation, knowledge circulation, entrepreneurship, virtual interfaces

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Introduction

Cork Institute of Technology's Extended Campus is a facility designed to support the two-way interactions of individuals and organisations with the HEI (Higher Education Institution) for knowledge exchange, lifelong learning and responsive engagement. There is a wealth of world-class research, learning and facilities available within Higher Education Institutions but it is not always clear to companies, enterprises, individuals or communities how to access or interface with this knowledge. There are also very valuable contributions to learning and knowledge generation at an undergraduate and at a postgraduate level that can be made by individuals and organisations working in collaboration with CIT. Our aim in the Extended Campus is to support and give recognition to these contributions by facilitating and providing a platform for the transfer of knowledge in both directions and enhancing opportunities for engagement.

Engagement or Third Mission in Higher Education

Consideration of the role or mission of the higher education provider within its region and community is not new. Newman's idea of a University was one of a site of free inquiry not constrained by vocational aims (Newman 1852). While the early European medieval universities were primarily teaching institutions committed to extending the frontiers of learning, the development of the research mission of universities is commonly attributed to Wilhelm von Humboldt in the mid-19th Century. Humboldt believed in the integration of the teaching and research role of the University. Over time, the understanding of the role of the university evolved to include both teaching and research and it is widely accepted that the modern university contributes both to the spreading of learning and the generation of new knowledge.

However, as the mission of the university continues to evolve 'universities are no longer simply dedicated teaching and research institutions; they are now regarded as the engines of the knowledge economy' (Vorley and Nelles 2008). This emphasis on an alternative mission of higher education incorporating a level of engagement or service is not new. In the United States of America service to the community was a clear part of the founding mission of the Land Grant Universities. Their mission was to focus on the improvements possible in agriculture and their work extended beyond

teaching to active involvement in bringing new findings and methods in agriculture directly to the producers (Cote and Cote 1993). Boyer (1990) referred to this type of engagement as the 'scholarship of application'.

The more recent shift in focus of higher education is considered by Etzkowitz *et al.* (2000) to be something of an academic revolution. This revolution marks the adoption of 'external engagement' as the third mission of the university along with teaching and research. Defining this 'third mission' of the tertiary education sector Molas-Gallart *et al.* (2002) posit that third stream activities are concerned with 'the generation, use, application and exploitation of knowledge and other university capabilities outside academic environments'. Alternatively the OECD (2007) considers 'regional engagement of higher education in several dimensions, notably: knowledge creation through research and technology transfer; knowledge transfer through education and human resources development and cultural and community development, which can, among other things, create the conditions in which innovation thrives'.

Engagement in Action

Molas-Gallart *et al.* (2002) state that Third Stream activities are about the interaction between universities and the rest of society. This is a very broad brush stroke and it might be argued that, as universities do not exist in isolation, all university activities interact with society in one sense or another. Consideration of the specific activities that are generally meant by engagement often focuses on the interactions that constitute University-Business cooperation. In considering a range of potential engagement the European Commission (2011) describes eight ways in which HEIs and Business cooperate:

- Collaboration in research and development
- Mobility of academics
- Mobility of students
- Commercialisation of R&D results
- Curriculum development and delivery
- Lifelong learning
- Entrepreneurship
- Governance

The European Commission report (2011) goes on to explore the state of University-Business cooperation and identifies four levels of the relationship: Formation, Basic Collaboration, Joint collaboration and Strategic Partnership.

While the 'engagement' part of a HEI mission, encompassing the full range of external interactions with enterprises, individuals and communities, is often presented as distinct from the first two missions of Teaching and Research, it is only effective if it is closely interlinked with them. In fact if it is considered as a separate distinct function it is diminished in potential and impact. Vorley and Nelles (2008) describe this third mission as a 'thread that has the capacity to weave together teaching and research, while assuming a more economic and societal focus'. The question becomes one of how to ensure that the third stream aspirations are fully integrated into the HEI mission and

are not 'bolted-on'. Burnes (2005) describes the systems, strategies, leadership and culture which ensure the embeddedness of the engagement mission in a holistic way and its adoption as an integral part of the strategic planning horizon and as a part of the opportunity for organisational learning. Another common theme is the interaction with business and community as part of this engagement agenda. Different universities have, of course, distinct missions and have distinctive approaches to balancing their priorities with varying emphasis on the three streams. This diversity enriches the landscape in higher education nationally and internationally.

According to Duke (2008) the language of the engagement or 'outreach' traditionally implied the one directional parcelling out of knowledge by the Higher Education Institution to those outside its walls. However, recognising that the workplace is a valuable environment for the development and support of reflective higher level learning and knowledge generated (Lester and Costley 2010), the relationship has shifted to one of partnership, a shift towards what has been called 'co-creation' of knowledge. Gibbons *et al.* (1994) described a new fluid interaction model wherein Universities were not isolated entities for knowledge production but rather agents within a number of overlapping, interdependent knowledge producers. This contributes to the consideration of engagement within a partnership model of operation.

This partnership model of interaction can span the full range of teaching and learning as well as research and development activity. However, the concept of engagement is often viewed simply from the perspective of the technology transfer opportunities arising from the commercialisation of research. This is tempting from the perspective of the ease and visibility of the application of metrics and measurement systems to contracts, patent applications, and spin-offs. This sometimes results in the 'engagement' agenda being linked to the research agenda and less with the teaching agenda of the university. Florida (2001) warns that the pressure for commercialisation success may undermine the greater societal and economic impact of a university. Vorley and Nelles (2008) stress that engagement with industry and academics with collaborative research and commercial experience can make a significant contribution to teaching and learning and recognise that this can lead to contributions to curriculum development and indeed that the students themselves can become the bridge for the engagement through industry sponsored projects and cooperative placements.

In order to contribute to local and regional economic development and social cohesion higher education institutions must extend their role beyond that of simply educating. They must engage with enterprises and communities in meeting skills and technology needs to ensure the creation and maintenance of employment and contribute to accessible lifelong learning opportunities. (OECD 2007). Smidt and Sursock (2011) also highlight the pressure on the higher education sector to develop strategies in response to the global economic crisis and increased international competition, these pressures are felt within the Irish system as keenly as elsewhere.

Engagement within the Irish Higher Education Sector

In Ireland the Regional Technical Colleges Act 1992, which forms the basis for the Institutes of Technology Act 1992-2006, describes the function of the provider to 'be to provide vocational and technical education and training for the economic, technological, scientific, commercial, industrial, social and cultural development of the State with particular reference to the region served'. Given the economic climate in Ireland and the recognition that HEIs may provide an important part of the engine for growth in a difficult economy, this engagement agenda has recently become a more

explicit part of the higher education dialogue and strategy. While recognising the importance of foreign direct investment there has also been a policy shift to support and recognise the importance of indigenous development through organisations including regional development councils and Enterprise Ireland which supports a range of academic-industry interactions from feasibility studies to commercialisation funding for enterprise start-ups. In 'Building Ireland's Smart Economy' (Ireland, 2008) the Government identified the emerging 'knowledge economy' and recognised the importance of lifelong learning and workforce development required to fully participate.

A key to successful partnerships in University/Enterprise interactions is the recognition of the workplace as a valuable environment for the development and support of reflective higher level learning and knowledge generation (Lester and Costley 2010). In this regard Ireland performs badly as illustrated by a study of courses designed as relevant to workplace learners which found that only 13% were by an industry partner in conjunction with the Higher Education Institution (Linehan 2008). At the same time Ireland's performance in terms of persons engaging with lifelong learning remains below the Lisbon target of 12.5% (National Competitiveness Council, 2009).

In 2006 the Higher Education Authority (HEA) released a call for proposals under its Strategic Innovation Fund (SIF). It was a competitively-driven resource stream intended to support higher education institutional reform. The OECD (2004) review of higher education in Ireland had made a compelling case for reform of third and fourth level education in Ireland. In the context of increasingly difficult economic circumstances the Strategic Innovation Fund became an important driver for investment and reform of higher education enabling, as it did, Higher Education Institutions to meet the challenges presented by changing social and economic realities while building on their existing strengths. One of the projects funded under the SIF was the *Education in Employment* project focused on ensuring that the higher education partners can serve the learning needs of those in the workplace in a partnership model, recognising the role of the individual learners and the employers in creating relevant, inclusive and accessible pathways to learning. The collaborative *Education in Employment* project explored some specific enablers of broader participation in education for those in the workforce under four separate themes:

- Blended Learning and Work-Based Learning (WBL)
- Recognition of Prior Learning (RPL)
- Progression routes and diversification opportunities for Craftspersons
- Education & Training for migrants in the workforce
- The project included nine of the 21 major publically funded Higher Education Institutions in Ireland and all four themes were considered from a number of perspectives resulting in practice-based reports outlining current practice and proposing guidelines and reusable toolkits to support practice development.

Following from the *Education in Employment* project and in consideration of a broader range of potential engagement with external enterprises the *Roadmap for Employment Academic Partnerships (REAP) project* was proposed to the HEA with the intention of developing a blueprint to support a broad range of different interactions between Higher Education Institutions and employers. In recognising the breadth of engagement possibilities the project consortium developed a partnership continuum which saw the possibility of academic – enterprise relationships ranging from one of mutual awareness to one of strategic partnership similar to the '*Stairway Model to Strategic Partnership*' described by Baaken and Schröder (2008).

The *National Strategy for Higher Education to 2030* DoES (2011) stresses the potential for higher education to play a pivotal role in enhancing Ireland’s economic competitiveness. It also states that greater engagement with wider communities has the potential to enhance equality in access to education and social cohesion. While accepting that HEIs have undertaken a range of engagement activities over the years the strategy document articulates the need for engagement to be embedded more firmly within the core of higher education in Ireland.

Within the recommendations of the strategy in terms of engagement with the wider society it calls for actions to:

- Encourage greater inward and outward mobility of staff and students
- Respond positively and flexibly to the learning and development needs of the wider community
- Recognise and support civic engagement within programme structures
- Support the involvement of a wider community in programme design

The report indicates that in order to achieve this level of engagement the culture and business processes of the HEIs will need to be changed. It emphasises the limitations presented by disparate interactions as opposed to systemic interventions to support the full range of potential engagement. The REAP project consortium, through an informed enquiry process, explored the range of partnership interactions underway within their institutions and developed the following table of activities:

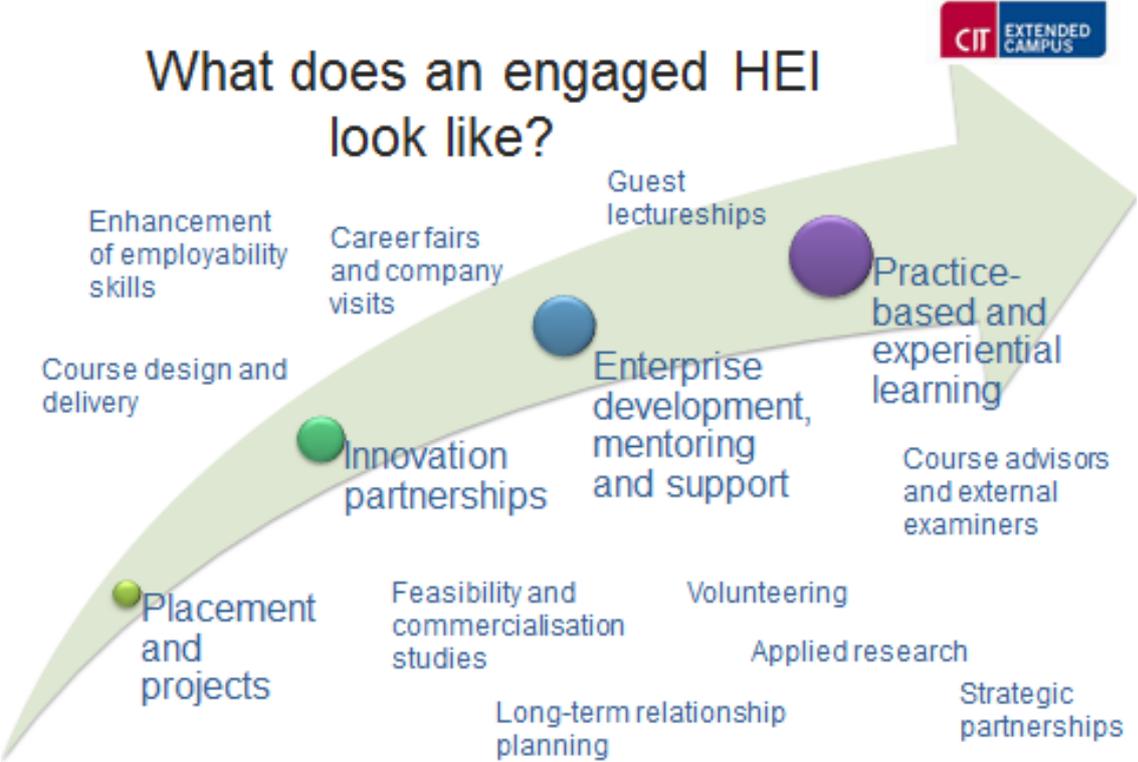


Figure 1: Overview of engagement activity
 This practice-informed attempt at codification of the types of interaction currently underway provided the baseline for the further exploration and analysis of the practice of engagement.

It was noted that the engagements uncovered include:

- Contribution by the external partner into the curriculum development and learning processes – through advisory panels, guest lectureships, work placement, project sponsorship, building entrepreneurial and employability skills into the curriculum
- Co-creation of curriculum and the valuing of the workplace as a centre for learning - through Recognition of Prior Learning (RPL), Work Based Learning (WBL), development of focused in-house courses, learning needs analysis and collaboration in training and development planning
- Collaboration in promoting greater access to learning – promotion of STEM subjects to underrepresented groups, co-development of focused learning opportunities for the unemployed and marginalised
- Collaboration in research and enterprise development through short sponsored applied research initiatives, to commercialisation of collaborative research, to incubation of emerging enterprises

These are clearly two-way interactions that span the range of institutional activities. Through exploration of existing practice in engagement the REAP project consortium considered the concept of partnership in general through a partnership symposium and some specific examples of collaboration in particular through the collation of a number of different perspectives on the actual interactions. In particular the interactions surrounding undergraduate work placement within third level programmes were considered from the perspective of the higher education staff (through workshops and on-line forum), the employer (through interview and survey) and the student (through focus groups) undertaking the placement (Sheridan and Linehan 2011).

In addition the practice in the development of targeted, customised courses for specific workplace needs was explored through detailed case study of 18 different instances within the partner institutions. A consultation process with individual employers and the Irish Business Employers Confederation (IBEC) was undertaken to gauge the experience at the employer side of the partnership. (Sheridan and Murphy 2012)

REAP Project Findings

The REAP project consortium identified several key dimensions to successful partnership interaction and worked to develop those into generalizable lessons on engagement leading to guidelines for good practice which were widely disseminated, through publications and workshops, to the Higher Education sector in Ireland generally. Early findings indicated that successful and sustainable partnerships need resources, relationships and realistic objectives. In considering the key enablers of partnership activity the following was noted:

Importance and value of planning and clear communication in interactions

- Recognition and valuing of the knowledge generated outside of the HE system – supporting a ‘Knowledge Exchange’ vs. ‘Knowledge Transfer’ culture
- Range or continuum of possible partnership interaction
- Transferability of experiences and expertise across engagement activities and the importance of linking engagement relating to learning, research, development and community involvement to ensure that the full potential benefits accrue
- Need for institutional learning through exploration of good practice and of the system changes required to make good practice common practice
- Need for simplification and professionalization of the interface to ensure that the external partner has a consistent experience across the system
- Need to generate the ‘pull’ from the external partner by demonstrating the value of a variety of interactions
- Significant benefits from a shared approach to HE organisational development for engagement
- Importance of metrics and measures of activity and practice development
- Importance of a shared goal or vision in all interactions

The investigation of the breadth of existing relationships between Irish HEIs and external entities found that the HEI tends to operate not as a single homogenous entity but as a series of separate and distinct units. The experience from the perspective of an external partner then, is not one of a single, seamless relationship but of many disparate and different relationships with different parts of the institution. Academic and research units operate as separate and sometimes competing entities from the perspective of the external partner. Individual companies often collaborate in work placement activities with a number of academic departments taking students on placement at varying levels, for varying lengths of time and with varying learning outcomes and assessment regimes. The same company will simultaneously work with different academic units on workforce development projects with a range of on-campus, in-company and distance learning experiences

Initial investigation found that there was no single view of this relationship extant within the HEI. This led to difficulties, as without an understanding of the breadth and the extent of the relationship, it could not be replicated elsewhere or be built into the strategy of the institution. Without a clear institutional view of what is happening at any point in time, it is difficult to achieve any organisation learning or to develop potential strategies that might benefit from a more integrated response from more than one academic or research unit. Interdisciplinary responses are more likely to meet complex enterprise or community needs than disparate ones.

Considering how improved engagement could best be facilitated the REAP project team, informed by interviews and communications with enterprises and employer representative groups proposed a structured approach which would underpin engagement activity. The approach consisted of the following key elements:

- Clear point of contact
- Single informed view of the institution's capabilities
- Professional approach to managing engagement interactions
- Stimulus for engagement through exemplars
- Referral process throughout the Higher Education sector

The existing structures and supports within Higher Education in Ireland for engagement vary. The support for commercialisation and technology transfer activities tends to reside in close collaboration with the applied research units while the teaching and learning interactions are often based in separate academic units.

CIT Extended Campus – a dedicated unit for engagement activities

In response to these findings, and to the *National Strategy for Higher Education to 2030 (DoES 2010)* which makes clear that the engagement agenda is no longer an optional element of a Higher Education Institution's mission, Cork Institute of Technology has established the CIT Extended Campus. The CIT Extended Campus is a facility designed to support the two-way interactions of individuals and organisations with the HEI for knowledge exchange, learning, research and development. It represents the first such dedicated support centre in Ireland.

In facilitating flexible and responsive engagement the CIT Extended Campus will:

- Provide a central point of access to knowledge expertise, services and facilities
- Collate and disseminate information of a range of engagement activities
- Provide linkages and connections where needs or opportunities arise
- Explore new directions and strategies for potential engagement activity
- Monitor the progress of interactions and provide support and guidance throughout the process
- Act as an exemplar for other such services in Irish HEIs
- Disseminate experiences and metrics broadly through the higher education, community and enterprise sectors
- Develop case studies to stimulate demand and showcase the range of interaction at CIT's extended campus
- Develop a meaningful Customer Relationship Management System (CRM) to facilitate engagement tracking and deepening relationships between the Institution and its partners

Through its work the CIT Extended Campus will act to bridge the gaps between the internal institutional centres; academic units, research units, centres of expertise and the external employers, community groups, and individuals to enable and support more interaction. By offering a single point of contact the Extended Campus will facilitate the deepening and broadening of the engagement process; offering a wider menu of potential for those who already interact with the Institution and opening the door for those who have not yet found ways to engage.

Conclusion

The mission(s) of Higher Education Institutions are constantly evolving, and, while there is diversity of mission between institutions, all recognise at least some form of public and social accountability. All seek a reputation for relevance and transferability of learning and research as well as higher quality (Duke 2008). The extent to which engagement is seen as an optional 'add-on' rather than centrally embedded as part of the frame of reference within which research and development activity and teaching and learning activity is undertaken varies, as does the structural support for engagement. Drawing on international and national experience and informed by the outcomes and outputs of a four year collaborative project structure CIT has formalised a structured support mechanism for engagement. In the first stages of operation the CIT Extended Campus will explore both the operational toolkit to support a broad embedded engagement agenda and will develop metrics and measures of success which value engagement activity as well as monetary outcomes. At the heart of this will be the development and implementation of a Customer Relationship Management System to ensure that Extended Campus engagement agenda is optimised.

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Caeiro, S.^{1,2} - Martinho, A. P.^{1,3} - Matta, H.¹ - Amador, F.^{1,4} - Oliveira, C.^{1,5}: The effectiveness of using videos within an e-learning course of Geographical Information Systems

Strand: Quality Assurance in eLearning

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Introduction

A lot of ways for taking advantage of e-learning and for improving the teaching process are arising. To insert static images helps to improve the information. Accompanying text with audio enriches considerably the text. To produce a combined video image and sound is the most comprehensive offering that can be done to anyone seeking information. Nevertheless the challenge to improve the effectiveness of learning by using video lessons has become urgent as web-based materials contain more and more video and control tools for the learner (Bilbao et al., 2009).

The aim of this work is to evaluate the effectiveness of the use of videos in the students learning outcomes in a applied sciences e-learning undergraduate course: the Geographical Information Systems (GIS), at Universidade Aberta (UAb).

Methodology

At Universidade Aberta students in a e-learning platform are guide by a curricular unit plan, digital resources, formative activities and a continuous assessment according to UAb pedagogical model (Pereira et al., 2007). In this work we analyze the results obtained in separate classes, held in different academic years, by using different teaching strategies, in particular for a more practical topic of the GIS Course – Exploring ArcGIS software. In the first two classes (academic years of 2008/09 and 2009/10), a written document with ArcGis tutorials was made available to the students and the doubts about the resolution of the proposed exercises were asynchronously answered by the teacher within a discussion forum. In the other two class (academic years of 2010/11 and 2011/12) besides the tutorials and the forum it was made available to the students a set of videos. The proposed exercises were solved by the teacher in the videos that could be seen at any time during

the semester. The videos effectiveness was assessed by comparing students written assignments (continuous and final exam) in the different classes, and interaction and doubts on the asynchronous forum discussions. To the students that had access to the videos an American-type test was applied with questions that were directly related to the subjects taught in the videos. Furthermore open questions were also part of the test and the students were asked to give their opinion about the use of the videos in the learning outcomes. Categories and related subcategories about educational, technical and content related issues were developed, integrating the open questions answers according to an content analysis of student by student.

Results

The preliminary analysis of the results indicates a positive trend about the effectiveness of the use of videos in the education of GIS. The students that had access to the videos were able to develop better GIS projects and showed a better exploitations of the software functionalities than their colleagues of the previous classes. In fact the main aim of the videos as creative learning tool, is to complement the text tutorials and not to replace the practical exercises made by the students. GIS like most of the courses in science do need a lot of practice to allow a well understanding of their contents. To improve the course additional videos should be developed with more practical exercises within environmental science as well as an improvement in the videos quality, as students recommend. Also videos of the theory part can be developed, since students in the socialization cafe and also in informal conversations with the teachers, usually complain that e-books of the theoretical part are not too much stimulating. Nevertheless in the class of 2011/12 the interactions with the teacher in the forum seems to decrease and students used the videos as the main educational resource and not as a complement of the practical exercises they should accomplish. So, teachers should always explain to the students the correct use and aims of the videos in e-learning regime of a practical course.

More deep studies with more data and data treatment need to be conducted to evaluate the true effectiveness of the use of the videos in GIS e-learning. For example an viewing scenarios, viewing behaviour, and viewing styles, as developed by Bouher et al. (2011) should be conducted for a more deep analysis of the videos effectiveness.

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Crepon R.: Development of common resources for Academic and Corporate e-learning - underlying business models and limitations

Strand: **New Markets**

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Introduction

In the post-industrial society, knowledge became a central source of growth in a fast changing business environment. According to the economist Fritz Machlup, who developed the concept of the Information Society, university is a center of knowledge production and teaching (Nikolov, 2009). In the attempt to keep a leading position in the educational market and more generally in the knowledge management field, Higher Education Institutions (HEI) make the move to serve the corporate training market.

In the experts' opinion, public funding is expected to decrease. It will lead to enhanced competition among education institutions for fund raising and to public-private partnerships (Learnovation, 2008). HEI will have to reach new learning markets for revenue diversification purpose. In addition, from a cultural and political perspective, the public and the private sector are holders of opposite interests, respectively the public good and the individual profit. Then, the broader societal concern is to find the right balance between the public sector and private/market mechanisms in delivering public goods and pursuing socially relevant goals (Learnovation, 2008).

In a first part, we introduce the corporate learning market and the technology-based contents for learning. After understanding their main characteristics, we study how HEI can play an active role in the corporate learning provision while diversifying their sources of revenue. We describe three main business models and we give an emphasis on their respective limitations.

The market of corporate training

Corporate training is also called professional training, vocational training or Continuous Vocational Education and Training (CVET). We can define the corporate training as an educational practice which is organized by a company for the benefit of its employees in order to reach better organizational performance. The landscape of CVET is diverse. Practices are different across countries, industry verticals and vocations. A common factor is that it always deals with adult education with the end-purpose of better achievement in the workplace.

Technology, products and markets move fast. Companies and their human capital have to adapt and even anticipate changing business conditions in order to innovate ahead of competition. Learning is a

key resource to trigger and direct organizational change and to support goal-oriented restructuring of organizations (Learnovation, 2008). Additionally, a training whose purpose is to develop employees' particular skills to better handle the job means higher employee's satisfaction and better individual contribution to the company performance.

The design, the production and the animation of the learning activities can be organized in-house or performed by external agents, respectively \$78.61 billion and \$47.27 billion for US organizations in 2010 (ASTD, 2010). In the case of outsourced training, external players are most probably coming from for-profit organizations.

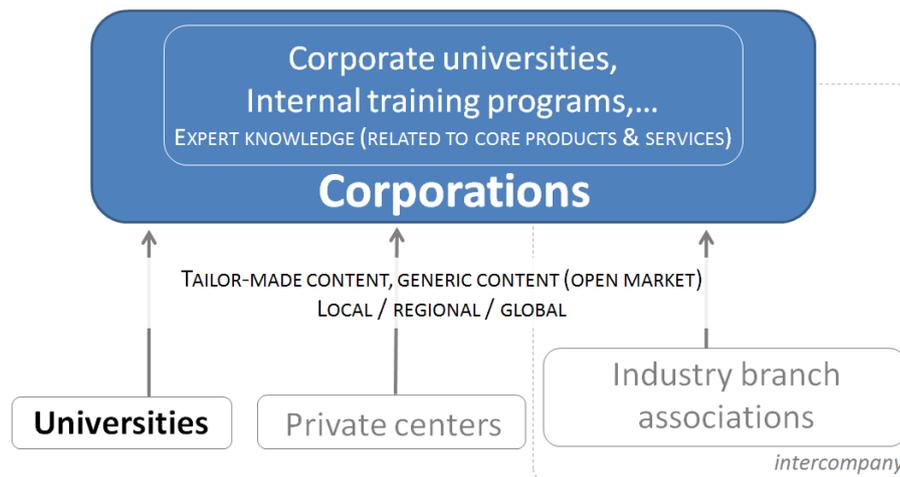


Figure 1: Corporate training provision

Within the broader professional training market we find a number of external providers (see Figure 1):

- Private training institutes (traditional or distance learning),
- Training institutes of industry branch associations (development & operational costs sharing),
- Universities (conventional, open and distance universities). “US companies spent \$16.5 billion in tuition assistance supporting personnel who enrol in accredited degree-granting programs as part of employee benefits packages” (Ubel, 2010).

The main advantage of the internally made training is its capacity to focus on expert knowledge and the possibility to take into account the diversity of the employees' profile. This structure enables a great reactivity and an early anticipation of the future needs of the company. “For employees and organizations, a sustainable and significant system is capable of making the most of the internal training potential” (Martínez-Aceituno et al., 2010). However, in-house made training requires further investments, dedicated teams and new competences. Corporate Universities, or Academies, are well known examples of corporate training structures. They often refer to centralized activities that enable the alignment of top managers' capabilities with the companies' strategy. “Corporate universities aim at developing people and expanding organizational capabilities” (Allen, 2007).

Considering the outsourced services, any specific development (tailor-made training) requires a major effort for coordination between the training supplier and the company. Yet training suppliers benefit from their dedicated resources and from a large client base from which they learn best practices.

Learning or Training?

We consider that learning and training are close concepts mostly dependent on the nature of knowledge that is handled. Training preferably refers to procedural knowledge (know-how). Learning essentially deals with conceptual knowledge.

In the midst of the industrial era, manufacturing had a dominant role. At that time, vocation essentially involved manual work. Working skills were often reduced to procedural knowledge related to the job: performing tasks and operational procedures. With the rise of the Knowledge Society, the human capital became productive and competitive factors. Higher capacity to think leads to efficient designs and to innovative products or services. The competences are multidisciplinary and highly conceptual, emphasizing on the immaterial production of ideas, on complex working processes and on the ability to make decision.

Table 1: Corporate and Academic Learning (Ubell, 2010)

Corporate	Academic
training	education
procedural learning	conceptual learning
behaviorism	constructivism
autonomous	collaborative

Within companies, CVET preferably follows a self-directed learning process. Employees are proactive; they choose their learning in accordance with their preferences, their needs and the managers' prescriptions. In addition, behaviourism has largely been adopted by corporations (see Table 1). "Behaviourism claims that only objectively observable features of learning count, while constructivism sees learning as a process in which the learner actively builds knowledge" (Ubell, 2010).

Specialization and diversification

The application of knowledge is specific to the business environment. Expert knowledge is centered on specific core products and services within various industries: extraction, manufacturing, product development, supply chain, marketing, and customer service. It is a strategic asset for competing in the respective markets. According to Jonassen (2003) findings, "there is a demand for more "authentic" learning tasks that match real world conditions, as well as the desire to have rich learning environments that offer a wide variety of in-context opportunities for discovery, inquiry, design, practice, instruction and constructive exploration". Along with specialized learning, "there is a strong focus on the "interdisciplinary" dimension, expected to be a prominent feature of future approaches to knowledge, as well as a desirable step towards innovation of learning systems" (Learnovation, 2008).

Investing on learning

As for HEI, corporate training includes direct and indirect costs for the learning provision and its

delivery. These costs cover the material expenditures and all the related expenses (facilities, faculty, etc.). However the main difference is that learners are employees. Consequently, the companies take in charge the employees' training expenses (tuition fees, travel and accommodation) and they incur production loss due to the employee's downtime. In some cases and depending on the country legislation, corporate training, in or out working hours, might be regulated by the state (see Table 2).

Table 2: Continuous vocational training, 2005 (Eurostat yearbook 2010)

	Training enterprises (% of all enterprises)	Cost of CVT courses (% of total labour cost)	Average time spent in CVT courses per employee (hours)	Enterprises where there was an impact of public measures on CVT plans (% of all training enterprises) (²)
EU-27	60	2	9	36
Belgium	63	2	12	60
Bulgaria	29	1	4	32
Czech Republic	72	2	14	21
Denmark	85	3	10	33
Germany	69	1	9	18
Estonia	67	2	7	20
Ireland	67	2	12	:
Greece	21	1	3	59
Spain	47	1	9	38
France	74	2	13	56
Italy	32	1	7	38
Cyprus	51	1	7	72
Latvia	36	1	4	24
Lithuania	46	1	5	15
Luxembourg	72	2	16	22
Hungary	49	2	6	24
Malta	46	2	11	32
Netherlands	75	2	12	52
Austria	81	1	9	43
Poland	35	1	6	25
Portugal	44	1	7	54
Romania	40	1	5	8
Slovenia	73	2	14	30
Slovakia	60	2	12	21
Finland	77	2	10	25
Sweden	78	2	15	37
United Kingdom	90	1	7	45
Norway	86	1	9	5

(¹) Refer to the Internet metadata file (http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/en/trng_cvts3_esms.htm).

(²) EU-27 calculated on the basis of the available country data (i.e. excluding Ireland).

Source: Eurostat (trng_cvts3_01, trng_cvts3_53, trng_cvts3_71 and trng_cvts3_29)

e-learning in Corporations

The American Commission on Technology and Adult Learning stated: "e-Learning is instructional content or learning experiences delivered or enabled by electronic technology" (ASTD, 2001). Technology enhanced learning is a practice that enables contents scalability (direct access to dematerialized learning), distance learning (anywhere) and a great flexibility of usage (anytime). It includes both the communication technology, as the Learning Management Systems (LMS) or the web conferencing tools, and the technology-based learning contents also called e-learning contents, learning objects (LO), digital resources or digital contents.

The worldwide market for self-paced eLearning products and services reached \$32.1 billion in 2010. Western Europe accounted for the second highest expenditures (Ambient Insight, 2010). In 2009, 33% of the \$125.88 billion US corporate training delivery was supported partially or totally by technology (ASTD, 2010). The penetration of e-learning in corporations has been facilitated by a low shifting cost from traditional to technology enhanced learning. At the workplace, IS systems are ubiquitous and employees are familiar with ICT usage.

▼ How often do you use the following types of e-learning resources / activities in your company?

▼ Do you plan to use the following types of e-learning resources/activities more frequently over the next 2 years?

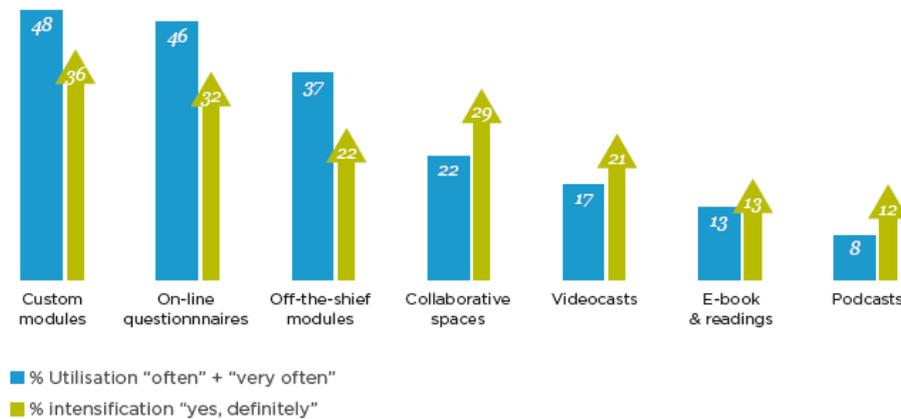


Figure 2: Type of learning resources (CrossKnowledge / FEFAUR / IPSOS, 2011)

Tailor-made content is the first type of e-learning resource used in European corporations (see Figure 2). Its growth perspective is the highest in the corporate learning landscape. These dynamic market trends make the provision of technology-based contents a real opportunity for HEI to enter the corporate field. Universities can bring their disciplinary knowledge and their teaching abilities along the e-learning value-chain.

Technology-based content

In specialized disciplines such as Science, Technology, Engineering and Mathematics (STEM) e-learning contents permit new representation capabilities and new interactions with the learning objects that help construct individual comprehension. Papert (1993) states that “findings underscore the importance of constructing external models, both physically (with wood blocks, LEGOs, etc.) and “virtually” (drawings on paper and computer screens, simulation modelling with The Sims, etc.). These “visceral and virtual” modelling activities provide strong external supports for the internal model-making going on inside our heads”. Indeed, it is admitted that blended learning is more effective than pure traditional or virtual learning (Means et al., 2009). The combination of traditional and virtual learning (blended learning) contributes to diversify learning. In that respect, “we know enough now to encourage multiple learning approaches to match diverse learning styles and multiple ways of expressing understanding” (Gardner, 1999). Technology-based contents cover the whole range of products from a stand-alone illustration to a serious game.

Virtual and blended learning mean ... extra-costs

The main initial investments for traditional teaching are the time spent by the faculty members on the course design and the material expenses (printed material, books). In blended format, we add the upfront cost of the multimedia content development (see Figure 3). In fact, ICT development is known to be expensive due to the technology utilization (2D, 3D, real time, sound, videos, and level of interaction) and because of further project management activities.

Due to technical constraints, the e-learning provision has to be anticipated. That implies a deterministic approach and high methodology standards to define the contents and to control the associated costs.

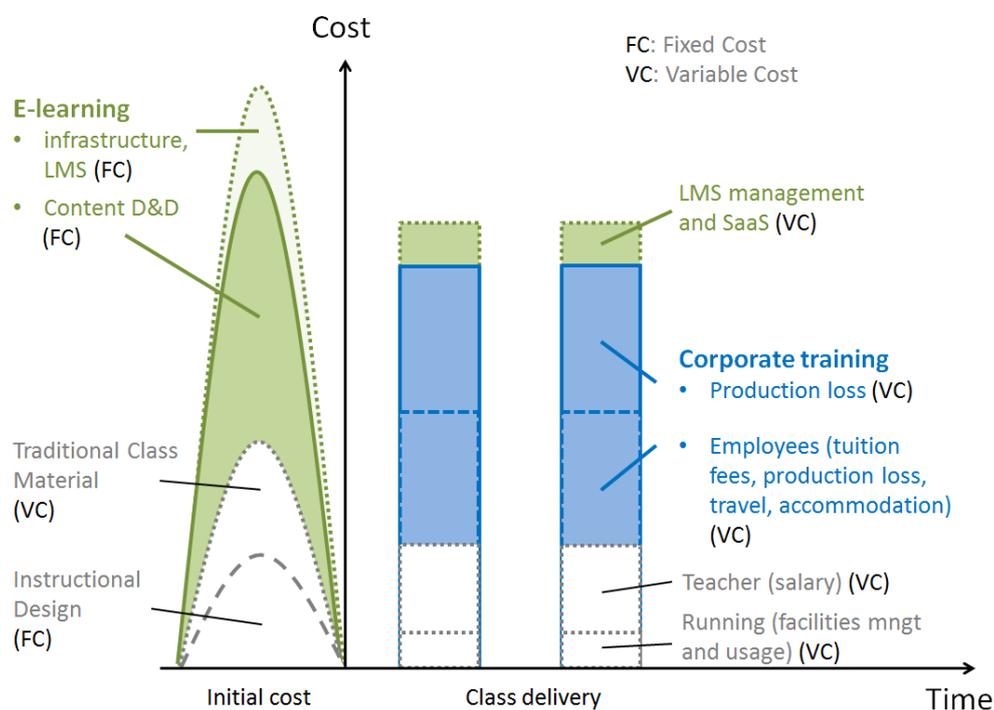


Figure 3: Spending for blended corporate training

This is often the scale effect that makes e-learning cost effective. As e-learning historian Paul Nicholson remarks, “E-learning in business and training [is] driven by notions of ... cost reduction, especially in an increasingly globalized business environment” (Ubell, 2010). The entry in the corporate learning market is also the opportunity for HEI to develop their e-learning offer and to enlarge their user base.

Content specifications

Technology-based content is characterized by the disciplinary knowledge involved. Hereafter are some of the areas of e-learning projects in European companies (see Figure 4). Again, specialized training arrives first.

▼ In which of the following areas do you use e-learning in your company?

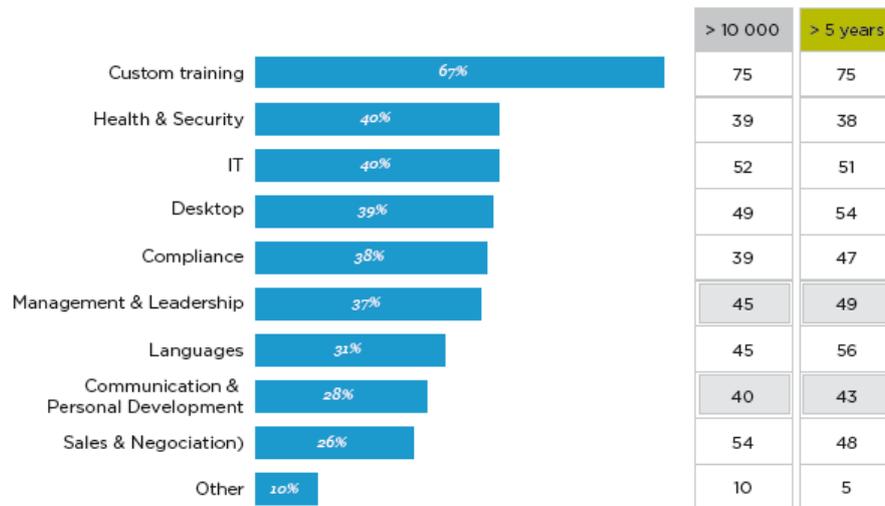


Figure 4: Domains for e-learning application in European corporations (CrossKnowledge / FEFAUR / IPSOS, 2011)

We can define different levels of content specialization. The course can deal with general and transferable content; this is the case of generic courses (off-the-shelf modules) which can be distributed across various industries for a large number of users. General language education falls under this category. Otherwise, the content can be custom-made to an industry, for instance a sector course like a sales training in the food industry. Besides, the course can be internal to one corporation. A class on proprietary microprocessor products in a technology firm would be one example.

One another feature is the relevance to the cultural context. Each course can be designed for a local, a regional or a global audience. “Forecasts refer rather to a move towards differentiation, both along local/context-based lines as well as personalization and tailor-made solutions. In addition, global economic uncertainty will lead to more comprehensive local development strategies, addressing the specificities of the territory through cross-sectorial approaches. They will promote local development, by investigating and addressing specific learning needs, thus becoming part of regional innovation systems” (Learnovation, 2008). These specification features have to be aligned with the HEI learning strategy and the HEI positioning.

Granularity of the learning object

The learning object granularity is the faculty of a content to be context independent and to be reused in different instructional contexts. Flamand & Gervais identified three categories of LO. “They distinguish the media objects that are less complex and context-free (image, video, animation, etc.), utilitarian objects (software for modelling, etc.) and learning objects composed of basic elementary information (facts, ideas, concepts, principles, processes). The granularity is a process that involves breaking down the digital content into smaller chunks or elementary blocks that have a pedagogical sense, also called grain. These grains can be re-combined and assembled to create coherent educational courseware” (Battou et al., 2010). “Learning objects have to be sufficiently broad in

scope to be meaningful to students and useful to faculty while being granular enough to be reused in various contexts” (Thompson, 2005).

The granularity of the learning content is a key factor for its future adaptability to the context of the industry.

Main business models for common e-learning resources development

In this second part we present the main models for the shared provision of technology-based content. The business models are descriptions of the possible working and revenue flows between HEI and corporations.

As we previously said, one of the main drivers for such collaboration is economical. E-learning content production is expensive. Then, one condition for e-learning institutionalization is to reduce the upfront cost and to enlarge the user base.

In order to optimize the e-learning investments and under the force of HEI’ move for revenue diversification, HEI and firms can devise new approaches for what we can call a “lean learning provision system”¹. “Public-private partnerships are expected to increase in Education & Training (E&T) in the years to come, following a trend which is already in place, and is deemed able to combine the best features of each partner, producing a virtuous model of innovation and efficiency” (Learnovation, 2008).

1) Business Model: development cost sharing

The first business model consists of sharing the initial development costs between universities and corporations (see Figure 5).

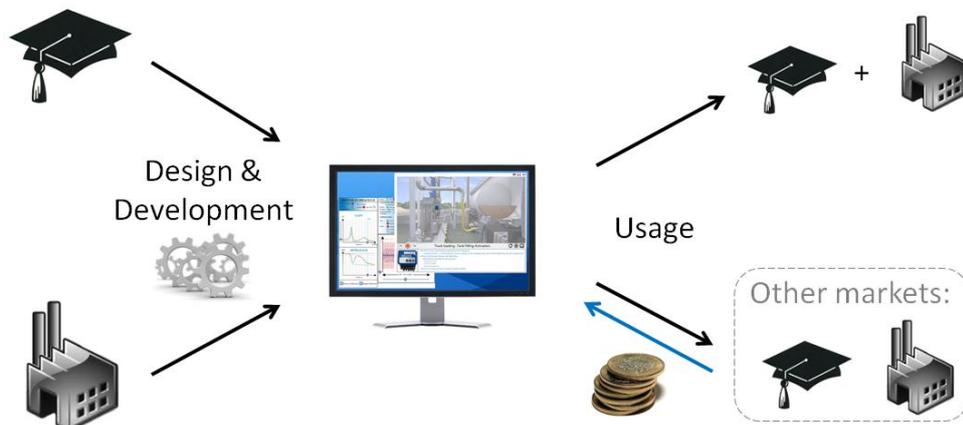


Figure 5: Development cost sharing

This model is particularly adapted when some HEI and corporate members belong to the same community of practice. “A community of practice is a group of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by

¹ “Lean Learning Provision System” is a supplying system of learning contents that involves only the necessary technology-based developments in order to avoid duplicates and waste of resources.

interacting on an on-going basis” (Wenger et al., 2002). An example would be collaborating investigation teams which decide to build together an up-to-date course on an expert content at the forefront of knowledge.

Hereafter are some examples of possible collaboration:

- Learning related to common investigation work,
- Learning related to advanced technology / product development,
- Learning related to advanced service development.

Limitations

As we already stated, public and private sectors have opposite interests. Nonetheless, this model is the one requiring the most of each partner within a collaborative framework. Consequently, universities and companies have to agree on common objectives in order to be successful. Both contributors have to design an appropriate governance to overcome all the four barriers of institutional change: cognitive, politics, resources and motivational.

Among the traditional project management issues, the following items have to be adequately thought:

- Areas of responsibilities in terms of learning content specification and production,
- Areas of knowledge expertise,
- Forecasted use in each institution,
- Commercial agreement (development and operational cost sharing, intellectual property, distribution rights).

The second risk for failure would be a low level of expertise from one of the parties. As an example, an HEI which doesn't justify a leading position in the domain would signify low cost for the corporation to shift towards new partners in the academic arena.

In the case of the distribution of the learning content towards new markets, HEI and corporations need to think of the content reusability in other organizational contexts. It can be argued that the learning content has to be context-specific, especially for corporate training. The granularity of the learning object might be the main lever to ensure context-free content usage across organizations. “It is a widespread hope that learning objects created in one organizational context will be routinely incorporated into different contexts. At present, it is the immediate organizational context of a learning object initiative that holds the most promise for addressing specific granularity issues such as the proportion of content relative to practice and assessment” (Thompson et al, 2005). This issue must be addressed and specified from the beginning of the collaborative work.

2) Business Model: distribution rights

The second frame includes revenue generation by reselling contents to companies. Universities take the initiative for the development; they are learning content providers (see Figure 6).

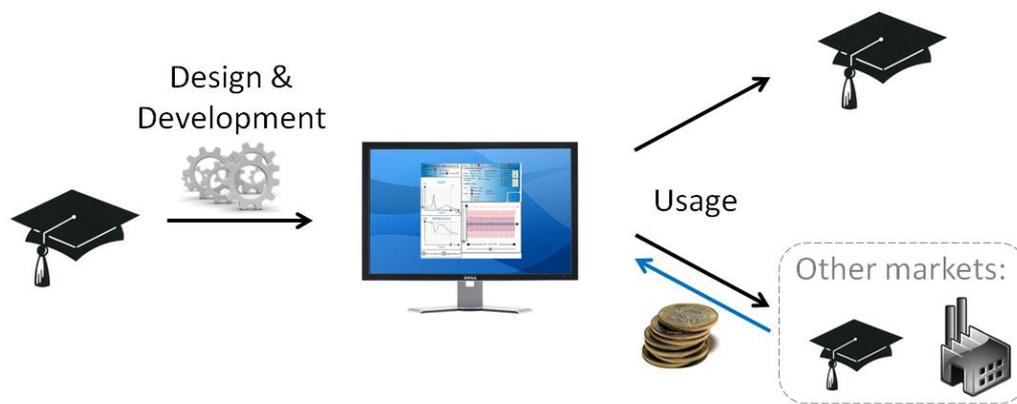


Figure 6: Distribution rights

HEI make the “marketing” efforts in order to prospect among potential buyers and to secure future sales. This model is recommended for HEI which are highly specialized and recognized as pioneers in education. They have a good understanding of the fast changing corporate needs (market intelligence). They can anticipate future trends. In addition, they are willing to strengthen their reputation and/or monetize their learning contents.

This model can be considered when:

- HEI are specialized in a field where some businesses identified a skill gap (the academic investigation is advanced),
- HEI master some fields of knowledge where companies are not willing to invest: non-core capabilities, support functions as language education or computer skills.

Limitations

In times of economic uncertainties, the marketing effort is more demanding. In this scheme, universities take all the risks. HEI will tend to adopt short term market adaptation tactics where the potential clients view will be predominately considered. “This approach implies a number of shortcomings. An excessive interest in market adaptation may lead to lop-sided development of the training process: the educational institution turns into the mirror reflecting the corporation opinion and moulds its vision of the future only due to demands of the corporation” (Sitnikov et al., 2001).

To compensate, HEI will mitigate the risk using the learning contents to address their own needs. Doing so, they will prioritize on short-term universities’ necessities instead of adopting criteria to guarantee the content reusability on the long run. The right balance between self-centred development and market adaptation has to be found. Again, the granularity of the content is a determinant factor.

Finally, we see the risk to create confusion among the learning officers population with the Open Educational Resources (OER) offering. HEI might distribute OER dealing with the same disciplinary knowledge and on free access principles.

3) Business Model: content circulation

Corporations select HEI and vice-versa in order to complement their learning offer. Strategic alliances are undertaken in order to provide cross-organizational learning provision (see Figure 7).

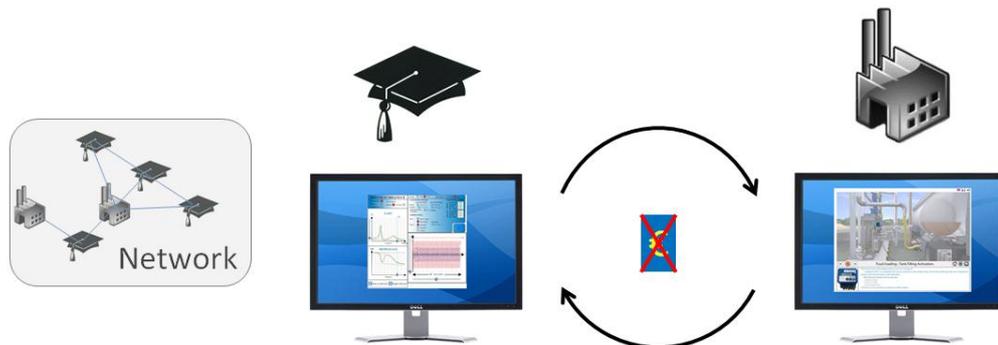


Figure 7: Content circulation

Specialization and diversification of E&T providers is expected to feature prominently in the 2020 education scenario (Learnovation, 2008). This model will naturally strengthen the university-business relations within a learning ecosystem where corporations play an active role. The exchange mechanism is virtuous in the sense that it is symmetric and balanced between partners.

This model suits the following situations:

- Complementarity of learning needs and of learning offers. HEI provide conceptual knowledge based learning. At the same time, they are interest in authentic-learning in order to stimulate students' critical thinking abilities and problem solving capabilities. Corporations provide real business cases while being interested in long life learning solutions that will maintain their human capital up-to-date. With longer working life and more diverse career paths, employees have to continuously refresh their general knowledge base,
- Companies are willing to develop their relations with HEI. They want to attract new talents,
- Companies donate their learning contents (philanthropy, branding).

Limitations

Companies might not be ready to open their learning resources. Knowledge is a strategic asset. To overcome that hurdle, companies would have to design modular resources in order to be able to split the sensitive content from the non-sensitive one.

In addition, this business model is close to a trading system where learning contents are circulating. HEI and corporations will have to agree on an integrated approach for learning valuation, depending on the interest of each party.

Conclusion

HEI enter the corporate learning market to defend a leading position in the educational market and for revenue diversification. This market, fragmented and highly competitive between suppliers, is characterized by its fast changing needs. In companies, the learning objective is to develop capabilities in order to better handle a job. Learning is often self-directed, authentic (in-context) and deals with procedural knowledge for observable results. From the company perspective, training is an investment on the human capital for long-term performance.

Corporations use technology enhanced learning to benefit from the scale effect, from its flexibility of use and from its capacity to complement traditional didactics. The specifications of the learning content are set in anticipation and have to be aligned with the learning strategy: the content specialization, its relevance to the cultural context and its granularity.

In order to optimize their investment in learning resources, HEI and firms can devise new approaches for what we can call a “lean learning provision system”². We propose three distinct models where HEI develop technology-based contents in collaboration with the private sector, sell the contents to the corporations or exchange their contents against corporate learning contents. Each business model best fits to some organizational contexts depending on the set of objectives, on the nature of the expert knowledge involved, and on both the positioning and capabilities of the institutions.

In any case they contribute to:

- “Foster public / private and school / company partnerships,
- Assure public and private funding and stakeholders’ involvement,
- Ensure bridges and flow of information between ICT for learning providers and institutions able to anticipate skills shortages” (Learnovation, 2008).

We hope the present publication will contribute to develop the “capacity to drive ICT exploitation in education” (Learnovation, 2008) for the benefit of the organizations and their employees, might they belong to the public or to the private sector.

² “Lean Learning Provision System” is a supplying system of learning contents that involves only the necessary technology-based developments in order to avoid duplicates and waste of resources.

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Ferran-Ferrer N. - García-Brustenga G. - Garreta M. - Santanach F.: Open Apps-Opening Teaching Experiences and Applications

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Introduction

The Universitat Oberta de Catalunya (Open University of Catalonia, UOC) is an online university that makes extensive use of information and communication technologies (ICTs) to provide education and lifelong learning services. It was created to meet the educational needs involved in e-learning and to engage in educational activity by making the most of the internet's potential. Ever since the UOC was established, its model of education has been its main distinguishing characteristic.

The learning activity of students lies at the heart of the model in question, and they are able to draw on three main elements to help them carry it out, namely resources, collaboration and accompaniment (UOC, 2010).

1. Resources are the content, facilities and tools necessary to carry out and assess learning activities.
2. Collaboration is defined as all the participative and communication dynamics conducive to students and teaching staff constructing knowledge through teamwork in situations involving solving problems, carrying out projects and collective creation.
3. Accompaniment comprises everything members of teaching staff do to monitor students and assist them with planning their work, carrying out activities, assessment and decision making. It results in students receiving personal treatment, enjoying permanent guidance while at the UOC, and interacting and communicating with the education community.

Those three elements have resulted in the UOC being the backdrop to various innovative educational experiences involving successful solutions to problems related to e-learning. Innovation is a cross-cutting feature of all the University's teaching and management activities and processes.

1. Teaching and management innovation

At the UOC, as is the case in most universities, initiatives involving innovation in teaching and management are not the exclusive domain of a particular department or group, but can potentially occur anywhere within the institution. The UOC therefore has mechanisms for encouraging such innovation.

Firstly, the Office of the Vice President for Research and Innovation promotes teaching and management innovation projects by annually inviting applications for funding for such initiatives. Since 2007, 135 of the 273 projects proposed by members of the UOC's 725-strong teaching and

management staff have been put into practice.

The UOC also has an Innovation Programme for identifying and speeding up innovation processes. Specifically geared to fulfilling the goals established by the vice president for research and innovation and the Innovation Committee (which comprises the University's vice presidents and general manager), the programme has an annual budget to invest in projects and ideas with great potential for disruption.

Lastly, and given the importance teaching innovation holds for the University, the UOC has an Office of Learning Technologies, which offers lecturers assistance with: 1) designing and preparing educational resources for generating richer virtual learning environments; and 2) basic aspects of the institution's model of education (resources, collaboration and accompaniment), taking advantage of the wide range of options available on the internet. Essentially, the Office of Learning Technologies collects information on the needs of students and lecturers, defines the functional requirements corresponding to each such need, and implements online tools capable of satisfying them.

ICTs are not only crucial to the UOC's teaching activity, but also to offering all its academic services and covering all the management processes involved. The University therefore annually invests in improvements to its management applications. Doing so is also an essential requirement for many other universities, and is by no means exclusive to entirely virtual institutions such as the UOC, a situation clearly reflected in the volume and activity of the *Moodle Plugins Directory* (Moodle Community, 2012), which contains modules and plug-ins for educational platforms, as well as applications for management and for integrating business systems into the Moodle platform.

In teaching and management, initiatives of the kind in question can be deemed innovative once they have been shown to adapt and improve previous processes and methodologies. To that end, it is essential to have the necessary time to be able to implement them (time to market), as well as a means of testing them in a controlled environment where their results can be monitored and their efficacy assessed. Last semester (2011-12), pilot testing of one kind or another was carried out in approximately 200 of the UOC's virtual classrooms, with real students and lecturers.

Once an initiative's efficacy has been proven (ineffective initiatives are discarded), its scope must be studied. The controlled environment in which it was tested might not have been representative or may simply have been insufficient to gauge its real impact. Identifying an initiative's scope can often entail much more work than the initial innovation did.

In any case, most innovations are of the incremental variety (Hollander, 1965). Nonetheless, steps should be taken to enhance an innovation's impact and its effect in terms of acting as an incentive for change. Collaboration, exchanging opinions, comparing experiences, dissemination, building up a following and regarding innovation as cross-cutting and non-exclusive tend to be good ways of facilitating change. Opening up in such a way can sometimes lead to an incremental innovation generating changes that eventually bring about a disruptive innovation (Bowder and Christensen, 1997).

Helping to open up innovation is the UOC's aim in creating the *Open Apps* platform (UOC, 2012). Presented as a directory or inventory of the UOC's applications, experiences and methodologies, it is designed to stimulate their use within the University and open them up to the outside world, enabling any educational institution, lecturer, student or IT professional to access, learn about and download them, replicate the learning practices described in them, test them, offer opinions on them and participate in their development.

2. The *Open Apps* platform

The *Open Apps* portal is intended to place the experience (in teaching, learning and management) the UOC has gained in more than 15 years of providing e-learning services at the disposal of the education community, along with the latest learning technology innovations implemented in the classrooms on the University's Virtual Campus. *Open Apps* is one of several UOC services characterised by the same open access philosophy. Others include the *O2* institutional repository (UOC, 2011), which provides access to and preserves the University's scientific output, and the *OpenCourseWare* website (UOC, 2008), through which its educational materials are freely available. *Open Apps* is thus a platform that provides open access to real experiences of using technology for lifelong learning and for management related to e-learning. It is a medium in which lecturers, educational institutions and sector professionals can easily find tools of the kind in question, reflect on their use and share experiences, and which enables them to apply the same tools in their own e-learning environment. In short, it is an online library of open resources for education and the management thereof.

2.1. Apps in the sense of applications and experiences

The content of *Open Apps* must be considered from a broad perspective, as the platform's apps are not limited to software. In this case, the term 'apps' refers to the distribution system and layout used rather than to the nature of the object. Functionally speaking, the portal's format is similar to today's most popular app stores and markets, so users are familiar with the way the interface works and the concept of such platforms.

A search system is available to users for accessing the *Open Apps*, and it initially appears along with an overview of recent additions and featured applications. For each app, users are able to access associated resources, information on use and a range of related services. Instead of the 'Download' button found in most app stores or markets, the *Open Apps* platform has an 'I'm interested' button, by means of which users specify whether they want to download a given app, test it, receive technical support for installing it or contact the lecturer responsible for it with a view to helping develop it and/or sharing experiences, educational resources, etc.

Technologically, the portal is based on the *Joomla* framework and some of its plug-ins, such as FLEXIcontent. A particularly notable aspect of the platform is its advanced search functionality, which enables users to search by competence, based on the classification established in the Tuning project (Tuning, 2000); by knowledge area; or by educational purpose, based on a classification established as part of the *Open Apps* project itself, including options such as assessment tool, content preparation, methodology and learning activity. The metadata used to describe the *Open Apps* is also based on the LOM standard and the Dublin Core terms.

The applications and experiences accessible via the *Open Apps* platform have to meet certain requisites. They must:

- Be innovative. They must represent a significant new development and an improvement in their field of application in comparison to conventional solutions, or provide elements and connections which did not exist previously. They may be services, products or methods and new experiences.
- Be interoperable. They may not be based on endemic technological or methodological solutions that only function in a restricted context. They must be readily applicable or adaptable to multiple contexts and offer scope for complementing other solutions.
- Be open. They must be covered by open copy left licenses (Creative Commons, GPL, GNU, etc.) under which they can be freely used and modified so that third parties can develop them.
- Have been put into practice previously. They must have been applied, reasonably successfully, in their original context, and there must be prior experiences that vouch for their results or provide knowledge regarding their use.

At present, users can access seven innovations via *Open Apps*, and work is being carried out to make a further 20 applications and experiences available in September 2012. One of the applications already available via the platform is *GestióIP*, an automatic IP address and network management tool. *Mathcasting*, meanwhile, revolves around maths lecturers' experience of working with LiveScribe, a smart pen that records written and audio input. *Microblog*, a tool that draws on more popular technologies, is used as an education-oriented Twitter in IT and law classrooms. Based on the open source application *StatusNet*, it is a solution that fosters communication between students and lecturers, enabling them to interact via mobile devices. *Present@*, a teaching experience and application based on *WordPress*, provides a simple means of uploading and viewing videos of students' activities. Its main innovative feature is that it allows for forum-style discussions of such videos, enabling students and lecturers alike to establish dialogues with different purposes. It has been used for the presentation of degree students' final projects.

The UOC's School of Languages has provided the other three innovations currently available via the platform. The *Japanese Virtual Writing Notebook* is for learning to write Japanese characters (kanji). The *Tandem* application enables pairs of students to establish synchronous oral dialogues guided by content involving activities such as spotting differences between photographs and identifying similarities between objects and situations. Finally, *Langblog* is an adapted blog-style application that has functionalities for creating video and audio material and is geared to acquiring oral production skills asynchronously. In addition to language teaching, it has been used for law studies, for simulating certain oral communication tasks corresponding to lawyers.

2.2. Purposes and users of Open Apps

The main purpose of *Open Apps* is to place the UOC's know-how at the disposal of the community, so that educational institutions and individuals can apply, adapt or develop it.

Another purpose of *Open Apps* consists of helping forge cooperative ties between users and organisations, going beyond mere application or use. An Open App may be modified and adapted by third parties, as well as serving as a basis for the establishment of other cooperative agreements between users and organisations.

Following on from the above, the *Open Apps* platform's potential users and the specific purposes initially established for it are as follows:

Teachers: *Open Apps* offers teachers from the face-to-face and distance learning arenas alike information on experiences of using technology and tools for managing education. Those experiences may give them food for thought, provide them with new ideas, be directly applicable in their teaching activity or be applicable in different ways, for other purposes or uses. The platform also enables teachers to swap information with others in the same profession who have already used the tools in question. It thus encourages members of different education communities to exchange and pass on their knowledge and experiences.

Training providers: *Open Apps* lets institutions that provide e-learning or blended learning services benefit from the new options the UOC's applications and experiences offer them, thus enabling them to meet the demands of their students and teaching staff by providing access to more tools specifically designed for distance learning in different contexts. Additionally, the wide variety of tools that will be available in the medium and long term will allow them to personalise their courses and specialise to a far greater extent.

Online service or tool providers and developers: *Open Apps* gives institutions that develop learning tools a new perspective on educational technologies, one with a focus on the application itself, in contrast to current models that centre on the learning environment. In the case of *Open Apps*, the emphasis is very much on the application rather than the learning platform to be used. The *Open Apps* concept involves every teacher being able to use the tools best suited to their teaching activity, regardless of the learning platform with which they work. Many institutions whose main business focus is not education could consequently find that *Open Apps* offers them a good model for extending their activity in the education sector. For example, a company specialising in software for designing integrated circuits or a business that makes computer games could consider ways of using its tools for educational purposes without worrying about the platform into which they would need to be integrated. *Open Apps* is also an environment for the development of new applications and experiences. Students on the UOC's IT degree programme carry out their final projects with the possibility of them going on to become Open Apps in mind.

Cloud computing for education: *Open Apps* paves the way for a new type of online service based on a client contracting infrastructure for e-learning, thus making it unnecessary for them to own any such infrastructure. A service of the kind in question could be fully customised, allowing the client to specify which tools are to be used for teaching, how many students and members of teaching staff are to be catered for, in what combinations and when. The *Open Apps* platform's tools could be installed in cloud infrastructure to bring the cloud computing concept to education, thus giving rise to the possibility of creating companies that specialise in offering such services.

2.3. Future lines of work

The platform was launched in July 2012, with an initial sample of seven representative Open Apps. The project will become a stable UOC service as of November 2012, at which point approximately 20 Open Apps are expected to be available. Additionally, the UOC will have the necessary internal

mechanisms in place to guarantee the platform's long-term stability and to allow new applications to be fully or semi-automatically uploaded in the future. To that end, procedures, checklists and forms will be developed to enable those responsible for applications to add to the platform.

It is hoped that the next batch of Open Apps made available via the platform will include applications that the UOC's IT students have developed. As of the academic year 2012-13, students taking the University's IT degree programme will have the option of carrying out a final project related to *Open Apps*, with a view to developing existing applications further and making it possible, for example, to access them via mobile devices.

The platform's evolution depends on the UOC community and the community of *Open Apps* users. The number and types of Open Apps available will ultimately be determined by the University's students, teaching staff and developers and the platform's users. Additionally, analysis of usage data and users' observations, feedback, needs, preferences and interests could see the platform develop into a more social medium with a greater emphasis on query resolution and consultation, and incorporate services in line with the education community's requirements. In that regard, one possibility is the current application platform becoming a kind of open service platform (Chesbrough, 2010), in the sense of an open innovation ecosystem in which providers, students, partners, institutions and collaborators participate. We believe that a radical change of direction could occur, involving the product/application-focused approach being replaced by a new approach revolving around services, and that each institution's closed innovation could give rise to an open innovation concept.

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Gravani M.N.¹ – Karagiorgi Y.²: Open University tutors' and adult learners' experiences and perceptions of educational practices used at the Open University of Cyprus (OUC) and the Hellenic Open University (HOU): A case study approach

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Introduction

This paper presents part of a research study undertaken to investigate adult tutors' and learners' experiences with distance learning courses in the context of the Open University of Cyprus (OUC) and the Hellenic Open University (HOU).

Educational research has not as yet provided insight into the subtleties of the educational practices used at the OUC. In fact, research on teaching and learning in distance programmes of higher education (HE) remains scarce, with the exception of a few empirical studies on adult distance education (Zembylas, 2008; Zembylas et. al., 2008; Gravani, et. al., 2010; Gravani, et al., 2012; Christidou et al., 2012), while no research has been conducted on the OUC programmes in relation to the HOU courses. Contrary to limited research on distance adult HE in Cyprus, in Greece a number of researchers have focused on the HOU and various teaching and learning aspects, such as the dropout rates and their causes (Pierrakeas, et. al., 2004), pedagogical practices and use of ICT (Koustourakis et. al., 2008), communication among tutors and students (Iliadou & Anastasiadis, 2010), adult participation (Sianou-Kirgiou, 2010), as well as the use of technology in the courses (Koustourakis et. al., 2010).

Hence, the study reported in this paper aims to throw light into under-researched aspects of educational practices, exercised in the context of the two institutions (the OUC and the HOU), with a particular focus on the face-to-face meetings of two programmes, in an effort to highlight underpinning principles pertaining the design and implementation of effective distance programmes.

Key concepts

The concepts **distance education** and **learning, open learning, e-learning** and **blended learning** are central to this study. Distance education is regarded as a 'mainstream' educational delivery method,

often related to the separation between the teacher and the learner(s). Along this line, Ormrod (2008) as well as Lei and Gupta (n.d.) define as distance education the technology-based instruction where students are physically separated from their instructor during the course of study. For Dodds (1991), teaching and learning take place with the teacher at a distance from the learners most of the time. For others (e.g. Williams et al., 1999; Smith, 2010) except from the learner/teacher separation, distance learning also involves a different educational approach enhancing flexibility. For example, Fitzpatrick (2001) notes that distance education employs the principles of modern learning pedagogy; such pedagogy often involves either self-study or group (residential) study (Garrison, 1993, cited in Peters, 2001). In this regard, distance learning resembles different models: the correspondence model, the conversation model, the teacher model, the tutor model, the technological extension model and the transactional distance model (Peters, 2001). Smith (2010) argues that, despite slight conceptual differences, in practice all these models reflect strategies that enable wider participation in education at all levels.

Distance learning is frequently related to open learning, i.e. the type of learning that helps students overcome possible barriers, such as qualifications, location, social engagements etc. In other words, open learning is based on the use of materials in which possible constraints in terms of access, entry, time or place, pace and method of study are minimised. The combination of distance education and open education has given rise to what is known as **open and distance learning (ODL)**. At the same time, Olugbenga Ajani (2009) warns that since distance education does not allow direct interaction between teacher and learners, it can promote openness but it is not identical with open learning.

Although all terms above -distance learning, open and distance learning- are employed interchangeably in the respective literature, the identification of distance learning with e-learning or online learning is not unproblematic. **E-learning**, as Uzunboylu (2006) suggests, often refers to instruction delivered through media, computers, and technologies such as the WWW and intranets in relation to certain goals and methods for achieving individual or organizational goals. In line with this, the European Commission defines e-learning as the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchange and collaboration (Reding, 2003). Another related term, **online learning**, as Hiltz and Turoff (2005) point, is the latest in a long list of social technologies introduced to improve distance learning by adding various augmentations, substitutions, or blending of new pedagogical approaches and technologies such as correspondence courses, physical mail, printer material; audio and video recordings, computer-assisted instruction, multimedia etc. According to Desai et al. (2008) online learning provides asynchronous and synchronous communication and involves a sensory of vastness that generates reality and fosters growth/change; learning is often non-linear in a hyper textual pattern, has an open environment and is independent of time. Consequently, online learning is a new social process employed as a complete substitute for both distance and face-to-face classes. From the above, it becomes palpable that the boundaries between distance education and e-learning often blur due to the fact that distance education in developed countries is provided through e-learning (although again most e-learning is not used for distance education). In fact, the provision of distance education constitutes a partial function of e-learning, which often focuses on the campus as the centre of university culture, knowledge generation and student-teacher interaction. At the same time, these boundaries do not merge in other contexts; in developing countries which lack resources or technology infrastructure, distance programmes are still conducted through old technologies such as print or satellite broadcasts, in line with the industrial model that still provides the best route to mass education. Since developing countries rely on print-based materials, often supplemented with

multimedia while developed countries employ ICT-based approaches and ODL institutions, respective approaches also vary, giving rise to different paradigms (Luschei et al., 2008).

Consequently, online courses range from modules offered electronically to full-time students physically located at the university, to modules offered exclusively electronically to students at a distance, to modules offered as part of a **blended learning** approach that combines face-to-face teaching with computer-mediated activities (Williams et al., 2007) to form an integrated instructional approach. Smith (2010) suggests the continuous growth of e-methods in a hybrid approach, mixing both traditional and e-methods. The terms blended, hybrid, and mixed-mode are used interchangeably both in the current research literature as well as in this paper.

With regards to the educational practices employed by distance-teaching universities, as pointed out above, these vary, since, as Peters (2001) argues, each university has its own character which cannot be completely evaluated without a deep knowledge of the country in which the institution belongs. In analysing the educational practices and models of teaching and learning used in the University of South Africa, the Open University in the UK, the FernUniversität in Germany, the Central Radio Television University in China, the University of the Air in Japan, the Empire College in the USA, the American National University Teleconference Network, and the Canadian project 'Contact North', Peters (2001, pp. 241-242) discusses different models of teaching and learning such as: correspondence studies, classical distance education in a multimedia system, research-based distance education, group distance education, autonomous distance education, distance education based on teleconferencing as well as distributed learning.

The differences of these models, according to Peters (2001), are based on different grounds, such as the general institutional aims. For example, in developing countries emphasis is on the access paradigm, while developed countries operate under a quality paradigm. The use of technical media is another factor accounting for differences among models. For example, the University of South Africa employs a first-generation distance education system based on printed material and the correspondence between teachers and students, while the 'Contact North' project uses second- and third generation distance education with less than four forms of teleconferencing in its teaching and learning system with the support of digital media (Peters, 2001). Autonomous versus heteronomous learning is another factor that distinguishes models of distance teaching and learning; when learning paths are carefully structured, then learning becomes more heteronomous. Finally, different dominant pedagogical concepts, learning cultures and academic traditions in various countries influence university distance education (Peters, 2001). The above overtly demonstrate the flexibility and variety of teaching and learning in distance education.

The context of the study

In Cyprus, the Ministry of Education and Culture has the overall responsibility for educational policy. With regards to HE, the first university of the country -the University of Cyprus- accepted its first students in 1992. Since then, three public universities have been operating in the country, along with four private universities and twenty one private institutions of higher non-university education. According to the latest document on progress towards the Lisbon objectives in education and training and adult participation in lifelong learning (European Commission, 2009), Cyprus was the EU member state with the highest share of population with HE attainment. However, the adult participation rate in lifelong learning was not higher than the EU average and EU benchmarks; in

2000 it was 7.9% and was increased to 8.5% in 2008. Lifelong learning has become imperative priority for Cyprus, a trend reflected in various official documents: the Report for Educational Reform of 2004, the comprehensive Lifelong Learning Strategy of 2007 and the National Development Plan 2007-2013. At the same time, there has been a renewed governmental focus on HE and, in particular, the contribution of the Open University of Cyprus (OUC) to the development of Cyprus into an international centre for education. The OUC was established in 2003 under Law 234 (I) and operated in 2006, offering postgraduate and undergraduate, training and vocational programmes through 'open and distance learning'. The emergence of the first open university in the country aimed to assist citizens participate in lifelong learning, study on their own pace and obtain HE qualifications. Today, the OUC has more than 150 tutors, 21 members of academic staff, about 2000 students in 13 different programmes, while more programmes are soon to be initiated.

Similarly, in Greece, the Ministry of Education, Religion, Culture and Sports is held responsible for educational policy. Public HE is provided through universities (AEI-22) as well as technological education institutes (TEI-16) and private colleges. The Hellenic Open University (HOU), which was established in 1992 and operated since 1999, has four faculties as well as the learning material and educational methodology laboratory. The HOU has around 18000 undergraduate and 12000 postgraduate students in 186 programmes, 1600 tutors and around 40 academic research staff. According to the latest document about progress towards the Lisbon objectives in education and training and adult participation in lifelong learning (European Commission, 2009), Greece had a very low performance in comparison both to the European average and to the EU benchmarks, slightly increasing from 2.6% in 2000 to 2.9% in 2008. The same report indicated the HOU as one of the institutions that offer learning opportunities to adults, including the so-called "non-traditional" learners and those most vulnerable and severely affected by inequalities and economic swings. In terms of development and implementation of lifelong learning strategies in Greece, two basic legislative acts have been initiated: the Law 3369/2005 on the 'Systematisation of Lifelong Learning' and the Law 3879/2010 on the 'Further Development of Lifelong Learning'.

This study focuses on two programmes, similarly provided by both universities: the undergraduate programme in Greek Civilization and the postgraduate programme in Education Studies. These two programmes were chosen due to their identical aims in the two contexts; in fact, the programmes at the OUC were modelled after the ones at the HOU. At the same time, the two programmes were provided by different institutions in different countries with different socio-economic and cultural background. Both programmes explored in the two settings reflected structured printed distance-teaching courses and involved the employment of specialised learning materials (books). The latter were developed by members of the academic staff in collaboration with the tutors with particular attention to distance students' learning needs. Adult learners studied on their own, using the specific printed and digital (video and audio) educational material provided by the university. Each student was allocated to a tutor, whose role was to provide guidance and support to the student throughout the course. The study material was split into weeks, while learners planned reading this material according to a study guide accompanying their 'study package'. Self-study was complimented by the attendance of five face-to-face meetings per academic year, which were not obligatory. The tutors administered face-to-face meetings as well as on-line meetings and teleconferences, also communicating with adult learners via phone, e-mail and post. Students were evaluated by their tutors through written assignments (four in some thematic units and three in others) and written exams at the end of the academic year.

Methodological approach

This study adopted case-study methodologies within a qualitative paradigm. Due to the focus on the two programmes described above, data was collected from two units of each of the programmes. In particular, with regards to the undergraduate programme, two units (“Ancient Greek and Byzantine Literature/ELP21”; “Modern Literature 19th-20th Century/ELP28”) were chosen within the context of the OUC and two respective ones (“Literature I: Ancient Greek and Byzantine Philology/ELP21”, “Literature II: Modern Greek Philology/ELP30”) in the context of the HOU. With regards to the graduate programme, two more units were explored (“Educational Research/ELP51”, “Continuing Education and Lifelong Learning/EPA64”) in the context of the OUC and two similar ones (“Educational Research/EKP51”, “Adult Education/EKP64”) within the context of the HOU.

Decisions were also made with regards to the choice of the participants and “whom to talk to”; 16 adult learners (open university students - 8 from each of the two universities), and 8 adult educators (tutors - 4 from each of the two universities) were chosen. In particular, 2 students were selected (an experienced student with 3-4 years of experience in the university, and an inexperienced student) from each of the four thematic units explored in the two respective contexts. Adult learners -10 women and 6 men with varying employment status- ranged in age from 25 to 55 and varied in their adult life stages. In addition, one university tutor was selected from each of the four thematic units investigated in the OUC and the HOU. Tutors -5 women and 3 men- varied both in their status, as they ranged from permanent members of academic staff in other universities to primary school teachers as well as in their experience of teaching in the open-university context, which ranged from 1 to 10 years.

The tools employed for data collection included in-depth, audio-recorded, semi-structured interviews carried out over a two-month period (April- May 2011). As Punch (1998) argues, interviews constitute a very good way of accessing people’s perceptions, experiences, definitions of situations and constructions of reality. The familiarity of researchers with both programmes and contexts enabled ease of access, surmount rapport and confidence. Researchers were well trained and were guarded against their own biases through the recording of detailed field notes, including reflections on their own subjectivity, to establish validity. Semi-structured interviews were chosen to elicit equivalent information from a number of informants, thus allowing for a more flexible style suited to the personality and circumstances of the interviewees, and permitting the researchers to probe and further expand on informants’ responses (Hitchcock & Hughes, 1989). Different interview schedules were prepared for tutors and learners. The interview agenda included questions related to the educational practices used in the open-university context as well as to adult learners’ involvement in decision making about such practices, with regards to the face-to-face meetings. Participants were interviewed separately in a setting and at a time convenient and comfortable for them. Prior to the interview, the researchers had early contacts with the respondents, explaining the aims, nature, utility and contribution of the research to establish rapport and trust. Each interview lasted between forty five minutes to one hour.

The data analysis was conducted in the spirit of hermeneutics and concerned the deployment of the constant comparative method, whereby categories and their properties emerged from a detailed sententious analysis of the data. Data were indexed and themes were identified. This was the process of coding-sorting data, according to the commonalities they shared into categories. Emergent categories were then turned into a series of codes that were applied to the corpus; these

were derived from an iterative reading of the data and guided the validity of the emerging themes. This process comprised of three sub-components; naming, comparing and memoing. The themes were contextualised by being placed in correspondence to the literature through the process of theoretical memoing (Locke, 2001). The final accounts were illustrated through the employment of the most telling pieces of data, evoking the original words of the participants. For purposes of clarity, adult learners and tutors are referred to as L1 to L16 and T1 to T8, respectively.

Findings

Primarily, the dominant educational practices and teaching and learning situation in the two contexts were identified through the analysis of the data. In what follows, the experiences and perceptions of the participants in the face-to face-meetings of the two universities are presented in the following categories: **planning, educational techniques and means, students' participation and students' attitudes towards meetings.**

Planning

With regards to planning the five face-to-face meetings, university tutors followed various practices. Some of them argued that they did not have any freedom to choose the themes for the meetings since these were decided by the coordinators of the units in collaboration with the course team (*"I don't choose the topics (for discussion). They are common for all groups. I only get to choose the activity"*, T4/HOU). Others stated that they were the ones who decided about the content of the meetings, which they simply announced to their students. In doing so, they tried to choose topics that they thought would be of interest to their audience. It is worth pointing out that some tutors claimed that whenever they asked university students to choose themes for the meetings, students' response was limited (*"I give out the topics through email for the last ten years, I ask them if they want to discuss some topics, in all ten years only 3-4 students have replied that they would like to discuss a certain topic"*, T1/HOU). Interestingly, two tutors cynically pointed that they consciously planned the face-to-face meetings without involving their students. However, they tried to give the latter the impression that they had some sort of involvement in planning: *"The people develop the illusion that they participate and shape the topics with us, however we lead them where we want"* (T5/OUC).

At the same time, though, some tutors, mainly experienced in adult teaching and learning, appeared to demonstrate a more democratic profile. During the meetings, they systematically provided time for their students to present their queries and the themes they wanted to discuss, mainly related to problems with their studies or the written assignments. For example, as T8/OUC pointed:

My role, let me say, is not that of an authority -'I come to tell you what to do'- which is what students appreciate particularly. [...] I always go prepared, with answers to their questions, which have already been proposed by them, but also with answers to questions that could possibly be asked, which I need to predict for. I don't choose the topics for discussion. They (the students) do so. I am not going to the meeting with a pre-set agenda. The topics are

sent by students before the meeting, one week or more. They upload the topics on the platform. I put them all together. Usually they are more than ten. There have been cases where we had more than twenty. We deal with them one by one, from the first to the last. There are cases where I put up a topic, when I see an issue emerging from the discussion, which is not on the agenda.

The above were also confirmed by students who -in their majority- verified that the content of the meetings was decided by their tutors, while their involvement in the choice of topics to be discussed or educational techniques remained minimal. As L5/OUC pointed, *“We did not have any chance to participate. We were not asked how the meeting would take place or when [...] I think these are decided by others”*, while L8/OUC stressed, *“The organization of the meeting is an exclusive responsibility of our tutor”*.

Nevertheless, a small number of students articulated that sometimes tutors presented their agenda to the meetings, also asking learners to approve of this or propose new topics for discussion, hence giving the impression of mutually planning the meetings with the students. For example, L15/OUC suggested that:

When I was asked to suggest a topic, I was not ready to do so. [...] for a student to propose a topic, he/she needs to have done the reading, deal with it, have questions, find topics and judging from my practices, I had a hard time even reading through, not to say studying, following the guide, so I was always afraid (‘what should I ask, I support what you say, tutor’). However, it was good to see that the tutor tried to raise our level of interest.

Educational techniques and means

In the course of the face-to-face meetings, a variety of educational methods, techniques and means were used. Democratic dialogue and team working, favoured by adult learners, also appeared to be in place, apart from the *ex-cathedra* teaching that was dominant in respondents’ accounts. Some tutors’ comments were illustrative of the attempts to encourage students’ participation:

I try to avoid traditional teaching. I don’t ‘deliver teaching’. There will be discussion. I put them in groups for the activities [...] so that they don’t work individually, they will work in teams, they will have fights, they will laugh, they will play, each one will freely express an opinion, and then a group representative will do a presentation, this develops discussion. (T5/OUC)

I mainly use dialogue. Usually the first meeting is exploratory, so I don’t expect them to participate all the time, but from the second one onwards (as we have five meetings) we have participatory dialogue. (T8/OUC)

Students also appeared to confirm the employment of participatory models of teaching in certain units. As L12/HOU pointed, *“I really liked the exchange of views, the disagreements, then one of us had to synthesize the opinions of all of us, as a spokesperson for the group”*. Another student

suggested that *“since the unit is about educating adults, which involves a variety of participatory educational processes, contrary to other units where there was a presentation by the tutor and questions/answers, in this unit we had group work, the students talked more...”* (L1/OUC).

Tutors claimed that the selection of educational techniques was influenced to a great extent by the lack of appropriate infrastructure, such as well-equipped classrooms or audio visual aids. As T8/OUC pointed, *“There is a fixed microphone, so I need to be standing in the same position to talk. Participatory dialogue demands that I am at a short distance from my students? I cannot be at one end and my students at another”*.

As far as the educational means were concerned, both tutors and learners argued towards the use of printed material (books and photocopies), the blackboard, the computer for presentations and the overhead projector (*“Basically the computer, the PowerPoint, the teleconferencing for those that cannot be physically present, tutors’ notes”*, L3/OUC).

Students’ participation

Both tutors and adult students in this study agreed that the latter had active participation in the face-to-face-meetings, during which they were involved in: identifying educational needs; submitting questions to the tutors; proposing suggestions for the improvement of the programmes of study (although these were not always taken into account); commenting on the content of the printed and digital educational material; and participating in the evaluation process.

Yes, they participate. [...] The students need to feel comfortable to express their opinion, to make mistakes [...] One of the points I repeatedly raise in my feedback is that the students should find their personal voice. Not just to reproduce the theoretical background. [...] From the first assignment to the fourth this happens, because you push them in this direction. (T7/OUC)

In the first meeting, students come in contact with the open university for the first time, if this is their first unit, which means they need explanations, explanations about the evaluation criteria. I devote time in the first meeting to that, since this falls within our pedagogical contract. They write their demands; I write mine so that we have a basic social contract between the tutor and the students. (T2/HOU)

However, as one of the tutors pointed, learners’ participation was not always as considerable, as should have probably been. This could be attributed to the long distance between the place of meeting and students’ place of living. As a result, many of the learners did not turn up in these meetings, which were non-compulsory anyway. In addition, an electronic platform was available, through which students could attend the meetings from home.

Yes, this is a problem. In my unit this year, out of the 13 persons, 9 are from Greece and the rest from Cyprus. The ones from Cyprus come to all the meetings. However, the participation level is really low, not just with regards to the students physically present, but also the ones

that attend the meeting through teleconferencing. They know when the meeting will take place, they can access the teleconferencing platform, but they don't attend. They don't participate. (T8/OUC)

In addition, students noted that to be able to contribute, they needed to be well-prepared for the meeting. As L10/OUC pointed,

We go to the meetings, without first finishing the readings. [...] You turn in an assignment, let's say on Sunday night, then in 3-4 days you have more topics to study for, which will be discussed in 8 days at a meeting. I don't think anybody bothers to read beforehand. You go to the meeting and you do the reading later. (L10/OUC)

Students' attitudes towards face-to-face-meetings

Tutors and students similarly commented that adult learners did not face any particular problems in the meetings in which they participate constructively. In fact, most students appeared to show great interest for the meetings, which they thought of as helpful. As two students at the OUC commented:

I think I have not had been absent from any meetings. Because they take place over the weekends, I have family commitments, I may need to leave a bit earlier e.g. half an hour. The particular unit was always on Sundays, 4-8.

I wish there were more meetings. I simply feel that if there were more meetings, this would reduce the effort and time we need at home. I am a bit stressed, since the unit is specialized, but I can say that in the course of the study my stress was reduced, when I saw my tutor's interest, when I saw that she responded to a phone call, she explained [things] to me.

The students at the HOU also appeared to agree about the usefulness of the face-to-face meetings:

It would have been beneficial to have more meetings. In general I think that physical real communication answers a lot of questions, and provides an opportunity for us to say things, which are not easy to discuss through email communication.

At least you get enough information that can help you in your next assignment or the exams.

In some cases, adult students viewed the meetings as an excuse to complain about the low grades, to express feelings of low self-esteem and to criticize the long content of the thematic unit and the demanding topics for the assignments. As T4/OUC noted, *"They complain when they get a 4. They tell you 'this is the lowest grade I ever had', which is natural and human. Once, I had a student cry. In such cases, you need to act as an advisor and provide motives for them to keep going on"*. Another tutor also confirmed this: *"People complain about grades, it is a bit ridiculous to complain why it is an 8 and not an 8.5. I am not bothered though. [...] My students are very good, they cooperate well"* (T2/OUC). Tutors at the HOU also reported similar concerns from students over grades that appeared low to them.

Additionally, tutors surprisingly noticed that during the meetings some adult learners expressed their notions of the tutors as authorities and invited them to embark in ex cathedra teaching. As T4/OUC suggested, *“They expect the tutor to be a tutor i.e. to deliver the lesson, finish and go home. They need to get the sense of authority, that the tutor knows things”*.

Concluding remarks

Apparently, both distance programmes at the two open universities reflected a **blended approach**, combining computer-mediated activities with face-to-face meetings. In other words, the major part of the two programmes -of focus to the current paper- related to distance learning, with the tutors physically separated from the learners. Similarly to what happens in most developed countries, in these programmes, distance learning employed e-learning and print-based materials for self-study. At the same time, such learning was complimented by face-to-face meetings. The adoption of a **hybrid approach**, combining traditional and e-methods in the particular contexts is not surprising since, as pointed earlier in this paper, this is a dominant trend in the context of HE internationally.

It is important to note, here, that this study certainly did not examine the distance part of the two programmes as to whether this employed principles of modern learning pedagogy with regards to e.g. self-study or group study. At the same time, this paper does not explore the online component of the two programmes, in terms of e.g. the asynchronous and synchronous communication and the environments and platforms that were developed to enhance learning; hence, the potential of online learning to substitute for both distance and face-to-face classes cannot be discussed. Consequently, any discussion can only relate to the face-to-face meetings, developed in the context of the two programmes, so the conclusions that follow can only reflect this aspect.

Undoubtedly, returning to Peter’s (2001) discussion earlier in this paper, the programmes designed at the two universities reflected the **access paradigm**, as these were provided to learners possibly unable to attend full time higher education due to age, social, economic or other factors. The two settings -the OUC and the HOU- appeared to offer another chance to university education to adult students. At the same time, the two universities seemed to operate under the **quality paradigm**, as well. In other words, beyond improving access to higher education, they aimed at the provision of efficient distance education courses to mature students to respond to their educational needs. In specific, tutors’ and learners’ accounts to some extent reflected certain efforts to enhance students’ participation in the planning and implementation of face-to-face meetings. On the basis of these accounts, one can certainly draw the conclusion that these meetings to some extent aimed to employ flexibility and variety, as well as mutuality.

At the same time, however, the levels of flexibility as well as students’ involvement in the planning and implementation of such meetings, as depicted in respondents’ accounts, were far from ideal. Apparently, the structure and agency emerged as factors that interacted to impact upon participants’ experiences (Merrill, 2001). Possibly, the ‘structured’ context of the thematic units could not easily enhance the identification of students’ needs for learning, so as to take these needs into consideration, while planning and designing the thematic units for the two programmes. In this regard, individuality including adult learners’ needs, interests, learning styles and past experiences as well as ‘cultural baggage’ of their past and present lives -aspects that seriously impact the way adults experience learning- could be easily overlooked. Similarly, the available infrastructure appeared to

impact teaching and learning, often restricting participants' active participation in the meetings. At the same time, learners' and tutors' expectations from the programmes and themselves often appeared to resemble stereotypical roles in learning and teaching, respectively.

In this regard, further steps could be taken to establish **more active involvement of adult learners** in these meetings, while providing for **more opportunities for flexible learning**. Moreover, efforts should be directed towards identifying the emotions and feelings triggered in the course of the programmes, as these often impact adult distance teaching and learning critically; when such emotions are positive and participants feel respected and trusted, adult learning is enhanced.

To sum up, this study advocates for more open systems and for the integration of adult learning principles, when designing HE distance programmes to a greater extent. These principles could be taken into consideration also while organising and implementing such programmes in the context of 'an open university' in Cyprus and Greece. In fact, further research would be necessary, to explore the issues raised above so as to inform future policies and strategies for adult distance teaching and learning in such institutions.

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Gregoriou H.¹ – Savva M.² – Dalosi M.³ – Kalli M.⁴: The operation of industry liaison offices at the Open Universities in Cyprus – the case of the Open University in Cyprus

Strand: University – Business Cooperation, Knowledge Circulation, Entrepreneurship, Virtual interfaces

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1. Research and innovation in the European Union and in Cyprus

1.1 Research and Innovation and the Europe 2020 Strategy

The demand for a sustainable and inclusive growth in the last 20 years enforced European policy makers to explore the impact of research and innovation on contemporary business and academic environments. In March 2010, the President of the European Commission José Manuel Durão Barroso, introduced the European Strategy for smart, sustainable and inclusive growth. “Europe 2020” aims at enforcing the economic prosperity of Europe in areas such as employability, entrepreneurship, research and innovation, technology transfer and education.

Five headline targets –representative of the three priorities of smart, sustainable and inclusive growth- have been initiated by the Commission along with seven flagship initiatives in order to ensure progress under each of the priorities. One of the headline targets proposed by the European Commission is the increase of the European Gross Domestic Product (GDP) dedicated to research and development (R&D) up to 3%³. Currently, R&D spending in Europe is below 2%, compared to 2.6% in the United States and 3.4% in Japan, mainly as a result of lower levels of private investment. This is why Europe needs to focus on the impact and composition of research spending and to improve the conditions for private sector R&D. A European venture capital market will assist direct business access to capital markets and will provide incentives for private sector funds for start-up companies, and for innovative small- medium enterprises.

The flagship initiative “Innovation Union” aims at the development of innovative ideas into products and services that can create growth and jobs. In order to achieve this aim at a national level, the European member states will need to reform R&D and Innovation systems to foster excellence and

³ The 3% goal was agreed initially in 2002 by the Barcelona European Council which reviewed progress towards the Lisbon goal (Commission of the European Communities, 2002).

smart specialisation, and to reinforce cooperation between universities, research and business (European Commission, 2010).

1.2 National progress towards Research and Innovation

Notwithstanding the European target of 3% by 2020, Cyprus has set as a national target to increase expenditure for R&D from 0,42% in 2008 to 0,50% of gross domestic product (GDP) by 2020. Although there was a 0.05% increase in total research expenditure reaching the 0.49% of the gross domestic product in Cyprus in 2009, the “Innovation Union Competitiveness Report” published in 2011 demonstrated a 25% difference in 2009 between Cyprus and the European Union on gross domestic expenditure on R&D (GDRD). With an average of 0.51%, Cyprus is placed at the lower levels in patent application under the Patent Cooperation Treaty (PCT) compared to the European average of 4%. (European Commission, 2011a).

Public efforts to improve research and innovation in the last five years have resulted in the enhancement of capabilities but still, the feebleness of the business sector to undertake and invest in R&D activities did not affect the overall country performance significantly. In 2009, there was an 8% difference between the Cyprus and the European average regarding business enterprise expenditure on R&D (European Commission, 2011a).

In 2008, the higher education institutes were the major actors in R&D with a share of 44% of GERD, while public sector’s share was 23% and businesses’ was 23% as well. Public investment represented 64% of the domestic spending on R&D (GERD) while business investment represented 18% and funds from abroad 15%. (Republic of Cyprus. Planning Bureau, 2011). Funds from abroad derived mainly from European Framework Programmes for Research and Technological Development and other European Research Programmes.

In 2009, there was an increasing trend of research organizations in Cyprus investing on research activities through the European Seventh Framework Programme (FP7) which reached 13, 7 million euros. The research area of Information and Communications Technology (ICT) was particularly successful during the period 2004-2009; reaching 43.8% of signed grant agreements in 2009. The growing capabilities in research and innovation within the framework of programs such as “Regional Competitiveness and Employment” and “European territorial cooperation” financed by the European Regional Development, were also beneficial for Cypriot research sectors for the funding period, 2007-2013. (Ευρωπαϊκές Κοινότητες, 2009).

It is remarkable that Cyprus ranks among the lowest performers among the EU Member States in terms of R&D expenditure as a percentage of GDP and at the same time ranks among the highest performers regarding Innovation (Republic of Cyprus. Planning Bureau, 2011). A consistent innovation policy has evolved rapidly and now Cyprus has upgraded from a “Catching-up country” in

2007 to an “Innovation Follower country” in 2009. Regarding the Summary Innovation Index (SII),⁴ in 2010 Cyprus showed a performance close to that of the EU27 (0,516) with a SII score of 0,495 which ranks Cyprus 12th among the 27 members of the European Union (EU27) (ibid).

2. Current Economic Situation in Cyprus

The vast number of small- medium enterprises (SMEs)⁵ in Cyprus has a high impact on the economy. According to the Statistical Register of Enterprises 2010, there are 60.217 enterprises registered in Cyprus. Almost all of these are small- medium with the meaning that they employ less than 250 persons whereas 93,1% of these SMEs employ less than 10 persons and are considered micro enterprises. The large companies represent 0.17% of the total number of enterprises. (Statistical Service of Cyprus (CYSTAT), 2010). According to the data of the Statistical Office of the European Union (Eurostat), in the year 2009 the majority of enterprises (SMEs) provided 83,5% of the total country employment while 91,8% of the micro enterprises provided 29,7% of the country employment (European Commission, 2011b).

The Small Business Act (SBA) Fact Sheet 2010/2011 about Cyprus shows that SMEs are particularly strong in “Entrepreneurship”, “Public Procurement and State Aid” and “Skills and Innovation”. Regarding access to finance, the SMEs have an overall sufficient access to credit despite cash flow situations and the fact that public financial support from EU funds - not only regional, but also structural ones- are focused much less on SMEs in Cyprus than in the European Union (EU) on average. (European Commission, 2011b).

Recently, the Cypriot authorities requested for financial support from the EU emergency funds, the European Financial Stability Facility and the European Stability Mechanism. Accordingly, Cyprus invited the International Monetary Fund (IMF) to participate in the external financial assistance to contain the risks of the euro zone sovereign debt crisis to the Cypriot economy. Officials from the International Monetary Fund, the European Commission and the European Central Bank - known as the “Troika” - have visited the island twice since Cyprus asked for financial aid on June 25 2012. It is difficult to calculate the consequences of these advances on the total economy or on specific fields such as the development of research and innovation. Indisputably, getting out of recession will be the biggest challenge for Cyprus in the following years.

3. The importance of the liaison between academia and industry

A link between academia and industry is necessary for the establishment of an alliance between

⁴ The Summary Innovation Index (SII) gives an “at a glance” overview of aggregate national innovation performance. The SII is calculated using the most statistics from Eurostat and other internationally recognised sources.

⁵ “SME” stands for small and medium-sized enterprises – as defined in European Union’s law (European Commission, 2003).

them and that link can be the university- industry liaison office. The liaison office can play a vital role in the sustainability of the collaboration between the two societal forces in order the industry to support academia by providing financial tools and the university to supply the industry with scientific and technological resources for the productive functioning of business.

The relationship among academia and industry can abide an improved research development. Innovative ideas and experiences originated from the collaboration of the two societal segments are important for the implementation and integration of research activities. The linkage between academia and industry may result in an increased interest of businesses to invest on research. An increase in research funding may lead not only in research growth but also in R&D sustainability. More funding by external stakeholders can result in an increase of professors' academic effectiveness (Gulbrandsen & Smeby, 2005 in Manjarres-Henriquez et al., 2009), in high- technology equipment, skilled teaching and top class training that can be used to solve industrial problems (Jones- Evans et al., 1999).

One of the key elements stemming from a potential affiliation of university and industry is the transfer of technological knowledge to the stakeholders. The development of scientific research (in the form of science and technology parks) and entrepreneurship (in the form of business incubators) is an example of prosperous collaboration between the two spheres. (Fassin, 2000).

Jones-Evans et al. conducted a research on the role that the universities, and more specifically their industrial liaison offices, play in the regional economic development in Sweden and Ireland and they concluded that the partnership between academia and industry may lead to considerable dissemination of scientific and technical knowledge, especially into the small enterprises sector. This could be of particular benefit to smaller peripheral economies. The authors see the industrial liaison office of the university as part of the pro-active role that the university can play in developing strong associations with industry. (Jones-Evans et al., 1999).

Given that a university is active in a variety of academic fields of study, research areas and proficiency, the university- industry liaison office is a sine qua non element of any modern university in order to transfer information to external stakeholders regarding the university's functions and capacities. The university - industry liaison office promotes the University's activities in an attractive way, so as to increase the stakeholders' interest. The Liaison Office supports the marketing strategy of the university both externally and externally. Some of the marketing approaches might include the dissemination of the University's activities to the general public, systematic writing and publishing of scientific articles and their provision not only in scientific journals, but also in the media.

4. The project "Development and Operation of Enterprise Liaison Offices in Universities Operating in the Republic of Cyprus"

4.1 The National Framework of the project

The project titled "Development and Operation of Enterprise Liaison Offices in universities operating in the Republic of Cyprus" (from now on referred as the project) is implemented under the

“Operational Programme for Employment, Human Capital and Social Cohesion, 2007-2013” (from now on referred as the programme) which specialises the National Strategic Reference Framework (NSRF). The strategic objectives of this Programme as they are presented in the context of a wider strategic framework include “full and quality employment, development of human capital and strengthening of social cohesion and equal opportunities conditions” (Republic of Cyprus. Planning Bureau, 2008). The focus is at developing human capital and facing the structural weaknesses of the labour market, focusing on upgrading the skills of certain population groups and thus promoting them to employment.

The project is implemented under the first priority axis of the Programme with the title “Human Resources Development and Adaptability”. With a budget of more than 86 million euros (European Commission, 2012), this axis represents the general objective “Improvement of Human Capital and Increase of the Adaptability of the Private and Public Sector”. The first axis targets in the adaptability of administrative and productive operations of enterprises to the new market fundamentals. The aim is to redirect educational knowledge and skills towards skills of a higher level which are required by the wider economic framework. The key factor for adaptability in the economy’s demands is the embracement of new technologies and innovations, new forms of work organization and the upgrading of the skills of the workforce. Strengthening lifelong learning serves as a solution for continuous adaptation of skills and knowledge to the rapidly changing demands of economic activities.

4.2 Profile of the Project

The project “Development and Operation of Enterprise Liaison Offices in Universities Operating in the Republic of Cyprus” refers to the development and the operation of university- industry liaison offices (from now on referred also as liaison offices) in each of the six universities operating in the Republic of Cyprus in 2008. The project is funded by the European Social Fund⁶ and national resources with a budget of €3.104.793. A consortium of six universities with the University of Cyprus as the coordinating partner will implement the project for a five years period (2009- 2014). More than 18 qualified individuals are working exclusively on the project implementation.

All sectors of the Cypriot economy, higher education institutions, researchers and university students are expected to benefit from the implementation of the project. The liaison offices aim at improving communication and cooperation between universities and businesses on issues such as: technology transfer, provision of solutions of specific problems in industry, student internship placements and the promotion of innovation and entrepreneurship in general.

The main strategic objectives of the project consist on the development of a network of model

⁶ “The European Social Fund (ESF)”, set up in 1958, contributes to the integration into working life of the unemployed and disadvantaged sections of the population. The ESF focuses on four key areas: increasing adaptability of workers and enterprises, enhancing access to employment and participation in the labour market, reinforcing social inclusion by combating discrimination and facilitating access to the labour market for disadvantaged people, and promoting partnership for reform in the fields of employment and inclusion.

university- industry liaison offices, the technology transfer from academic institutions to Cypriot businesses and the improvement of university students' employability⁷. The objectives include the investigation of the Cypriot industry's need for technology transfer; the evaluation of the contribution of the academia in Cyprus to meet these needs; the promotion and development of practical methods of cooperation to bring mutual economic (and social) benefits to universities and businesses; the examination of alternative forms of students training to improve their employability; the promotion of an economy based on the concept of partnerships with local industry; the promotion of intellectual property protection the preparation procedures for patent registration; the active cooperation with stakeholders capable to support innovative/ technological entrepreneurship; the development of educational materials and finally the reinforcement of the entrepreneurial culture in general.

The initiative is accompanied by dissemination measures so as to inform the Cypriot business community and the public regarding the work undertaken by the liaison offices and the subsequent benefit of funding by the European Social Fund (ESF) to the Cypriot society.

4.3 The significance of the Liaison Offices for the Republic of Cyprus

The project "Development and Operation of Enterprise Liaison Offices in Universities Operating in the Republic of Cyprus" generates conditions for cooperation between the academic and business communities of Cyprus. The current situation regarding the cooperation of the business and academic sector is far from the desired level, both in terms of adaptation of university curricula to labor market needs, and in terms of collaborative research (where conditions are particularly difficult due to the very small size of the Cypriot enterprises). The business sector in Cyprus lacks the capabilities to supply financially the research field. (Republic of Cyprus. Planning Bureau, 2011). The project is expected to have a positive result in the field of business participation in research and technology development (RTD) with a view to the increase of business productivity. It is also expected to contribute significantly not only to the European Community added value and the overall Lisbon Strategy⁸, but also to the overall purpose of the European Social Fund. In particular, it is estimated to contribute with a significant amount of resources available; to promote the adaptability of enterprises and their links with higher education and to broad the resources available from other projects co-funded by the European Social Fund and the European Regional Development Fund. Specific procedures of the implementation phase of the project such as (a) the cooperation and partnership, (b) the planning and implementation of developmental interventions at all levels and (c) the multiannual programing, monitoring, evaluation and sound financial management are expected

⁷ "Employability" refers to a person's capability for gaining and maintaining employment (Hillage and Pollard, 1998). The European Union declared the promotion of employability an important task for (vocational) education in the context of the Lisbon agenda in order to make the EU the world's most competitive knowledge society (COM (2003) 685 final, 2003). It involves changes in skill requirements, increasing flexibility of labour market structures, a diversification of job profiles, and the globalization of markets.

⁸ The Lisbon Strategy, was an action and development plan for the economy of the European Union between 2000 and 2010 set out by the European Council in Lisbon in March 2000. Its aim was to make the EU "the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion", by 2010.

to affect the qualitative and quantitative added value of the overall system of the Structural Funds⁹.

¹⁰

The project contributes directly to the strategic goal “human resources development and strengthening social cohesion and equal opportunities” of the National Framework but also indirectly to the employment growth by improving business competitiveness and by enhancing the university students’ and graduates’ employment opportunities and their access to research projects in collaboration with companies; which could also lead to long term employment. At the same time, the project promotes cooperation between enterprises and universities, in order to foster innovation and research and technology development widely (mainly through the utilization of the National Framework Programmes for Research, Technological Development and Innovation of the Research Promotion Foundation and the use of national resources.

More broadly, the project facilitates collaboration between Cypriot Universities and sociocultural, industrial bodies. Specific actions (such as the establishment of an important network and industry problem solving) taken during the project’s progress foster industry competitiveness.

As a final point, we would note that the project’s sub-action regarding internship placement of university students and graduates is totally within the policy areas of the European Social Fund since it promotes growth and employment, economic and social cohesion, equal opportunities for all and social inclusion which is also a horizontal (European) Community priority.

5. The Liaison Office of the Open University of Cyprus

5.1 The profile of the Open University of Cyprus

The Open University of Cyprus (OUC) is a state university and the only institution of higher education in Cyprus which offers recognised academic programmes at all levels (undergraduate, master’s and doctorate) using the methodology of distance education. The OUC consists of three faculties: the Faculty of Humanities and Social Sciences, the Faculty of Pure and Applied Sciences and the Faculty of Economics and Management. The Open University of Cyprus is oriented both in the domestic and the international educational communities and their activities and goals. During the academic year 2011- 2012, the University has an enrolment of over 2500 students and has already developed ten, dynamic study courses.

The Open University of Cyprus provides distance education to adults the majority of which are already employed. Therefore, it has a substantial lead in the liaison with the industry through the direct contact with the students who are already part of the business world. The liaison office is

⁹ The Structural Funds are parts of the financial tools set up to implement the Cohesion Policy also referred to as the Regional policy of the European Union. They aim to reduce regional disparities in terms of income, wealth and opportunities.

¹⁰ Technical Description of the project “Development and Operation of Enterprise Liaison Offices in Universities Operating in the Republic of Cyprus”.

oriented in the development of these contacts for the effective communication between the University and businesses as far as students' internships and research collaboration are concerned.

5.2 The Liaison Office team

The material infrastructure and the profile of the personnel of the liaison offices were standardized prior to the recruitment and the training of specialized personnel for each university- industry liaison office. The project team of each liaison office consists of five people. Each university has appointed one person to be in charge of the project and to represent the university in the consortium of universities participating in the project. In the Open University of Cyprus, the person in charge is the head of the student welfare services. The project manager, the assistant project manager and the secretary of each liaison office were recruited by the procedure of public procurement.¹¹ The company they represent has a contract with the University to provide specific services and deliverables for a period of three years (March 2012 to April 2015). Each university has also assigned one university officer to be responsible for the cooperation between the personnel of the liaison office and the university. In the case of the Open University of Cyprus, this role has been undertaken by a research & liaison officer.

5.3 The Goals

The goals of the liaison office at the Open University are divided into short-term, medium-term and long-term according to the time schedule of the overall project. Short-term goals included the planning of procedures, the creation of supportive template documents and the research of resources necessary for the office's operations. More goals concern the preparation of information material regarding the functions of the liaison office of the OUC, the dissemination of these materials in the university community and the "mapping" of the university. The mapping of the university was accomplished by recording all information regarding faculty's professional experience and research activity. Medium- term objectives are related to the actual liaison with the industry. Desk research will be completed prior to the meetings with managers and executives of companies and organizations. Extended databases will be updated with all related information. In parallel, the office will also support non- research activities such as the provision of continuing education training programs. The liaison office will also operate as the career center of the OUC.

Long term, the liaison office will support the transfer of technological knowledge and innovative ideas and the provision of advisory services to the industry.

5.4 The Deliverables

Following the rules of every project co- funded by the European Social Fund, the outputs of the university- industry liaison office's operation are monitored and evaluated on the basis of tangible

¹¹ Public procurement for their own purposes by government and other public entities and institutions at national and local level represents a very important portion of total public expenditure in the European member states and thus has an important role in domestic economies.

objects in the form of deliverables. The deliverables are evaluated on a monthly basis.

The first deliverable was concerning the establishment of a strong relationship between the office and the University. An initial acquaintance with faculty members and laboratories operating within the university facilitated the liaison office to present its capabilities and to become fully informed about the university. The liaison office encompasses a twofold marketing role that follows internal and external procedures. The campaign of the research potential of university to the industry is a form of external marketing. The promotion among faculty members of the role of the liaison office in the increase the university's competences in the market requires internal marketing processes. In order to follow effectively internal marketing approaches, the liaison office was engaged in initial discussions with faculty members about the possibilities of an effective link between the university and industry. The first step to accomplish this task was the mapping of the university. The professional and research profiles of all members of academic staff were recorded with the method of the standardized semi-structured interview. During the interviews, the personnel of the liaison office discussed with the academics about their general and specific research fields of expertise, their experience in consultation and other forms of cooperation with social, cultural and productive entities in general. Finally, the academics were asked to provide suggestions, based on their expertise, on developing ways of future cooperation with social, cultural, productive entities and to indicate specific industry stakeholders in which they foresee possibilities for cooperation.

Data were also collected about the research projects currently conducted by faculty members as well as information regarding each research team. The list of the research programmes include projects funded by the Open University (internal research projects) and projects with external funding resources (national, European and/ or international). Moreover, detailed records were created about the laboratories operating in the university including fields about each laboratory's material infrastructure and scientific operations. Following the completion of the university mapping process, the liaison office generated for each faculty member an individual profile which contains all the information gathered during the interviews. The office also developed databases about liaison fields and needs, working teams, research projects and laboratories.

Another deliverable of the liaison office was the creation of detailed contact records of all media (newspaper, magazines, television and radio) in Cyprus with a focus on the journalists covering academic and European subjects. The main goal of this deliverable was the establishment of communication with the media so as to advertise the activities of the liaison office and to inform the general public about the university's achievements in the liaison with the industry.

As part of a dissemination strategy, the liaison office was decided to participate in business and scientific conferences. The participation of the liaison office in conferences has a major impact on how the liaison is presented to external (businesses) and internal (university faculty) stakeholders. The team of the liaison office presented a paper on "The Operation of an Industry Liaison Office at the Open University of Cyprus" in the "East-Meets-West on Innovation and Entrepreneurship Congress and Exhibition" organised by the European Office Cyprus to promote and implement new tools of effective collaboration between business and academia. This paper presentation at the EADTU's (European Association of Distance Teaching Universities) conference on "The role of open and flexible education in European higher education systems for 2020: new models, new markets,

new media” here in Paphos is the second scientific presentation of the liaison office’s team. The liaison office also participated in the 5th national Conference on “Corporate Social Responsibility”. Important networking with stakeholders from the industry was achieved during the conferences.

The dissemination strategy is also assisted by the website that demonstrates the activities of the liaison office and enables the sharing of information and tools. On the website, graduate students can find useful information regarding post graduate studies in universities around the world. The website also serves the focuses in career advisory issues, such as job seeking techniques and tools such as templates for different types of curriculum vitae (CV) and related guidelines.

Following the success of its Independent Modules & Short-Term Vocational Programmes, the Open University intends to become more actively engaged in the field of training. The liaison office was assigned to conduct a research on the possible structure of a new legal entity or department which will perform as a training center within the university. The deliverable was a set of guidelines for the establishment either of a non-profit company or a non-governmental organization. Moreover, the liaison office collected the official documentation necessary in each case.

In order to facilitate the creation of a strong network of cooperation between university and industry, the liaison office developed the tools necessary for the administration of the liaison activities. Some of these tools are the databases of contacts within the industry, the guidelines for the approach of stakeholders and a set of template forms for recording the operations and needs of the industry. These templates incorporate fields such as the description of business activities¹² and operations, business capacity, areas of possible cooperation, business needs regarding counselling services, information related to intellectual property protection and the procedure for patent registration and finally potential internship positions.

Conclusion

Education, research, innovation and technology transfer are vital factors contributing to the establishment of a prosperous economic environment in Europe. The university- industry liaison office of the Open University of Cyprus aspires to facilitate all the above factors in academic and business environment by promoting a fruitful partnership between the university and research, business, government and civil society entities in Cyprus.

¹² The classification used is the Statistical Classification of Economic Activities in the European Community (in French: Nomenclature statistique des activités économiques dans la Communauté européenne), commonly referred as NACE which is a European industry standard classification system.

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Haché A. – Ferrari A. – Punie Y.: Open Education initiatives in Higher Education - an overview of current Business and sustainability models

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Introduction

At present, a major educational wave is emerging, which promotes the use of Open Educational Resources (henceforth: OER) and fosters an Open Education culture based on the idea of education as a public and common good. OER refers to "the open provision of educational resources, enabled by ICT, for consultation, use and adaptation by a community of users" (UNESCO, 2002). Those "resources" comprise the creation of contents and courses, inasmuch as open source software, standards and licensing tools. OER can be under a copyright license that allow their distribution by clearly specifying which rights are reserved to the author (e.g. Creative Commons, Copyleft licenses) or under a free content license which has no significant legal restriction on people's freedom (e.g. Copyfree or Public Domain Licenses). Open Courseware relates more precisely to free and open digital publication of high quality and university-level educational materials, which are organized as courses including planning materials, evaluation tools, and thematic contents. Finally, Open Education (OpenEd) encompasses previous notions and has wider implications as it requires a "systematic analysis of assessment and accreditation systems, student support, curriculum frameworks, mechanisms to recognize prior learning in order to determine the extent to which they enhance or impede openness" (Butcher, 2011) .

Many events which have driven to the birth of OpenEd were rooted inside Higher Education (HE) settings. A pioneer project was the Multimedia Educational Resources for Learning and Online Teaching initiative (MERLOT) set up in 1997. Its mission exemplifies the spirit of OpenEd: "A free and open online community of resources designed primarily for faculty, staff and students of HE from around the world to share their learning materials and pedagogy"¹³. According to Feldstein, other important steps were undertaken in 1999 when David Wiley founded the "Open Content Project", thus providing a name to the new movement, and when Richard Baraniuk and colleagues at Rice University began working on "Connexions", an OER site that, beside functioning as a content

¹³ More information at: <http://about.merlot.org/index.html>

repository, focuses on software for authoring content¹⁴. In the same year, the University of Tübingen in Germany published online videos of lectures in the context of its Internet Multimedia Server initiative¹⁵. In 2001, the Massachusetts Institute of Technology (MIT) announced the release of nearly all its courses on the internet for free access¹⁶ and got worldwide attention because of this move. In 2008, another milestone took place with Harvard becoming the first university in the U.S. which faculty members adopted unanimously an Open Access mandate for all their academic publications.

Because of the rapid growth of initiatives making OER available, the issue of sustainability is gaining central stage. As a consequence, the main questions behind the development of this paper are: 1) How are HE organizations engaging with the access, distribution, reuse and remix of their open educational resources?; 2) How do they evaluate potential and barriers derived from their engagement with OpenEd?; and finally, 3) how does this engagement translate into new business and sustainability models insuring OER initiatives remain useful and successful over time? These questions arise from the need for evidence-base data on the impact of Open Ed initiatives which are linked to the increasing demands for online and distance learning, a shortage of physical universities and campus for all the population enrolling in HE in the next decades¹⁷ and the rise of new methodologies for assessment and certification seeking to match job market needs (e.g. the eSkills gap).

This article summarises the key findings about business and sustainability models deployed by OER initiatives inside the HE sector. It draws from a larger study developed by IPTS-DG JRC¹⁸ in order to provide a critical assessment of OER initiatives and practices in Europe.¹⁹ The article concentrates on the peculiarities of sustainability for HE organizations and then presents the most frequent models deployed by OER initiatives. It then focus on emergent business models enabling the Open Access/Open publication of scientific research, and the development of Open Distance Learning environments enabling research, tests and experiments around the payment of services offered along open courses.

Methodology

The results presented below draw from the above mentioned OEREU study developed by IPTS-DG JRC though focusing on the initiatives undertaken by HE institutions or within an HE frame. A sequence of research activities were undertaken following a methodological triangulation, namely: a literature review of the state of the art of the research on the field; the development of 11 in-depth interviews with recognized experts; an online survey targeting 14 OER initiatives; and the analysis of

¹⁴ Feldstein, M., (2006). "History of Open Education". Retrieved from: <http://mfeldstein.com/itoe-history-of-open-education>

¹⁵ More information at: <http://oai.uni-tuebingen.de/>

¹⁶ More information at: <http://www.youtube.com/watch?v=4XFvqOSRsa8>

¹⁷ "Forecasts suggest that current global enrollments of 165 million will grow by a further 98 million by 2025. However, this growth is unlikely to be accompanied by equivalent increases in the human and financial resources available to the higher education sector" (COL/UNESCO, 2011) .

¹⁸ IPTS (Institute of Prospective Technological Studies) is one of the seven institutes of the Joint Research Centre (JRC) of the European Commission. More information at: <http://ipts.jrc.ec.europa.eu/>

¹⁹ For more information on the study, please see: <http://is.jrc.ec.europa.eu/pages/EAP/OEREU.html>

22 additional projects (for a total of 36 OER initiatives). Table 1 below provides a list of the reviewed initiatives highlighting the 14 ones in bold dealing that took part in the survey. Not all are on HE. As a general principle the following definition of HE was adopted during the research process: “The stage of learning that occurs at universities, academies, colleges, seminaries, and institutes of technology. It also includes certain collegiate-level institutions, such as vocational schools, trade schools, and career colleges that award academic degrees or professional certifications”.²⁰ The reader should note that the use of extracts drafted from the interviews is indicated with the name and surname of the interviewee at the end of the quote.

Table 1: 36 reviewed OER initiatives

Name of initiative	Link
Alison	http://alison.com/
Bookcamping	http://bookcamping.cc/
Connexions	http://cnx.org/
Coursera	https://www.coursera.org/
Eastern Mediterranean University	http://opencourses.emu.edu.tr/
EdX	https://www.edx.org/
Flat World Knowledge	http://www.flatworldknowledge.com/
FLOSS Manuals	http://en.flossmanuals.net/
Free Technology Academy	http://www.ftacademy.org/
ict@innovation	http://www.ict-innovation.fossfa.net/
iTunes Stanford	http://itunes.stanford.edu/
iTunes University	http://www.apple.com/education/itunes-u/
Khan Academy	http://www.khanacademy.org/
Korea Open CourseWare	http://ocw.korea.edu/ocw/
LeMill	http://lemill.net/
MetodickyRVP.CZ	http://rvp.cz/
MIT OCW	http://ocw.mit.edu/index.htm
MITx	http://mitx.mit.edu/
Moodle	http://moodle.org/
National Repository of Online Courses	http://www.montereyinstitute.org/nroc/
Norwegian Digital Learning Arena	http://ndla.no
OERu	http://wikieducator.org/
Open-Ed	http://www.open-ed.eu/
OpenLearn	http://www.open.edu/openlearn/
Open Source Ecology	http://opensourceecology.org/
Open Study	http://openstudy.com/
Peer 2 Peer University	https://p2pu.org/en/
Public Library of Science	http://www.plos.org/
Sakai Foundation	http://www.sakaiproject.org/
Saylor foundation	http://www.saylor.org/
Udacity	http://www.udacity.com/
University of People	http://www.uopeople.org/
Wikipedia	http://www.wikipedia.org/
Wikiwijs	http://wikiwijsinhetonderwijs.nl/
Wolne Lektury	http://wolnelektury.pl/
YouTubeU	http://www.youtube.com/education

²⁰ More information at: http://en.wikipedia.org/wiki/Higher_education

Are OpenEd opportunities over-sizing barriers inside Higher Education?

The rapid growth of Open CourseWare, Massive Open Online Courses (MOOC) and peripheral organizations providing informal Open Distance Learning (ODL) at graduate levels reflects that HE is the most involved sector within OpenEd. Reasons for this engagement owes to a series of facts. HE institutions are traditionally perceived as centres of knowledge production, they enjoy more pedagogical and curricular freedom than primary and secondary schools when deciding which educational contents they use, and they face an increasing competition to attract students.

As a consequence of these peculiarities, only within the last months we have witnessed a multiplication of prospective reports demonstrating the exacerbated importance of OER for pedagogical innovation, social equity, inclusion and maybe more surprisingly for their business potential. The report "Innovating pedagogy" (Sharples, et al., 2012) points at 12 educational ICT-driven solutions (such as e-books, publisher-led short courses, assessment for learning, badges, MOOC, hybrid publishers, learning analytics, personal inquiry and rhizomatic learning) that could hold great promises in a near future. Those innovations indicate a renewed educational ecology where ICT and OpenEd are called to play preponderant roles. As reported by a recent Pew Internet study: "the business of Higher Education seems to some as susceptible to tech disruption as other information-centric industries [...] The transmission of knowledge need no longer be tethered to a college campus. The technical affordances of cloud-based computing, digital textbooks, mobile connectivity, high-quality streaming video, and "just-in-time" information gathering have pushed vast amounts of knowledge to the "placeless" Web" (Anderson, Boyles, & Rainie, 2012) .

In the same line, key findings from an analysis of capital flows towards education states that: "there is a great energy and enthusiasm around the PreK-12, Post-Secondary and Adult education markets as they relate to innovation and the opportunity to invest in emerging companies at all stages" (Global Silicon Valley Advisors, 2012). Catalysts explaining the recent interest from joint ventures for Education and Learning organisations lie in the increased amounts of OER and open source solutions enabling to build peripheral business on top and the larger amount of techy savvy students, parents and teachers with enough competences to take advantage and contribute to those OER. Because of this disposition, organisations thinking about investing in education, learning and training should understand how their money generates "Return on Education" (ROE) as a key test to measure their potential for successful related business that should achieve one, or all, of the following : "Drive down costs for learners and/or institutions; Substantially improve learning outcomes; Increase student and/or instructor access to education; Increase the effective "capacity" of instruction and instructors thereby improving student outcomes and the professional paths of learning leaders"(*ibid*, 2012). Wrapping up, educational innovation is moving fast because of OpenEd disruptive effects in the field; however there is a need to understand which are the current and most promising business and sustainability models deployed by OER initiatives. To do so, definitions and characteristics of those models are introduced below.

Understanding business and sustainability models inside Education and Learning

A business model (BM) describes the rationale of how an organization creates, delivers, and captures

value²¹. To put it simply, a BM will seek answering the following questions: "Who pays? For what? To whom? Why?" (Clarke, 2007) In that sense, BM analysis focuses on how a product or service selling can generate incoming funds generally under a financial form. As regards OER development: "it is critical to point early in the discussion that real costs can be met with resources other than money" (Wiley, 2007) . This means that the success of an OER initiative cannot be restricted only to its financial value as costs can also be covered through volunteer work, commitment, scale economies, partnerships and smart reutilisation of resources.

Experts interviewed in the frame of this project agreed with the idea that BM views have to be enlarged to OER's interaction with their environmental, social and economic contexts, enabling to spot social and educational returns. Accordingly, narrow business models do not allow to capture the main outputs of educational initiatives, for instance acquisition of soft skills such as better networking, cooperation and self-esteem capabilities, and impacts such as reduced drop-outs, increased enrolments, or improved success rates. These educational outcomes and impacts are neither strictly translatable into financial or monetary gains, nor easily sizeable and measurable.

Nevertheless, a common denominator of OER sustainability lies into their capacity to meet their objectives over time (Wiley, 2007). Besides, as all OER initiatives relates to their temporal evolution distinguishing between the moment they are planned, developed, released and the phase were they are reused as such or remixed and transformed into a new OER, they need to reach different types of sustainability over time: "They must find a way to sustain the production and sharing of OER; of equal importance, they must find a way to sustain the use and reuse of their OER by end users (whether teachers or learners)" (Hylén & Schuller, 2007). In regards to those elements, OER sustainability will also depend of their capacity to improve offer and services over time, and to ensure that OER are effectively accessible, usable, customisable, exportable, and up to date. In brief, the higher the opinions of users about OER quality, the more likely trust will be bond and the community will be able to attract new users.

Literature and interviewees agree that the field of OER has been overall concerned with producing resources and to a much lesser extent with knowing their communities users characteristics, how the resources were found, used and transformed and which impacts they were provoking. Many stakeholders point at the fact that OER are too often being seeded without insuring how much usable and useful they are, undermining the general sustainability of the OpenEd field: "Funders need to stop funding new development and instead fund adoption of existing OER. Those who are funded to create OER should only be funded in areas where none exists or they can prove that the OER which exists is not sufficient or of a quality that is usable. In addition, funders could support initiatives that research adoption and can make recommendations around quality, use, maps to learning outcomes" (Maggie Lynch).

Another substantial element relates to fitting adequately OER objectives with the mission of the organisation piloting its development. Ethical coherence is apparently appealing to users and can encourage their further engagement into a community of prosumers where they become also

21 More information at: http://en.wikipedia.org/wiki/Business_model

developers of OER. Likewise it enhances the overall sustainability by not having one objective sub-edited to its contrary (e.g. financial gains vs. delivering education): "Sustainability depends upon the activity fitting closely with the goals of the organization in a way that most of the activity is absorbed into existing systems and practices"(Lane, 2008). This extract indicates than the most sustainable model for OER can be looked into organisations that are already producing educational contents and opt to enlarge their mission to include the open licensing and release of those inside "common-pool" of OER (Hess & Ostrom, 2003). Enlarging the mission of the organisation to include OER can translate into low added costs. Still, to be fully successful this model requires acknowledgement and reward mechanisms, recognising the work achieved by faculty, raising awareness, training staff and insuring quality processes. Those processes will need to be set up implying some initial investment from the organisation.

Business and Sustainability models for OER

The review of BM/sustainability models of the 36 OER initiatives confirms that most of them are polarised in two extremes: on the one side, the producer's centred model, on the opposite side, the community based one. "The producer's centred model is based on a demand where a customer of certain type (government or foundation) put a request to a producer which gets paid by a fund. Business models are more related to this patron because there is a need to pay producers. Then the community based model where people organize into sub-communities or clusters and share cooperatively the work among them to produce a set of resources for a common value. People involve because they get a direct outcome from producing them, so it becomes cheaper and more affordable" (Stephen Downes). In order to identify organisational models situated in between those two archetypes, first steps of the research aimed at analysing the bulk of articles written on the issue of BM and sustainability models of OER, Open Source Software development and more in general, cultural production in the digital age. Consequently, other models enabling to gain income or resources polling were detected and organised into five clusters constituting the base for the online survey²². The clusters are listed below accordingly to their frequency among our sample ranging from the most common towards the rarest one.

²² More information at: <http://oer-oep.limequery.org/81786/lang-en>

- **Institutionally driven:** Resources mainly come from one or various third parties actors (structured as formal philanthropic, governmental, commercial institutions) which mandates the OER organisation to produce/store/distribute OER. Some of its models are: Philanthropy funding, Governmental funding, Macro R&D subventions, Endowment model and the Sponsorship model.
- **Community driven:** Resources (material, financial, human) are voluntarily provided by individuals that support the initiative by giving to it time, labour, money and/or creativity. Some of its models are: Donations, Crowdfunding, Community and Crowdsourcing.
- **Organisationally driven:** Resources are created through the development and selling of products/services that become a source of funding for the organisation that implement them. Some of its models are: Freemium/Conversion, Support contracts, Split-licensing, Licensing of brand, Author pays model and Membership model.
- **Self-contained:** Resources are maximised through smart organisational changes. This cluster thus encompasses models implemented within the organisation but which are not based on selling services. Some of its models are: Enlarging mission, migration to open solutions, Partnerships and exchanges.
- **Advertisement driven:** Funds provided from advertisement and/or from data mining of users and the consequent selling of the collected information to third parties companies. Some of its models are: Selling information, Streaming audio/video advertising, Online advertising (Ads) and API fees.

Key findings showed that most of the OER initiatives related to HE are deploying institutional driven models combined with self-contained ones, and a set of pioneering OER initiatives are also diving into organisational models experimenting around the business potential of freemium. It should be noted that almost no initiative were belonging to the advertisement-driven cluster, and that almost all OER initiatives were against models implying to sell users information to third parties organisations as a source of income. Finally, initiatives in the field of HE could seldom be placed in the community-driven cluster, as initiatives belonging to this cluster tend to target informal learning and adult education. As a consequence, we will concentrate on the remaining three clusters relating to HE (i.e. Self-contained, Institutionally driven, Organisationally driven), highlighting sustainability models and then focusing on specific BM enabling to achieve Open Access/Open publication of scientific research and the development of new services around Open Distance Learning environments.

[OER for Higher Education: From Self-contained and institutional models to organisational ones](#)

Sustainability of OER initiatives inside HE settings can greatly benefit from so called “self-contained models” which refer to strategies implemented within the organisation and which are not based on selling services to individuals or third party organisations. As introduced previously, one model consists of “Enlarging the mission” of an HE organisation to include the production and development of OER. Another model is the “Replacement/migration to open solutions” which are embraced by default by all OER initiatives adopting open contents, open source software and/or open standards

and which bring benefits from cost-savings produced by the migration. Finally, “Partnerships and exchanges” such as OER networks or consortiums can achieve economies of scales, share of risks and R&D costs meanwhile organisations experiment with new BM. Even though those models seem to be very logical and easy to set up, they require managers and administrative staff to be fully aware of the advantages of embracing OpenEd. Besides, as many organisations are still experimenting around those models, there is a lack of available literature and evidence base concerning their real cost-effectiveness. However, their frequency should increase as HE embraces openness and they might even condition the reception of institutional funding as funders will require more transparency and accountancy from HE organisations regarding how they spent their money when purchasing or developing educational resources.

As a general rule, an institutional funding will be defined as the case scenario in which "an institution will assume the responsibility itself for an OER initiative" (Downes, 2007). The Institutionally driven cluster enlarges this definition to situations where the main incomes/resources provide from one or various third parties actors, structured as formal philanthropic, governmental, commercial institutions, mandating the production, storage or distribution of OER. Literature review, expert's insights and surveyed OER acknowledge this is currently the most common form of income for initiatives. Indeed, some of the oldest and most known OER initiatives are depending from institutional support. For instance, The MIT Open CourseWare is backed up by the MIT University and the Connexions platform by The Rice University. The William and Flora, Shuttleworth, Mellon, Ford and the Soros foundations constitute some of the most engaged philanthropy funders of Open Ed. The non-profit Khan Academy has been sponsorship by Google awarding them with 2 million²³ and the OCW of Stanford University is supported by iTunes. The UK post-16 and HE councils support the JISC which is developing in-depth work regarding OER deployment in the UK, the American department of Labour and Education has granted \$2 billion to create OER materials for career training programs in community colleges, and Macro R&D subventions such as the Life Long Learning programs of the EC constitute some examples of the current public funding support behind Open Ed.

According to experts, those models cannot be defined strictly as BM: "If you look at the way OER projects are financed, mostly through external funding such as subsidies, it is much more a financing model of an OER product rather than a BM" (Ben Jansen). Nevertheless, accessing to institutional funding through grants and combining those with other forms of income can be interpreted as part of a business strategy: "Probably the most popular sustainability model in the U.S. is the development of, or continuance of, a non-profit organization of some type that then continues to raise money through a combination of writing grants and assessing membership fees" (Maggie Lynch). In any manner, the preponderance of these models has driven judgements stating that the OpenEd field is not yet sustainable: "Respondents believed that the production and use of OE and OER was only possible in Europe because Universities, national governments and the European Commission are primary sources of funding" (ELIG, 2011). This could be put into discussion according to the perception of what should be the mission of public institutions when redistributing

23 "In 2010, Google announced it would give the Khan Academy \$2 million for creating more courses and for translating the core library into the world's most widely spoken languages, as part of their Project 10100. Khan Academy has eclipsed MIT's OpenCourseWare (OCW) in terms of videos viewed. Its YouTube channel has over 150 million total views, compared to MIT's 38 million. It also has twice as many subscribers, at more than 320,000" More information at: http://en.wikipedia.org/wiki/Khan_Academy

public money through grants. If there are strong policy mandates for boosting initiatives fostering access to Education and learning (E&L) then public and institutional funds seeding of OER initiatives could remain a major source of income: "Public funding of free content development is a classic win-win scenario. Authors earn a living and can pay their bills. The funder gets the educational resources and over the medium term costs will be reduced through mass collaboration. The use of a free content provides the freedom for local adaptations. Revisions are easier and content can be updated more frequently" (Udas, Tucker, & al., 2007). Those visions underline that even though investing into OER and Open Ed might not translate into traditional financial streams, it could achieve in the mid and long term important socio-economic impacts. If OER initiatives achieve Education and Social returns on investment, those benefits could be for instance indirectly monetised through a larger educated, skilled and creative work force, and a reduction of social costs caused by unemployment rates or school drop outs.

Literature and experts agreed that the organisational driven cluster is the field where BM has more probabilities to emerge and mainstream. This cluster is based in processes where resources are mostly created through the development and selling of products/services that become a source of funding for the organisation. Some the models are: Split-licensing²⁴, Licensing of brand²⁵, Support contracts²⁶, Freemium/Conversion²⁷, Author pays model²⁸ and Membership model²⁹.

Archetypes composing this cluster can be divided along the lines of who are the final stakeholders paying for a service. The author pays and membership models are based on the payment of Article Processing Charges (APC) which can fall directly into the authors, or into the organisations they belong to. In any case, funding will most probably be assumed by scientific and academic organisations which researches have been financed with public or philanthropic money. Other models will generally concern students and Life Long Learners seeking to improve their skills and knowledge on a topic and are willing to pay for associated services such as guidance, networking, assessment, accreditations and/or certifications.

24 "Make a margin for reselling other companies' intellectual property. Some organisations sell customers a commercial licence that allows them to use the product without being covered by GPL. This is known as "Resale" (Chang, Mills, & Newhouse, 2007)

25 "A licensing agreement authorizes a company which markets a product or service (a licensee) to lease or rent a brand from a brand owner who operates a licensing program (a licensor)" (Wikipedia)

26 "You give something for free and sell support/assistance to customer/users - "The levels of support can be generically divided into three levels: basic support (subscription), middleclass support and premium support (on-site and 24/7)" (Chang, et al., 2007)

27 "In the Conversion model, you give something away for free and then convert the consumer of the freebie to a paying customer" (Downes, 2007)

28 "Some publishers are shifting to the author pays model, namely that the authors pay of the publication from their budgets (institutional, project budgets, etc) and anybody can access them immediately and free of charge. This model has gained much attention through the non profit venture Public Library of Science (PLoS)" (OLCOS, 2007)

29 "To meet the cost of publishing, authors who publish in our open access journals are asked to pay an article-processing charge (APC) per published paper. To remove this burden from the individual authors, institutions can join a Membership Program. The Membership Program enables academic and research institutions, societies, groups, funders and corporations to actively support open access in scholarly publishing, and help ensure the most widespread dissemination of the research published by their investigators or members" (OLCOS, 2007)

BM for Open Access

Open Access (OA) is the practice of providing unrestricted access via the Internet to peer-reviewed scholarly journal articles. Thus OA does not mean forcedly Open content, which is in turn when authors grant third parties a set of rights such as making derivative works or using those with commercial purposes. Scholarly OA publishing is gaining terrain because it enables to share scientific research, gain visibility, stick to ethical aims of scientific research for the public good and also because it is getting strong policy support. For instance, past July 2012 the UK government announced an OA policy for publicly funded research, amending some of the recommendations drafted by the working group on expanding access to published research findings, also known as the Finch Report. In the same line, Neelie Kroes, the European Commission vice-president for the digital agenda, announced that from 2014 OA will be a "general principle" applied to grants awarded through the €80bn Horizon 2020 programme for research and innovation.

The FINCH report, while highlighting reasons for change and evaluating difficulties, estimated "an additional £50-60m a year in expenditure from the HE sector" to achieve successfully the process towards OA into the UK. They also underlined that "costs are modest in relation to total public expenditure on research (£5.5bn from the Research Councils and Funding Councils alone)" (FINCH, 2012). Some press coverage doubted of those figures alleging they include a £10m of extensions to licences which "can be discounted immediately as the transition will result in reductions to subscription licences, not increases" and also because they oversize the average Article Processing Charge (APC) fee placing it "between £1.5k and £2k which is nearly the double to the \$1,350 (£870) charged by PLoS ONE"³⁰. In any case, two elements remain clear: first, evolving towards OA requires initial investment that is likely to fall in first instance on the public sector; and second, initial investment will be largely oversized by final costs-savings.

According to the field experience of PLOS one of the first non-profit scientific publisher to embrace OA: "Part of our initial challenge was the fact that our open access initiative was really experimental and pioneering at that time (2001). When a scientist receives a public or private research fund, a small part of this fund is used to pay the publishing fee. Our non-profit business model of article publishing charges differs from subscription based commercial publishers in that the article published are freely available and remain open access immediately. Open access benefits readers and the public in general, besides you can accelerate and transform science research by making knowledge free" (Susan Au). PLoS has become fully accountable in 2010 through a blended BM mix where main sources of revenue are in order of importance: "Articles Publishing Charges, donations and ads which are very small because PLoS will not accept advertisement from pharmaceutical, medical devices and tobacco" (Susan Au).

Finally, regarding the Membership model, the National Repository of Online Courses³¹ (NROC) is worth mentioning because it shifts fees on Institutional members which pay about \$1 per year per student for accessing all their high quality online courses. As explained by Heller: "This opens the

30 Taylor, M., (2012). "Open access means a bright future for scientific research". Retrieved from: <http://www.guardian.co.uk/science/blog/2012/jul/17/open-access-scientific-research?newsfeed=true>

31 More information at: <http://www.montereyinstitute.org/nroc/>

door for a new way of publishing in which investment is made 'once' and scholars get back to owning scholarship. It's not a wiki and not wide open but has the flavour of a community. This strategy still requires "true capital" for now from foundations".³² Their portal Hippocampus is receiving a monthly average of 250,000 visitors which is a positive indicator of their potential for new membership institutions joining the project.

Indirect income generation through freemium

BM based on the concept of freemium depart from the idea that E&L organisations can give "knowledge for free" (Hylén & Schuller, 2007) and generate indirect income through other means. The preference for freemium models lie in the accelerating availability of educational contents and software products openly licensed enabling third parties to tap into them and build peripheral businesses around. Added to this, there is a widen demand for new services filling gaps in the OER ecosystem including "open curriculum, open student support, open assessment and open accreditation" (Mackintosh, McGreal, & Taylor, 2011). Accordingly, it is becoming evident that "educational institutions that succeed are likely to do so predominantly by understanding that their real potential educational value lies not in content itself, but in their ability to guide students effectively through educational resources via well-designed teaching and learning pathways, offer effective support to students, and provide intelligent assessment and critical feedback to students on their performance" (Butcher, 2011).

Stakeholders in place are both universities and other Open Distance Learning organisations providing either Open CourseWare, with or without formal accreditation of students' educational achievements, either non formal education to Life Long Learners along with optional assessment and certification services. Many of the resulting initiatives are "Mixed push and pull OER" with a large base of quality contents provided top-down by the E&L organisation, embedded into participation and interaction channels that can achieve some type of crowdsourcing and p2p production bottom-up processes as learners comment, dialogue, rate, transform or produces new resources.

Researching and testing OER potential

Because BM based in freemium can be shaped with very different patrons, each organisation first need to test their viability and insure they do not hurt the current organisation mission and sustainability model. Quite often this experimentation is conducted through research processes thanks to the high availability of qualified human resources and the affinity with HE organisations mission. As indirect income generation can proceed through a rise of the number of enrolments of students seeking for formal accreditation and the campus experience, studies investigating the links between enrolments and OER are multiplying. According to Carson cited by Butcher & Hoosen: "Studies at MIT indicate that 35% of freshman aware of OCW before deciding to attend MIT were decided by its availability. In another example, the OpenLearn at Open University in the UK has

³² Heller, N., (2012). "Tomorrow's Business Models: Freemium and OER Growing Up". Retrieved from: <http://www.ednetinsight.com/news-alerts/hellerresults/tomorrow-s-business-models--freemium-and-oer-growing-up.html>

approximately 200.000 courses enrolments and 130.00 student each year, of whom, in a two year period, 7.800 have come from people who use the “enrol now” button in the OUUK's course samples to convert to a fully paid enrolment” (Butcher & Hoosen, 2012). In the case of the Open Universiteit in the Netherlands, they developed a survey to answer which amount of OER should be released for getting better enrolments results:” Three cases scenario defined different amount of OER (small, 20% and all) and different types of paying services around them. The favoured case scenario was the one with all OER offered with two choices, study materials as they are without paying or just paying services such as guidance in studying, examination, interaction with others students. Our expectation was to go for all free scenarios, but results pointed at the second scenario making clear that HE can develop new paying services around guidance” (Robert Shuwer). According to their researches: “we observe a similar pattern, which is that the percentage of people inclined to take a course and to enrol increases when the OER share grows [...] A little warning though: the results are not always statistically significant, so it would not be valid nor recommended to make an absolute of the specific numeric results. To remain on the safer side one could conclude that the 100% OER scenario would not do worse compared to the current scenario in terms of enrolment of students” (Janssen, 2011). Those findings indicate that in specific HE organisations, the release of OER will not harm their business strategy. Now how much those numbers can be boosted will depend of getting more E&L organisations achieving similar researches processes and sharing results with the HE community. Ultimately this will become possible if HE organizations understand that they can take advantage from sharing results regarding their experimentation with OER. On the contrary, if each one keep their data for themselves, no “coo petition³³” will be possible, making the global sustainability of the OpenEd field more difficult to achieve. As explained below, trends towards coo petition will depend of the equilibrium between the levels of competition among stakeholders and the amount of benefits they can acquire through exchanges and partnerships.

As new players enter the field, OpenEd for HE is becoming a highly competitive environment obliging OER initiatives to improve their reach out and achieve evidence-base regarding their impact on learner's skills and competences acquisition. To overcome the first challenge, organisations try to develop relationship marketing which includes “all the actions taken by an institution to build long-term relationships based on trust and loyalty that serve to differentiate the institution and its programmes from other providers in the minds of stakeholders. A relationship marketing strategy lets an institution know the needs of its current and prospective students and other stakeholders, and so guides it in the crafting of programmes and services that will meet those needs with consistent effectiveness and efficiency over time”(Farrell, 2012). Still this type of marketing and branding-trust development are still relatively unknown for public, or non-profit, universities which have traditionally depended on slower, closest and more centralised decision systems regarding the type of courses and credits offered by their organisation.

Regarding the second challenge, we found hardly any evidence of how OER impact on student's success rates at the exception of the following initiatives. The Open Learning Initiative (OLI) developed by the Carnegie Mellon University intends to create courses based on the findings of learning science and then evaluate those based on actual student performance in real classrooms.

³³ The term is the result of a contraction between “competition” and “cooperation”. Coopetition is a consequence of engaging into open innovation, open development and open design dynamics.

More precisely, one study determinate that "students using the OLI statistics course at Carnegie Mellon achieved the same or better learning outcomes as students in the traditional course in half of time" (Lovett, Meyer, & Thille, 2008) . One of our interviewee referring to the results of a research she conducted in the field stated the following: "What we have seen in the Kaleidoscope Project³⁴ is that the major outcome of adopting OER is increased student success [...] As OER replaces that textbook content, most faculty rethink what is important and what were the gaps the adopted textbook did not fill. They then may decide to re-sequence instruction, look for OER to resolve the gaps, and/or create OER in order to specifically emit the perceived needs of their student population. To my knowledge, there has not been research done that extricates these two variables-OER replacing proprietary textbooks AND teacher involvement in re-evaluation and thus re-design of the course". Even though those outcomes are very impressive, the link between open education and increased students achievements deserves further systematic and longitudinal research as positive outcomes can take a certain time before appearing.

Regarding cooperation, some HE organisations are also opting to partnership in order to share R&D costs and risks meanwhile they engage with OER, experiment with new BM and test assessment and accreditations methodologies. The Free Technology Academy³⁵ is a clear example of this perspective. It is hosted by the Free Knowledge Institute (FKI) in partnership with two European universities, the Universitat Oberta de Catalunya and the Open Universiteit. The FTA offers an online master level programme with course modules about Free Technologies. Credits obtained in the programme are recognised by these universities on an individual basis as judged by the exam committee. The full master programme can be concluded at one of the universities. As explained by its director: "We have been mixing models, we had some donations but it is not until now our core model. We started off with public funding. Now the issue of certification can become an interesting model. The tuition fees works if you have small group dynamics and the Massive Open Online Courses only work if there are no tuition fees. MOOC work for Stanford and MIT because they have strong brands that can attract large numbers of students, sounds very good to follow their courses even though you do not get a certification, but for smaller organization, non-profit or not so famous , I think it will be harder to organize a MOCC" (Wouter Tebbens).

Experimenting with new services

Referring to Massive Open Online Course (MOOC)³⁶ those engage networked learning methods within the typical structure of a course. As underlined by one interviewee, it essentially means "moving away from just providing the resources more openly towards providing a mediated learning experience" (Andy Lane). For instance, some of the portrayed services of the MITx platform are above the access to online free courses: "online laboratories; student-to-student and student-to-professor communication; and assessment of any student's work allowing students who

34 More information at: <http://www.project-kaleidoscope.org/blog/>

35 More information at: Source: <http://ftacademy.org/>

36 An extended list of MOOC and other resources is available at: <http://www.worldofwebcast.com/de/node/12455>

demonstrate their mastery of subjects to earn certificates awarded by MITx".³⁷ Lately different MOOC have been launched by prestigious universities in USA (Harvard, MIT, Stanford) and have attracted an enormous attention from the press, specialised blogosphere, and also from joint venture capitalist companies which have funded different initiatives aiming at hosting and delivering those MOOCs (Udacity³⁸, EdX³⁹, Coursera⁴⁰).

Altogether, MOOC are depicted with mixed feelings. Obviously, one of their most clear limitations lies in the loss of feeling part of a group because of their massive size: "What people value most about formal education is the direct interaction with the teachers and their peers. Because of socializing aspects, this is why online learning and eLearning have struggled" (Andy Lane). Other redundant complexities relate to: "delivering valuable signifiers of completion such as credentials, badges or acceptance into accredited programs; providing an experience and perceived value that enables higher course completion rates (most today have less than 10% of registered students actually completing the course); and authenticating students in a manner to satisfy accrediting institutions or hiring companies that the student identify is actually known"⁴¹. Issues regarding plagiarism have also recently arise obliging Coursera's coordinators to offer adding plagiarism-detection software in the future.⁴² Besides, some stakeholders feel uncomfortable with the lack of transparency of stakeholders testing their BM potential: "Open online Courses are about shared ownership and transparency. Tell us upfront if you are using this to geminate a start-up. Place your cards on the tables and treat your participants as equals and not guinea pigs".⁴³

Kolowich opinion on the issue of potential BM driven by MOOCs suggests that: "Udacity might double as a head-hunter for companies that might like to hire some of its more impressive students. Instead of simply selling those students credentials that they can list on their resumes while looking around for jobs, Udacity would offer to match students with companies that have enlisted Udacity as a talent scout and would take a commission for each successful match".⁴⁴ Above those possibilities, other articles suggest that MOOC might intend to cash around services related to matching students with other online courses providers, outsourcing library resources or tutoring services, provide premium products round networking with other peers possibilities. Although it is still unclear around which precise services those MOOC will build their BM in the end, delivering guidance, networking opportunities, assessment and certifications appear as the most probable options.

37 More information at: <http://mitx.mit.edu/>

38 Udacity is a private educational organization which provides Stanford University free courses such as the one on artificial intelligence offered in 2011 and which was followed by 160,000 students. Source: http://www.nytimes.com/2011/08/16/science/16stanford.html?_r=1

39 EdX is a joint venture initiated by the Massachusetts Institute of Technology and Harvard University that will offer university-level courses from a wide range of disciplines online to a worldwide audience at no charge.

40 Coursera, an education technology for-profit company which has created partnerships with has created partnerships with universities, including Stanford University, the University of Michigan, Princeton, the University of Pennsylvania, and University of Edinburgh. Additional partners announced in July, 2012 include California Institute of Technology; Duke University; Georgia Institute of Technology; Johns Hopkins University; Rice University; University of California, San Francisco; University of Illinois, Urbana-Champaign; University of Washington; University of Virginia; University of Toronto, and EPF Lausanne.

41 Phil Hill, (2012). "Four Barriers That MOOCs Must Overcome To Build a Sustainable Model". Retrieved from: <http://www.deltainitiative.com/bloggers/four-barriers-that-moocs-must-overcome-to-build-a-sustainable-model>

42 Young, J., (2012). "Dozens of Plagiarism Incidents Are Reported in Coursera's Free Online Courses". Retrieved from: <http://chronicle.com/article/Dozens-of-Plagiarism-Incidents/133697/?cid=wb>

43 Siemens, G., (2012), "Stanford AI MOOC: let's try transparency", Retrieved from: <http://www.elearnspace.org/blog/2011/09/09/stanford-ai-mooc-lets-try-transparency/>

44 Kolowich, S., (2012). "How Will MOOCs Make Money?". Retrieved from: <http://www.insidehighered.com/news/2012/06/11/experts-speculate-possible-business-models-mooc-providers>

Assessment, certification and accreditation

Freemium uptake inside Open and Distance Learning environments (ODL) will supposedly largely depend of solving the consequent problem: "Learners who access digital learning materials on the web and acquire knowledge and skills either formally or informally, alone or in groups, cannot readily have their learning assessed and subsequently receive appropriate academic recognition for their efforts" (WikiEducator).

"Now, if you want to become a MIT student and you have a previous MITx certification, it does not count yet, but it creates value for employees even if not yet fully recognized by HE. MIT will have a look at the possibility in the future to take into account those previous certificates when selecting their new students. To my knowledge, there are not similar initiatives for accreditation currently taking place in Europe" (Robert Shuwer). Because of the business potential offered by a growing demand for certification and accreditation of knowledge achieved in ODL environments, different initiatives are focusing on processes, standards and ICT for achieving robust, viable, inclusive and secure assessment processes. Some examples of pioneering OER initiatives are for instance the OER-University which draw together "existing free online learning materials from around the world and develop new OER to create whole degrees programs [...] Through the community service mission of participating institutions (9 universities located in USA, Canada, New Zealand, South Africa and Australia) the project plans to open pathways for OER learners to earn formal academic credit and pay reduced fees for assessment and credit" (Butcher, 2012).

The Lifelong Learning Programme of the European Commission has funded a project called OERtest which aims at testing the Feasibility of OER-Course Certification and mainstreaming of OER within HE. The premise of the project being that "thanks to reforms in HE in Europe designed to flexibilise learning pathways and brought about by the Bologna Process, the EHEA is in a unique position to experiment develop OER into a new form of provision which merges the traditions of recognition of non-formal learning and of distance provision".⁴⁵ The results of this research should be released during the fall of 2012.

Finally, regarding non formal learning OER initiatives, the Peer 2 Peer University (P2PU) defines itself as a grass-roots open education project with peer powered courses through mentorship where everyone can be a teacher and a learner at the same time. One of their courses entitled the "School of Webcraft" is oriented to web development and enables to earn badges that translate technical and community skills. Badges are based in Mozilla's Open Badges framework which intends to record, track, and display skills and knowledge across the web. Accordingly to them, "learning today happens everywhere" and open badges aims at enabling "recognition for skills and achievements gained outside of school and making it easy for any organization or learning community to issue, earn and display badges across the web". Badges are seen as potentially interesting for providing "alternative assessment and correcting key flaws in the formal K-12 system, for gamifying education, for learning scaffolding, to develop LLL skills, as Digital Media and Learning practices and for

45 More information at: <http://www.oer-europe.net/node/2>

democratizing learning".⁴⁶ Still assessment through badges remains highly experimental and its potential and pitfalls are still not clear, even though they frontally address an important societal need.

Conclusions

As argued throughout the paper, it is evident that the development, implementation and widespread use of OER is a trend that Higher Education institutions are embracing at an ever fastening speed. The overview presented above shows that initiatives engage with a variety of business models, many of which are still experimental in nature. As such, several initiatives enter into the paradox of endorsing an Open Education paradigm while at the same time displaying a lack of transparency on the results and the impact of the new business models they are trying out. For instance, there is a marked lack of data and information on the evaluation of cost effectiveness of new business models implementing OER or on the strategies that HE institutions deploy to attract students. Being able to monitor and measure the impact of each initiative is still a challenge for HE institutions. Information collected by this study indicates that the culture of evaluation has not yet pervaded the Open Educational field, thus driving to a lack of systematic and longitudinal data on those topics.

However, it is important to underline that, regardless of the seminal and experimental state of the OER trend, there is already evidence of the positive impact of OER on mass student engagement, thus fostering lifelong learning ambitions and realising inclusion objectives. There is nonetheless a lack of evidence and data collection on the impact of the use of OER on students' competences and achievements. Besides, even though there are studies on the deployment of new methodologies and pedagogies used by teachers who adopt OER, there are virtually no studies demonstrating the impact on their effectiveness. Moreover, as Open Education praises experimentation around new forms of assessment, certification and accreditation of formal, informal and non-formal learning, there is a need to track how these initiatives can help to better match job market needs, and contribute to the development of new skills for new jobs.

The issue of sustainability of the new business models endorsed by OE initiatives has not yet reached maturity. The snapshot provided through this study shows that, out of 14 initiative directly surveyed, 4 were found to be sustainable (i.e. displaying a balance of costs and returns), one to be rentable (as returns exceeded costs); while in the remaining nine the costs of the initiative was still higher than its returns. Results of the survey showed that all initiatives were combining different models in their sustainability strategy. This "ecology of variety" can be interpreted in different ways. On one hand, it could be said that the more variety of income sources, the better, as OER sustainability is not strictly dependent on a specific funder, organisational model, community or third party stakeholder. Nonetheless, the literature indicates that most wide-spread or successful OER initiatives within HE settings are still mainly dependent on institutional, philanthropic or governmental/public funding. Accordingly, those initiatives are also the ones with less variety in the sources of income and therefore the most dependent on third party stakeholders. Nevertheless, research showed that many OER for HE were also experimenting around organisational-driven models. This implies that

⁴⁶ Joseph, B., (2012), " Six Ways to Look at Badging Systems Designed for Learning". Retrieved from: <http://www.olpglobalkids.org/content/six-ways-look-badging-systems-designed-learning>

they were still testing how Open Education fits into their mission and could boost their current business strategy. Peripheral businesses initiatives targeting Educational organisations, and OER targeting Life Long Learners through non formal learning, assessment and/or certification are generally combining institutional driven models with organisational driven ones. Finally, OER initiatives targeting informal learning and adult education are generally the most dependent on community driven models in which community work, donations, crowd funding and crowdsourcing go hand in hand.

In any case, the hypothesis that Open Education and OER are acting as disruptive technologies in the field of education seems to be fulfilled. Solving sustainability issues of existing initiatives and nurturing the ground for a further expansion of businesses based on Open Educational Practices constitute now the main challenges at stake.

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Introduction

The ‘open’ resources we are concerned with in this article are documents typically produced by specialist institutions, for example:

- Government departments
- Regulatory bodies, for example, the UK’s Ofcom, or the International Telecommunication Union
- Public corporations, for example in the UK the BBC
- United Nations organisations, such as UNESCO
- Private companies
- Standards bodies, for example the Bluetooth Special Interest Group, or 3rd Generation Partnership Project (3GPP) which sets standards for third generation mobile telecommunications
- Charities
- Academic and cultural organisations

Organisations such as these often publish reports, white papers and research findings freely on line. We consider that such resources have considerable educational potential, and give some examples of their use in an educational context. Whether these resources are truly ‘open educational resources’, however, is a moot point. Duval and Wiley (2010), paraphrasing a UNESCO definition from 2002, say that ‘open educational resources are learning objects that use an open source license.’ Duval and Wiley’s reference to ‘learning object’ emphasises an educational intent behind open educational resources, whereas the resources discussed here generally have no such intent, although they are usually intended to be informative. Atkins et al. (2007, p. 4; quoted in Lane and McAndrew, 2010, p. 954), while allowing that many types of resource may count as open educational resources, specify that they be issued under ‘an intellectual property license that permits their free use or re-purposing by others.’ That would disqualify resources covered by ordinary copyright law, as are most of those we are concerned with in this paper. Our preferred definition, courtesy of Clements and Pawlowski

(2012, p. 5), includes 'all resources for the purpose of learning, education, and training that are freely accessible,' to which we would add that whether a resource is 'for the purpose of learning' is less a property of the resource than of the way it is used, as we hope to show here.

By themselves, resources produced by bodies such as those listed above generally do not make satisfactory teaching material (although very exceptionally they may). Sometimes they assume a high level of prior knowledge, and sometimes the writing style is too poor to inflict on students whose own writing skills might not be high. The most satisfactory use of these materials, we suggest, is as a complement to teaching material, typically as case studies or as the basis for assessment activities. For example, assignment questions might be set whose answers can be found in a document of this type. Alternatively, students might be asked to comment or reflect on a document (or part of one). Such activities can be designed to test students' abilities to justify their answers in terms of the evidence within the source. This type of 'close reading' activity is well established in the humanities, but less so in other disciplines.

Depending on the type of course into which these materials are incorporated, locating the resources themselves can be made part of an activity. Students might be asked to evaluate the quality of the resource they have found, and maybe to compare and contrast it with a different resource. Again, the crucial skill here is for the student to be able to justify their claims with evidence taken from the document or from the circumstances of its publication (for example, whether it is likely to have been refereed or not). Such activities can be positioned as preparation for project work or other research work.

Authenticity, authority and topicality

Apart from their zero cost and easy availability (assuming a satisfactory internet connection), a primary virtue of these resources is their authenticity. In using these resources, students are often using the very materials used by practitioners. Two of the authors of this paper have written elsewhere of the value of authentic software tools in an educational context (Jones and Bissell, 2011). When the resources are documents produced by key institutions, students experience for themselves the approaches, formats, styles, and, quite often, shortcomings of practitioners' resources. Although this has educational value in itself, it often means that students need help to get the most out of materials that were intended for a different readership. Such assistance could take the form of commentaries, glossaries, overviews and summaries. For the educator, preparing this help this can be a significant amount of work.

Two other potential virtues of this type of resource should be mentioned. One is authority. For example, documents produced by government or United Nations statistical departments are likely the most authoritative available. Similarly, documents produced by standards bodies tend to be authoritative because their documents specify the standard, and what is required for compliance with it. Again, students will often need assistance if they are to benefit from using these resources. Another potential virtue is topicality. In quickly changing subjects such as technology, publications from a relevant standards body, for example, can be a way to keep a course topical.

We now discuss the use of these types of resource in two UK Open University level 3 modules.

T324 Keeping Ahead in Information and Communication Technology

T324 Keeping Ahead in Information and Communication Technology is a 30 point, nine-month module, presented annually. It was first presented in 2007, and its major aims are:

- 1 to introduce students to the fundamental principles of wireless ICT systems
- 2 to enable students to become much more independent learners, able to keep up to date in the ICT field
- 3 to improve students' understanding of the complexities of large-scale ICT systems involving not only technologies but also people, institutions and organisations

The module makes extensive use of third-party resources not only to keep the learning material up to date, but also to teach high level (undergraduate) skills in researching new topics and evaluating the authority of the resources identified. Some of these third-party resources are the type of 'open' resource referred to earlier; other resources might be, for example, journal articles available online via the University Library. Learning outcomes in these areas include:

- understand the structure of a typical specialist document dealing with an ICT topic
- be able to evaluate critically a range of resource materials originating from third parties, including news items and general interest publications
- be able to locate useful information in, and extract it from, highly technical documents including journal articles, product information, websites, etc.
- be able to cite and reference appropriately in their written work the information retrieved
- be able to learn independently from such materials, in order to keep up to date in ICT.

The module is structured into three blocks. The first introduces students to the fundamentals of wireless communication, and the learning materials consist mainly – although not entirely – of components produced by the OU Module Team. The second block is devoted predominantly to developing the skills of resource searching and evaluation, based on the topic of wireless sensor networks (WSNs). For this block students work extensively with materials *not* developed by the Module Team. The final block is devoted to the topic of ICTs in context, in particular (a) systems failures in ICT and (b) ICTs in the developing world, and is a mix of OU-generated and open and third-party resources.

The major use of an open resource in the Block 1 teaching is a publication by the UK communications regulator Ofcom – *The Spectrum Framework Review* (Ofcom, 2004). This is a discussion document, published by Ofcom to initiate discussion within the telecommunications industry about how the UK's radio spectrum should be managed. Part of its educational value, therefore, lies in its authenticity as a demonstration of a regulator's role, and how a regulator interacts with interested parties. Students are required to read a short extract from the document, and discuss aspects of proposed spectrum allocation.

The written assignment for Block 1, like all other assignments, changes each year. Often the assignment contains questions on topical issues in technology. For example, in the 2012 presentation, the assignment required students to study parts of another Ofcom document, *The Spectrum Plan for the London 2012 Games* (Ofcom 2012), which was concerned with spectrum provisions to meet the huge, localised demand for wireless communications during the Olympic

Games in London in August 2012. By working through the assignment, students should have come to appreciate the enormous complexity of the technical infrastructure of modern public events such as the Olympic Games, and the vulnerability of communication systems to unexpected interference. Students may have been reminded of this assignment when, in the early days of the games, newspaper headlines reported that intensive use of mobile phones by spectators, for tweeting and social networking, during a cycle race through London had jammed the GPS signals that broadcasters relied on for second-by-second location information on the cyclists.

Block 2, as noted above, exploits open resources extensively – as well as resources that are certainly not open to everyone, but which are ‘free’ to OU students by virtue of institutional subscriptions (such as the huge publication databases of the *Institute of Electronics and Electrical Engineers*, the *British Computer Society* and the *Association for Computing Machinery*). During their study of the block, students learn how to use such databases effectively, in the context of investigating the topic of WSNs. The written assignment for the block adopts a similar approach. A major part of it involves students locating three resources, given incomplete information about them – typically an academic journal article, a conference paper and some manufacturer’s literature or similar. They are then required to give a critical summary and evaluation of the documents, including an assessment of the documents’ authority based on content, provenance, and information about authors and their affiliations derived from institutional and personal websites.

Block 3 consists of two distinct parts. The teaching material of the first part looks predominantly at ICT system failures, in order to teach elements of the systems approach to such complex socio-technical environments. The block draws upon a UK Department for Transport (2007) publication *Public Transport Information*, as well as a UK National Audit Office (2004) report *Tackling Congestion by Making Better Use of England’s Motorways and Trunk Roads* and a report commissioned by the UK government entitled *The Eddington Transport Study* (HM Treasury, 2007). While these publications are certainly authoritative, they are not uncontroversial, and students are expected to engage critically with them. In the second part of the block, dealing with ICT in the developing world, use is made of World Bank and International Telecommunication Union data on average income and mobile phone penetration.

As in Blocks 1 and 2, the assessment of Block 3 uses open resources as case studies or as data sources to underpin a written assignment and to maintain currency of the teaching. Frequently the case study in the assessment is based on a major ICT project that has made the national headlines, often as a consequence of failure. For example, part of the assessment in 2009 explored the failure of C-NOMIS, the UK’s National Offender Management Information System, using material from a National Audit Office (2009) report. Assessment in 2010 was based on, among other things, a Factsheet produced by the UK government’s Department for Education and Skills (DfES, 2007) and the *Children’s Social Care Services, Core Information Requirements Process Model* from the Department for Health and Social Security (DHSS, 2008). These documents were supplied as background for students’ discussion of the Integrated Children’s System. This IT system for supporting children in need and their families was introduced in the UK following a high-profile failure to protect a child some years earlier (the ‘Baby P’ case, in which an infant died) and had been recently receiving some negative publicity. In 2011 students were asked to explore one aspect of the developing (and in some quarters, controversial) nationwide IT infrastructure of the National Health

Service, the Care Records System, but in this case the background information consisted of news reports and academic publications rather than open resources.

T324 was not designed with the explicit aim of exploiting open educational resources. Nevertheless, its major objective, of equipping students with the skills to enable them to ‘keep ahead in ICTs’ in a critically informed manner, meant that such resources were used widely in its design, production and presentation. The experience of producing this module influenced the development of what can be considered as a ‘companion’ module (with many of the same Module Team members), first presented two years after T324’s first presentation, and considered in the following section.

T325 Technologies for Digital Media

T325 sits alongside T324 in the curriculum with many students studying both modules, either at the same time or consecutively. Like T324, T325 is a 30 point, nine-month module, presented annually. It was first presented in 2009.

Although it is not a formal requirement, there are advantages to the student to study T324 before T325 if they are not studied simultaneously. This is because although both modules make extensive use of third party material, T324 has more teaching on how to find and use external material than T325.

The five stated aims of T325 are:

- 1 to introduce students to the fundamental principles of selected technologies for digital media
- 2 to enable students to become more independent learners, able to keep up to date in digital media technologies
- 3 to enable students to integrate knowledge from several sources in the presentation of an argument
- 4 to enable students to analyse, critique and synthesise examples of third-party material
- 5 to improve students’ understanding of the complexities of technological systems in terms of social, ethical and economic factors as well as the underlying technologies.

Although only the fourth of these makes explicit reference to third party material, such material contributes to them all to a some extent (substantially so for second and fifth; less so for first).

As with T324, this module is structured into three Blocks.

The first block, *Enabling technologies*, is an intensive study of the technologies used in Digital Media, covering hardware, such as disc drives, solid state (e.g. flash) memory, batteries, display screens and capture devices, and algorithms, such as error control coding and MPEG compression techniques. The emphasis of this first block is on the first of the aims listed above, and is largely presented using text and teaching software produced in-house by the Open University. Even for this block, however, external resources are important. For example, the effect of Giant Magnetoresistance (GMR), used for high-capacity hard-drives, is introduced using free resources from the website of the Nobel Foundation (the discoverers of GMR were awarded the Nobel Prize in 2007). Students are pointed to two documents: one, *Information for the Public* (Royal Swedish Academy of Sciences, 2007a), is aimed at non-specialists and is therefore a useful introduction to the science and technology of GMR; the other, *Scientific Background* (Royal Swedish Academy of Sciences, 2007b), contains much more detailed science, and T325 students are not expected to study this document in great detail.

Directing students to these papers simultaneously introduces them to the technology and provides an example of the sources available to them for independent study. Other free external resources used by this block are technology white papers, standards documents and product specifications. Product specifications are particularly valuable for assignment questions, since new products are appearing all the time and presenting students with the data sheet of, for example, a new flash memory device, reassures them that their study is relevant to the latest technology.

The second block, *Intellectual Property and Security Issues*, makes much more extensive use of third-party materials, and explicitly addresses all five of the module aims. The printed teaching text supplied to students is only half the size of that of Block 1 (128 compared to 256 pages), but students are in addition supplied with a 44 page booklet of articles containing academic papers and an extract from the 2006 *Gowers Review of Intellectual Property*, published by Her Majesty's Treasury (HM Treasury, 2006). Students are also directed to material online, including newspaper articles, further academic papers, the full text of the Gowers Review and some commercial resources.

Assignments testing Block 2 deliberately draw upon a range of resources in order to address the third and fourth aims listed earlier. These include the 'permanent' resources of the Block outlined above, but each assignment also presents students with other resources unique to that presentation. For example, the assignment testing Block 2 of the 2012 presentation of the module was based on the 2011 Hargreaves Report: *Digital Opportunity: A review of Intellectual Property and Growth* (Hargreaves, 2011), available freely from the website of the Intellectual Property Office. Students were directed to specific parts of the report and asked to explain some of the concepts in more detail, based on their study of T325.

Government reports tend to be straightforward text documents, perhaps with some limited graphics, but sometimes commercial organisations make more sophisticated multimedia available, and an example of this is the set of four Microsoft multimedia presentations explaining the Windows Media Digital Rights Management system. These also exemplify the risks of using third-party online material, however, since they disappeared from original location on a Microsoft site in the USA unexpectedly, two years into the life of T325. Fortunately, the module team eventually tracked down copies of them on a Korean Microsoft site (Microsoft, n.d.).

Block 3, *Mobile broadband*, also contains a mixture of material produced by the Open University and third-party resources. The Block describes developments designed to support broadband applications, and makes use of freely available White Papers such as those from 3GPP: the 3rd Generation Partnership Project. During the development of new standards, especially those that emerge from the collaboration of a range of different organisations, it is common to find that examples like this of White Papers that explain aspects of the technology to a general technical audience. The standards themselves are also often openly available and it is useful to expose students to short extracts from standards, but they are usually too detailed and too specialised to be used for teaching. White Papers provide a valuable bridge between the standard and the topics of the module.

Overall, there is so much use of third party material in T325 that it can be seen to be embedded in the 'outside world' in way which would have been impossible a few years ago. By drawing on the most recent resources, the module can be seen to be up to date. Since the credibility of any teaching on digital media would be fatally undermined if students perceived the module to be out of date, this is a far from trivial issue. Even apparently minor details such as a photograph of a device a couple years old can tarnish the perception of a module, so in addition to the benefits outlined above, there is also a cosmetic benefit that is not 'merely cosmetic'.

Conclusion

We have outlined some of the ways in which freely available non-educational resources can be used educationally in case studies and assignments. The uses we have described would be equally viable with conventionally published third-party materials, such as journal articles and books which are not distributed freely, of course. There is, indeed, a long tradition of conventionally published documents being used in the ways we have described (and T324 and T325 do use conventionally published articles as well as freely available sources). Fortunately, it is worth noting that the increasing availability of such facilities as Google Scholar and open research repositories, as well as the move towards 'open' academic publishing of one form or another, means that traditional academic journal publishing is increasingly becoming available free of charge to users (if not to the authors or their paymasters). Educators without privileged access to extensive, paid-for, resources of organisations such as the IEEE (Institute of Electrical and Electronics Engineers), BCS (British Computer Society) or ACM (Association for Computing Machinery) can thus adopt a similar approach to teaching and learning using freely available academic resources.

'Open', or freely available, resources are potentially interesting to educators not only because of their zero cost, however. The relative ease of access to these materials makes it practical to use them in modules, especially where student numbers are high. Also, the relative ease of online publishing and distribution has led many organisations to view the internet as a primary means of dissemination. This means that the range of potentially useful resources has expanded enormously. So too has the range of poor or useless resources. For the student or educator, winnowing the good from the bad is now a vital skill.

As with using any third party materials, there can be considerable effort for the educator in finding suitable materials (and in locating alternatives if a resource disappears, as happens not infrequently with free material). These resources should not be regarded as a quick or easy way to create a teaching module. Indeed, the justification for using them should be based on the benefit to the student, rather than the educator. Among these benefits are the ones cited earlier of authenticity, authority and (potentially) topicality. An incidental benefit is offering students an insight into the huge range of resource available nowadays. Although benefits to the student must be placed uppermost, as educators we have found that the research necessary for locating suitable materials has proved an effective way of keeping ourselves up-to-date with developments in our specialist topics.

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Kear K. – Rosewell J. – Williams K.: Social networking and open educational resources - updating quality assurance for e-learning excellence

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Introduction

E-xcellence Next (<http://www.eadtu.eu/e-xcellencenext.html>) is the third in a series of projects, funded by the EU Lifelong Learning programme and managed by EADTU (European Association of Distance Teaching Universities). The purpose of the *E-xcellence* suite of projects is to develop, use and evaluate resources for the quality assessment of e-learning in higher education. A methodology, handbook and resource materials were developed in the early stages of the projects, and have been used by a range of European higher education institutions. A major aim of the Excellence Next project was to review, update and improve the manual and associated resources. In particular, the manual update needed to include additional material to acknowledge: the emergence of open educational resources (OER); and developments in the educational use of social networking.

The E-xcellence manual (EADTU 2009b) and resources are structured into six sections:

- *Strategic Management*: a high level view of how the institution plans its e-learning
- *Curriculum Design*: how e-learning is used across a whole programme of study
- *Course Design*: how e-learning is used in the design and operation of individual courses
- *Course Delivery*: the technical and practical aspects of e-learning delivery
- *Staff Support*: the support and training provided to staff
- *Student Support*: the support, information and guidance provided to students.

Within each of these sections the manual provides: guidance on best practice; a set of benchmarks; and associated performance criteria, some of which are positioned at the more advanced 'excellence' level. Further detailed advice is offered in an associated document presented as *Guidance for Assessors*.

A particularly useful resource is the online, interactive *Quickscan* tool. For each of the six topics listed above, the Quickscan presents the benchmarks, together with some brief introductory text. The tool enables users to score their performance against each benchmark, and add comments. The Quickscan has been used as the basis for a series of two-day quality assessment events (described as *local seminars*) at various universities. Before the local seminar, the Quickscan is used by a team of the university's staff to carry out a self-assessment of the university's e-learning (typically based on a selection of relevant programmes of study). At the local seminar the university team is joined by two e-learning experts from the core team of the E-xcellence project. The results of the self-assessment

are then reviewed and discussed. During the course of the E-xcellence Next project, local seminars took place at six universities, as follows:

- Russia MESI University, Moscow
- Lithuania Kaunas University of Technology
- Poland Akademia Górniczo-Hutnicza, Krakow
- Cyprus Open University of Cyprus, Nicosia
- Latvia Riga Technical University
- Portugal Universidade Aberta, Lisbon
- Greece Hellenic Open University, Patras

The outcome of each local seminar is a 'roadmap' for the improvement of the university's e-learning offering. In addition, the university team provides feedback on the E-xcellence resources (Quickscan, manual and Assessor's Guide). This feedback has been used in the process of improving and updating the resources.

Other sources of feedback on the resources include:

- Comments on the previous set of benchmarks, elicited from E-xcellence Next project partners
- Inputs from participants at a workshop on OER and social networking, held as part of the 'European seminar on QA in e-learning', UNESCO, Paris, 17th June 2011
- Comments on a draft version of the updated manual from participants at an Excellence Next external stakeholders' meeting (12th June, 2012)
- Comments from representatives of the EADTU Student Council
- Comments from the EADTU Library Task Force.

In the remainder of this paper we present an overview of the major enhancements made to the manual and resources. These enhancements were primarily to cover the topics of open educational resources and social networking. The sections below discuss these topics in turn, in each case summarising the changes made to the E-xcellence manual.

Open Educational Resources

Taking inspiration from the open source software movement, the last decade has seen the emergence of a range of Open Educational Resources (OER). The term OER is an elastic one, but the OECD (2007) definition can be taken as a starting point: 'digitised materials offered freely and openly for educators, students and self-learners to use and reuse for teaching, learning and research'. There are now many repositories of educational material which can be freely used by either individual learners or other institutions. Although the OECD definition puts the focus on open content, there are other aspects such as licences and software tools that are associated with OER. There is also an emerging culture of Open Educational Practice which draws in other ideas such as Web 2.0 technologies, social networking, and the co-construction of knowledge (OPAL, 2011) to stress the social praxis of OER.

The stakeholders associated with the OER movement are varied, ranging from government policy makers, funders, institutions and teachers to learners. Some stakeholders have multiple roles, for

example, teachers as *consumers* of OER material and as *producers*. The motivations of these different stakeholders are similarly varied (OECD, 2007, pp. 11-12), but a common thread is the potential for improved quality.

The ways in which OER can be used are also very varied. Some possible use-cases, of increasingly large scale, are shown in

Table 3.

Table 3 Possible OER use-cases (Rosewell & Ferreira, 2011)

<p>An individual life-long learner finds material for independent study</p> <p>A teacher obtains images and videos to use in their own teaching material</p> <p>A course includes podcasts from iTunes U</p> <p>A course uses a complete 10-hour unit from OpenLearn or similar repository</p> <p>An entire 100-hour module is reused, with new summative assessment</p> <p>A consortium of institutions develop new material for their own use but makes it freely available</p>

This broad range of type of content, intended use, and stakeholders means that there are many ways in which OER can be used in learning and thus impinge on quality assurance. One reaction to this would be to take the position that quality assurance should simply assess the e-learning as experienced by the student, without regard to the provenance of the material. This approach would fit with the general approach of the E-xcellence Next project which has, as far as possible, avoided a focus on the specifics of the technologies used. However, this would ignore the potential for making some assertion about the quality associated with OER components.

For example, a teacher contemplating the use of OER is most likely to consider resources available from an existing repository. Figure 8 shows how, in practice, quality measures can arise in several ways around a repository. The repository may function analogously to conventional academic publishing, with peer review acting as a quality check on submission to the repository. In other cases, there may be no gatekeeper: anyone may upload material but user reviews and voting act as a recommendation system for other users. Additionally, the provenance of the material from individual author or institution carries with it an associated reputation or 'brand'. Thus a user of an item from an OER repository may form judgements on its quality from several perspectives.

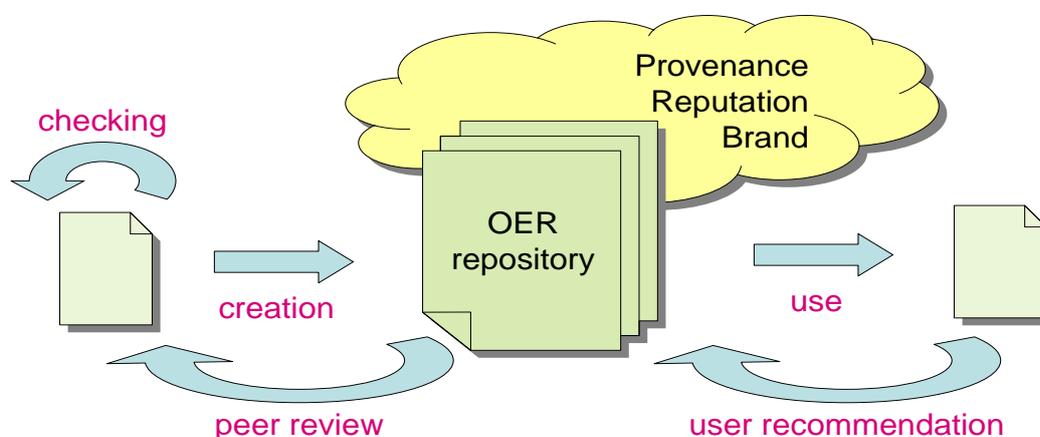


Figure 8 OER repositories and quality measures

Some quality dimensions of individual OER items would be largely familiar to any educator. These can be summarised (Rosewell & Ferreira, 2011, derived from MERLOT (n.d.)) as:

- **Content:** Accuracy, currency, relevance
- **Pedagogical effectiveness:** Learning outcomes, pre-requisites, learning design, learning styles, assessment
- **Ease of use:** Clarity, visually attractive, engaging, clear navigation, functional

However, OER resources have other specific dimensions that do not arise in conventional materials: those of reusability and openness. An overriding concern is the intellectual property rights associated with OER material. OER are by definition 'open' and permit re-use but usually some rights are reserved and must be respected. The Creative Commons licences (creativecommons.org) provide a widely used and readily understood spectrum of licences. Common in the OER realm are licences that require attribution, share-alike terms, non-commercial use and, more rarely, no-derivatives. Beyond licensing, however, there are other aspects that impact on the extent to which an OER can be reused (Table 4).

Table 4 Quality dimensions: reusability and openness (Rosewell & Ferreira, 2011)

Format: conformance to standards and file formats
Localisation: ease of adaptation to other languages, cultures, or contexts
Discoverability: metadata, tagging
Technological barriers: bandwidth, software requirements
Interoperability: ease of reuse in different software environments
Accessibility: to users with special needs
Digital preservation: likelihood of continuing access over the long-term

These dimensions would not be surfaced by an evaluation from a learner point of view but emerge when the OER item is considered as a reusable learning object: the educational quality of the material may be high but restricted reusability and openness would reduce its value as an OER item. These dimensions are particularly important concerns for those involved with the creation of new OER material.

As noted above, an underlying motivation behind the OER movement is to increase quality and capability through the interchange of resources. For this reason, an institution can expect to be both an importer and an exporter of resources and its QA processes should cater for both. Work undertaken by the OPAL project (oer-quality.org) presents a capability-maturity model that envisions a progression from exploratory engagement with OER through widespread use to creation of new OER, accompanied by an increased embedding in institutional policy (OPAL, 2011).

Revisions to E-xcellence manual, benchmarks and indicators for OER

The earlier versions of the E-xcellence manual and benchmarks (2006 & 2009) had made no mention of OER. Given the proliferation of OER repositories and the publicity generated by the OER movement, we expect the quality assurance community to meet increasing use of OER in the future.

Accordingly, we have revised the E-xcellence benchmarks and performance indicators to accommodate the use of OER, and given further background information and cross-referencing in the manual. Our preferred approach, however, has been to retain the generality and ‘agnosticism’ of the current benchmarks, wherever possible casting them in a form which is neutral to the technologies used. Below we highlight the changes that relate specifically to OER in each section of the E-xcellence manual.

Strategic Management

The 2006 manual and benchmarks already acknowledged that a move to e-learning could entail significant infrastructure and developmental costs and require skills that may not be available within the institution. Collaboration with other institutions or use of external services was recognised as a way of mitigating these issues, and benchmarks and commentary in the section on ‘Strategic management’ addressed such collaborative ventures. We have taken the view that use and creation of OER can be seen as a less formal approach to collaborative ventures, and that institutional policy on OER could be part of a general approach to collaboration with external partners. For the revision, we have therefore generalised the most appropriate benchmark, including specific mention of OER, and added new indicator statements (Table 5).

Table 5 Revisions to benchmarks and indicators on ‘Strategic management’ to encompass OER

<p>Strategic management</p> <p>Benchmark statement</p> <p>5 When e-learning involves activities or resources beyond the institution (for example, virtual mobility of students, institutional partnerships or development of Open Educational Resources), the roles and responsibilities are clearly defined, communicated to those concerned, and controlled by operational agreements where appropriate.</p> <p>Indicators</p> <p>Staff are supported in the rights issues associated with use of imported OER and implications of publishing their teaching materials as OER.</p> <p>The institution has processes for managing rights in the development and use of OER associated with any institutional managed repository or consortium.</p>
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The accompanying discussion in the manual provides some context for the indicators. In addition, it discusses the possibility of an institution either maintaining its own or a consortium repository. However, it was not felt appropriate to include this as a performance indicator for e-learning institutions.

Curriculum Design

No changes related to OER were made to the section on ‘Curriculum design’.

Course Design

When considering the possible use-cases for OER, feedback indicated that OER would most commonly be used in the form of relatively small-scale assets, resources and e-learning activities that would be incorporated with in-house materials in the creation of a course. The section of the E-xcellence manual on 'Course design' is thus the focus of most revisions related to OER.

The guidelines note that the increasing availability of OER provides an alternative to the creation of new materials. Background context is provided in a new sub-section, including a definition of OER, information about intellectual property rights, and aspects of quality assurance associated with repositories. Attention is drawn to the additional quality dimensions associated with reuse discussed above. OER are also highlighted as possible independent learning materials. Finally, the benefit to the academic community of being able to update and return improved material to the OER community is noted.

One additional benchmark has been added (benchmark 14, Table 6). This draws attention to the use of OER components and the possibility of re-versioning; however, it stresses that OER materials should be subject to the same review as other course materials. Several new indicators have been added that deal specifically with OER (Table 6), including one at excellence level on contributing OER to repositories. One indicator worth noting is:

There is a principled approach to judging the quality of material obtained from an OER repository.

This follows the style of other E-xcellence next indicators, which are generally written in broad terms and avoid over-specifying details in order to allow wide applicability to different institutional practices. The accompanying guidance provides background to suggest an approach if an institution needs to develop their ability to meet this indicator.

Table 6 Revisions to benchmarks and indicators on 'Course design' to encompass OER

<p>Course design</p> <p><i>Benchmark statement</i></p> <p>14 OER material is selected with regard to learning outcome, tailored if necessary for fit to the learning context, and integrated with other learning materials. OER materials are subject to the same review processes as other course materials.</p> <p><i>Indicators</i></p> <p>The institution has a policy for use of independent learning materials from a number of quality assured sources, including OER.</p> <p>Course materials obtained from OER are judged fit for purpose by students and external assessors.</p> <p>There is a principled approach to judging the quality of material obtained from an OER repository.</p> <p>There is a process for tracking intellectual property rights associated with e-learning components.</p> <p><i>At excellence level</i></p> <p>E-learning components are contributed to repositories as OER.</p>
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Course Delivery

The 'Course delivery' section of the E-xcellence manual deals with those aspects that are commonly provided by a virtual learning environment (VLE). From this perspective, OER are not much different from other, in-house e-learning components. Accordingly, there has been little revision of the contents specifically to address OER.

An existing indicator addressed intellectual property rights in third-party materials and applies equally to tracking rights in OER components; this has therefore been left unchanged.

One indicator has been added at excellence level which recognises reuse and sharing of materials both within the institution and in the OER community (Table 7).

Table 7 Revisions to benchmarks and indicators on 'Course delivery' to encompass OER

Course delivery

Indicators:

At excellence level

The institution has in place policies for internal reuse of materials and is active in the OER movement facilitating the sharing of materials between institutions and individual learners.

Staff Support

The section on 'Staff support' has received some minor additions with respect to the use of OER. A typical use-case for OER is that individual teachers obtain assets or e-learning activities from an OER repository and incorporate them in their own teaching material. Two indicators (one at excellence level) capture the need for staff to have support in locating and evaluating existing online resources. The accompanying guidance again highlights the need for care in tracking intellectual property rights.

Table 8 Revisions to benchmarks and indicators on 'Staff support' to encompass OER

Staff support

Indicators:

Support is available for course design staff in locating and evaluating online resources for student use.

At excellence level:

Development teams are routinely able to access previously developed materials and OER, and consider their potential for re-use.

Student Support

No changes related to OER were made to the section on 'Student support'.

Social networking

The term 'social networking' can be interpreted broadly to encompass a range of online

communication activities and technologies (e.g. forums, blogs, wikis). It can also be interpreted more narrowly, to focus on social networking sites (e.g. Facebook, Twitter, LinkedIn). On either basis, social networking has two primary purposes in an educational context: supporting learning; and building community.

Social theories of learning emphasise the importance of communication among learners, and between learners and teachers. Communication helps to build trust and openness, which are necessary for effective learning and teaching. Ideas of social learning have led to the concept of a learning community, and this concept can be extended to encompass learning communities supported via online communication tools (Palloff & Pratt, 2007). For many e-learning students, participation in an online learning community helps them to remain motivated and to make progress. Social technologies enable collaborative work to be carried out at a distance, using online tools to supplement or replace face-to-face meetings. The technologies also support new forms of assessment such as peer-assessment or the assessment of the collaborative process in group projects (Kear, 2010).

A range of social technologies can be used to support the interaction and collaboration that is needed for learning. For example:

- Forums can be used for discussion and debate
- Wikis can facilitate co-creation of resources
- Blogs can be used for reflection, sharing and feedback.

Some online communication tools are asynchronous: there is no need for participants to be online at the same time. Asynchronous tools can provide flexibility of time as well as place, which is important when learners have work or family commitments. Asynchronous tools include forums, blogs, wikis and social networking sites. Some communication tools are synchronous - where all participants need to be online together. Synchronous tools can contribute to participants' social presence - the sense that they are communicating with real people (Short et al., 1976). Synchronous tools include real-time chat, instant messaging and web conferencing. Deciding on an appropriate combination of asynchronous and synchronous tools is important for e-learning.

Social networking in education has a long history, particularly in the distance learning sector. A number of educators used early online communication tools, described as bulletin boards or computer conferencing systems, with their students (Mason & Kaye, 1989). The aim was to enable students to discuss course topics and gain support from each other and from their teachers, even if they rarely met face-to-face. As a result of this long experience, knowledge of best practice in the use of online learning communities has been developed and shared. With the increasing use of virtual learning environments (VLEs) in higher education, this knowledge will be of value to the majority of higher education institutions. VLEs offer a number of tools which can be used to support online learning communities. The most widely used are discussion forums (which are similar to the early tools mentioned above) but VLEs typically also offer wikis, blogs and real-time communication tools. Many educators are keen to use social networking sites with their students, beyond the boundary of an institutional VLE. This is partly driven by the concept of the 'digital native' Prensky (2001). Prensky and others have argued that there is a generation of students who use digital technologies daily, and who expect their use in education. However, more recent research counteracts the idea of a homogeneous generation of digital natives (Jones et al., 2010). Sites such as Facebook and Twitter can support connections among students and between students and teachers (Lampe et al., 2011;

Kassens-Noor, 2012). The benefits of using social networking sites for learning are similar to the benefits of any online communication tool: possibilities for increased sharing, collaboration and community-building. The potential problems of using these sites include; privacy issues; lack of control; and blurring of boundaries between social and academic life.

Revisions to E-xcellence manual, benchmarks and indicators for social networking

The earlier editions of the E-xcellence manual and benchmarks had included a reasonable amount of guidance related to developing academic communities, both face-to-face and online. However, the increasing use of online communication in higher education, together with recent interest in the educational potential of public social networking sites, meant that it was important to review and update these topics in the manual. Social networking (in its broadest sense) can be used to enhance the experience of online learning and to contribute to learning outcomes, but this must be done with thought and care to achieve the highest quality standards and to avoid potential problems. We therefore revised the E-xcellence benchmarks and performance indicators to conform with best practice in this domain, and to encourage e-learning practitioners to use social networking for assessed work, in addition to formative learning activities. We aimed to provide general guidance for building academic community online and using online communication for learning, rather than advocating particular techniques or technologies.

Below we highlight the changes to benchmarks and performance indicators that relate specifically to social networking in each section of the E-xcellence manual.

Strategic Management

In this section of the manual the main changes relate to the potential use of public social networking sites and/or public social software tools. There are a number of issues of concern when using online environments and tools which are outside the control of the educational institution. Consideration must be given to the privacy and security of students and staff; there are also matters of usability and accessibility for disabled users; a third issue is whether students and staff wish to have the boundaries between their academic life and their social life blurred. These issues were discussed briefly in the new manual text for this section. In addition, a new performance indicator was added, as shown in Table 9.

Table 9 Revisions to indicators on 'Strategic management' to encompass social networking

Strategic management
Indicator
Any use of social media takes account of accessibility and privacy issues.

Curriculum Design

This section of the manual already included material on building academic communities. However this was written when most online activities (where used) were carried out via discussion forums.

There is now increasing interest in using synchronous (real-time) communication tools such as instant messaging and desktop audio/ video-conferencing. The text of the manual was therefore changed to acknowledge and raise awareness of synchronous tools.

A further change was to increase the focus on using online communication tools as part of course assessment, rather than just for learning activities. Part of the motivation for including online communication tasks in assessment is to encourage students to take part. There is also the benefit of the permanent record of online activities (e.g. forum transcripts and the 'history' of wiki interactions) which can be used to assess students' contributions to the process of collaborative work.

Finally, a summary was included of the benefits and issues of using online communication in educational settings (Kear, 2010). The benchmarks and performance indicators relating to social networking in the 'Curriculum design' section of the manual are shown in Table 10.

Table 10 Revisions to benchmarks and indicators on 'Curriculum design' to encompass social networking

<p>Curriculum design</p> <p>Benchmark statement</p> <p>10 Curricula are designed to enable participation in academic communities via online social networking tools. These online communities provide opportunities for collaborative learning, contact with external professionals and involvement in research and professional activities.</p> <p>Indicators</p> <p>There are institutional policies relating to the provision of online community spaces for student-student and student-teacher interactions.</p> <p>Curriculum designers specify clearly the educational role that student-student interaction plays in their programmes.</p> <p>Criteria for the assessment of student online collaboration exist and are applied consistently across programmes and courses.</p> <p><i>At excellence level:</i></p> <ul style="list-style-type: none">• Teaching staff are supported by formal and informal staff development activity in the use of online tools for community building.• The institution works closely with professional bodies in the development of online professional communities.• Innovative assessment approaches, such as online collaborative work, peer assessment and self-assessment, form a part of the institution's practice in this area.

Course Design

Because social networking was discussed in detail in the previous section of the manual (in relation to curriculum design) there was no need to make extensive updates to the 'Course design' section. However, in this section social networking was specifically identified as a method for facilitating collaborative and dialogue-centred learning. One of the benchmarks was modified to stress the importance of student-to-student interactions, and the performance level indicators emphasised the role of student-tutor contact online (see Table 11).

Table 11 Revisions to benchmarks and indicators on 'Course design' to encompass social networking

<p>Course design</p> <p>Benchmark statement</p> <p>15 E-learning materials have sufficient interactivity (student-to-content or student-to-student) to encourage active engagement and enable students to test their knowledge, understanding and skills. Independent learning materials provide learners with regular feedback through self-assessment activities or tests.</p> <p>Indicators</p> <p>Tutors are able to use a variety of means (e-mail, telephone, forums etc.) to interact with learners both individually and in groups.</p> <p>At excellence level</p> <p>Tutor-learner and learner-learner interaction is integral to the educational design Where a Virtual Learning Environment is deployed, this fully supports the range of interactions needed, including individual and group interactions. The importance of appropriate interaction (synchronous or asynchronous) between learners and with tutors is reflected in the design of the course.</p>

Course Delivery

This section is concerned with the delivery of e-learning via hardware and software (e.g. a VLE), so there was no need for in-depth discussion of social networking. As in the 'Strategic management' section, the emphasis was on issues raised when considering the use of public social networking tools and technologies. The guidance in this section was changed to stress that e-learning institutions need to consider whether to use public tools, and if so, how they relate to the institution's VLE. The question of boundaries between institutional online spaces and personal online spaces needs consideration.

In this section there were no changes to benchmarks or performance indicators in relation to social networking.

Staff Support

This section is focused on the support that staff need to perform their jobs well. In relation to teaching staff, it is important that they receive training and support for the activities they are expected to carry out and the technologies they need to use. This is a generic requirement, which also applies to the use of social networking for teaching and learning. Teaching staff need training and support in both the educational and technical aspects of online communication.

In this section there were no changes to benchmarks or performance indicators in relation to social networking.

Student Support

This section was modified to emphasise the value of student support via online communities, whether hosted within an institution's VLE or via public social networking technologies. The section stressed the opportunities for using synchronous tools (e.g. web conferencing) as well as

asynchronous tools (e.g. forums). The need for monitoring online communities of students and teachers was highlighted, and also for handling any problems which might arise. Benchmarks and performance indicators were added or modified to cover these points (Table 12).

Table 12 Revisions to benchmarks and indicators on ‘Student support’ to encompass social networking.

<p>Student support</p> <p>Benchmark statements</p> <p>32 Online social networking opportunities are provided in order to build and support student communities. This may be achieved using the institution’s VLE or through external social networking sites, as appropriate.</p> <p>34 Students have access to learning resources, including: identified contacts who will provide constructive and timely feedback on academic performance and progression support for the development of key skills (including support for e-learning skills, collaborative working online and contributing to online communities) online library access.</p> <p>Indicators</p> <ul style="list-style-type: none">• The institution is committed to enabling the establishment and proper functioning of communities of e-learning students via its VLE or other online communication environments.• This functioning supports: learning interaction between individuals and within groups; social interaction between students; feedback on students' experiences of their programme. <p><i>At excellence level:</i></p> <ul style="list-style-type: none">• To support communities of learners the institution makes appropriate use of asynchronous tools (e.g. discussion forums, wikis, blogs, social networking sites) and synchronous tools (e.g. video-conferencing, real-time chat).
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Other changes to the manual

In addition to the changes and additions discussed above, the following aspects of the manual were improved, based on review and feedback.

- The language was simplified and clarified so that the manual would be more accessible to those whose first language is not English. The terminology was made more consistent, and a comprehensive glossary was included defining any terms whose meaning might not be clear from the context. These changes also improved the manual for native English speakers.
- A stronger focus was placed on the role of university libraries in e-learning provision. This was based on feedback from the EADTU Library Task Force, together with awareness by the authors of the key contributions made to e-learning by information scientists.
- Acknowledgement was made of developments in mobile learning. E-learning institutions need to be aware that students are using a range of mobile technologies to access learning resources and to keep in touch with fellow students (and staff).
- The guidance on using the Quicksan tool was strengthened to emphasise the value of a team approach to this activity.

Summary

In this paper we have provided an overview of the E-xcellence Next project activities, with a focus on enhancements made to the project resources, primarily the E-xcellence manual. These enhancements were required in order to incorporate new developments in open educational resources and increasing awareness of social networking for learning.

The process of enhancement based on review, use of the resources at local seminars, and feedback has resulted in a self-assessment tool which is up-to-date and broad in its coverage. The manual and associated resources will be applicable and valuable to higher education institutions which use blended learning, as well as to distance learning institutions which have made the move into e-learning.

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**Lambropoulos N. – Pitsou C. – Panagiotopoulos G. – Rizopoulos A. -
Christopoulou S. – Baris T. – Psychogiou E. – Tasoula S.:
Autonomous Leadership Best Practice on a Regional Level to Tackle
Higher Education Students' Future Competencies for the Private
Sector**

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Introduction

In a period of global crisis, one challenge for the higher Greek education system is to relate the curriculum to the future market and to balance national cultural aspects and societal forces for change. Also, the Greek Higher Education Institutions need to follow the Bologna Process, a series of ministerial meetings and agreements between the European countries designed to ensure comparability in the standards and quality of higher education qualifications. Consequently visionary educational leadership needs to create, take advantage and forward students' knowledge, skills and abilities (Blazey et al., 2008) suggested that for leaders, effecting changes in education is tough, and it is hard work to change an educational and learning system that has been relatively untouched and unchallenged for decades. In order to improve such system and assuring educational quality in all education levels, avoidance of individual initiatives and central educational quality management is needed (Massy, 2003). If according to quality management principles, 90 percent of problems are process, not employee problems (Coate, 1990) then leadership and educational policy have the potential to tackle some major problems; one is the relationship of the higher education to the future markets. Such transformational leadership is anchored in the following 3 pillars: efficiency (ability to perform), effectiveness (ability to fulfil political objectives), and accountability (ability to legitimize the results) (Papadimitriou, 2011). Eliou on Greece in the Encyclopedia of Higher Education (Clark & Neave, 1992) suggested that the overall evaluation of Greek higher education might focus on an initial level, on the existing structure of secondary education, in conjunction with the infrastructural inadequacies of tertiary education, maintaining a problematic system of entrance that creates powerful social pressures which, in turn, contribute to the development of excessive central regulation and student emigration.

According to European Qualifications Framework (EQF, 2008:11), *“knowledge” means the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the European*

Qualifications Framework, knowledge is described as theoretical and/or factual. “Skills” means the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the European Qualifications Framework, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments). “Competence” means the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development. In the context of the European Qualifications Framework, competence is described in terms of responsibility and autonomy.”

For the aforementioned purposes, the Regional Director of Primary and Secondary Education in Western Greece have created the European Projects Team aiming at building teachers’ and students’ new competencies; one major outcome would be to bridge the gap between higher education requirements and future market. This indicates an evolutionary transformation rather than mere evolution of existing knowledge, skills and competencies to reinforce the educational process via transformational strategies following the European Quality Framework and to respond to the current and future labour needs in Greece and Europe. European projects are based on: (a) the project-based methodological approach that can initiate the structure for authentic learning; (b) the direct implementation of related EQF knowledge, skills and abilities in authentic projects and thus, learning environments; and (c) working towards Community Innovation with the necessary engagement of the local and regional authorities for social and community innovation and project results sustainability. In this way, students widen their participation and horizon from the small locus of their school to the wider local, regional, national and European community with their active engagement.

The paper progresses as follows: in the first section the project-based method is discussed and proposed as one effective way to enable collaborative innovation and engage student in meaningful learning activities. In the second part, the knowledge, skills and abilities required to transfer from the primary and secondary education to the higher education and work labour are proposed in order to achieve community innovation. Then, the transitional levels between the three educational levels and the ways the European projects as well as the implemented methodology to advance students’ competences are discussed and analysed. Lastly, the paper finishes with conclusions, recommendations and future trends.

Project-Based Methodology for European Projects: Authentic Problem Solving

As Greece is in the middle of the global crisis and the first country to be affected by severe austerity measures, a great obstacle at the moment is the lack of productivity in the private sector. As such, following EQF, we may need to select the most suitable learning activities framework, as part of the experiential, project-based learning. A learning activity can be described as an interaction between a learner or learners and an environment (optionally including content resources, tools and instruments, computer systems and services, ‘real world’ events and objects) that is carried out in response to a task with an intended learning outcome (Conole, 2008; Beetham 2004).

Learning activities therefore take place within a group of learners who have specific learning objectives and related tasks. For this reason, a decision on connecting the European projects related school activities had to be made. Among other pedagogical approaches derived from the associative perspective of instructional systems design, the cognitive perspective such as constructivist learning

environments and activity systems and from the situative perspective as communities of practice. Most importantly, following the national curriculum, the project-based method was obligatory implemented in the educational system; as for the regional level, participation in European projects is the direct implementation of future required collaborative competencies in real and authentic situations in the private sector. European projects provide the space for new methodological approaches, tools and techniques such as teamwork, online and onsite collaboration, project-based skills and technique providing a framework for introducing and piloting innovation. The goals of PBL are to help the students develop flexible knowledge, effective problem solving skills, self-directed learning, effective collaboration skills and intrinsic motivation (Hmelo-Silver, 2004). The six core PBL characteristics are (Barrows, 1996):

- Consists of student-centred learning
- Learning occurs in small groups
- Teachers act as facilitators or guides (referred to as tutors)
- A problem forms the basis for organized focus and stimulus for learning
- Problems stimulate the development and use of problem solving skills
- New knowledge is obtained through means of self-directed learning

Such student-centred approach can be related to the needs in the market based on the globalised economy and authentic learning environments also promoting lifelong learning. Project-Based Learning (PBL) facilitates authentic group learning with learning activities to augment user-generated context. The students build their own learning paths by analysing and supporting the steps of the learning process dealing with real-world authentic problems (Yew & Schmidt, 2011; Amador et al., 2006). Allen et al (2011:21) suggest that students working in collaborative groups learn by resolving complex, realistic problems under teachers' guidance. Although there was a debate about the PBL effectiveness, evidence supports positive PBL learning results coming from diverse disciplines especially viewed as innovative disruptive interventions within the curriculum. PBL also combines different teaching and learning styles and promotes group knowledge and skills building whereas competencies can be developed within the real context activities. Usually the students identify a project they wish to work on in an authentic context of complex, multifaceted, and realistic problems providing viable solutions to problems. The tutor's role is the orchestrator of learning activities and promotes the team coordination and learning activities. Thus, new knowledge and products creation is feasible via scientific inquiry, critical thinking and problem solving using various learning styles and forms of communication. More particularly, PBL is organized around a problem, providing powerful and innovative solutions. The innovation subject of a European Project proposal as such, promotes the creation of new and innovative products, services and solutions. The pedagogical methods and evaluation tools and techniques support students' critical thinking, problem solving, collaboration, and various forms of communication developing the so called 21st Century Skills". Working in PBL, the students themselves evaluate, present and defend their own work using different techniques as for example the experts-based Delphi technique to acquire professional evaluation competencies when they actually implementing them in their own work.

Developing Future Citizens for Local Community Innovation

One of the developing conditions for education for citizenship in higher education is for the students to be able to survive in a society of free competition, invest and spend intelligently one's resources in a free and transparent market, using in rational manner information about products and services (Essomba et al, 2008; Rone et al., 2004). Also according to the EU, part of the social competence is the ability to communicate constructively in different environments, to show tolerance, express and understand different viewpoints, to negotiate with ability to create confidence, and to feel empathy (EU, 2006). Such competencies are feasible to be developed within early engagement in learning activities as part of the European projects. A constructive perspective on the ways primary schools should direct their learning activities towards the future citizen is also available by the EU. Primary education should build upon the following seven steps: (a) sense opened citizen, (b) knowledge based citizen, (c) active citizen, (d) communicative citizen, (e) productive citizen, (f) creative citizen, and (g) reflective citizen. When we refer to 'citizen' we adapt the following five categories of common attributes: sense of identity, enjoyment of certain rights, fulfilment of corresponding obligations, degree of interest and involvement in public affairs, and acceptance of basic societal values (Cogan & Derricot, 1998). Such multidimensional citizenship model requires citizens to address a series of interconnected dimensions of thought, belief and action, referred as personal, social, spatial and temporal (Grossman, 2001): (a) personal: a personal capacity for and commitment to a civic ethic characterized by responsible habits of mind, heart, and action; (b) social: capacity to live and work together for civic purposes; (c) spatial: capacity to see oneself as a member of several overlapping communities – local, regional, national, and multinational; and (d) temporal: capacity to locate present challenges in the context of both past and future in order to focus on long-term solutions to difficult challenges. All attributes need to converge under the three key concepts in citizenship: citizenship as belonging, citizenship as rights and citizenship as participation (Pasiás & Flouris, 2011). For such attributes to be developed related to associated competencies, is required for the Greek students to proceed to Higher Education and furthermore, to the future market. In a period of crisis an innovation community is critical for Greece's development and future. Future citizens need to increasingly be able to develop what they want themselves; this concept is called "democratizing innovation," (Von Hippel, 2005) and is enhanced substantially by the widespread use of information and communication technology. This trend is not only relevant for industries and companies but also for policy makers and various social groups. Therefore, a primary goal of the Regional Directorate of Primary and Secondary Education in Western Greece (PDEDE), which functions under the umbrella of the Greek Ministry of Education, Life-Long Learning and Religion, is the evolutionary transformation rather than mere evolution of existing knowledge, skills and competencies following the European Quality Framework. Such competencies development also requires the cooperation with the local companies and organisations. For this reason, PDEDE establishes cooperation agreements with several local organisations in order to promote real life environment for the European project learning activities to occur.

Autonomous Leadership Best Practice on a Regional Level

The European Projects team's efforts are anchored in Autonomous Leadership to match to cultural

and regional educational needs. Because culture as an abstract term is hard to define, in this context we consider culture the learned beliefs, values, rules, norms, symbols, and traditions that are common to the region of Western Greece. It is these shared qualities that make them unique as the way of life, customs, and regional narrative (Gudykunst & Ting-Toomey, 1988). Consequently, leadership is related to culture. The GLOBE team was influenced by the “implicit leadership theory”; according to this theory, individuals gradually develop, beginning as young children, a set of beliefs about the behaviours and characteristics of leaders. For most individuals, details of his or her belief-set, or theory, are out of conscious awareness, i.e., they are “implicit” and a “leader” is a term applied by observers (think of them as followers, at least potentially) to someone whose behaviours and characteristics match the observers’ implicit belief-set. Implicit leadership theory is true of groups as well as of individuals as each organizational or societal culture will be associated with a specific set of beliefs about leadership. In the specific area of culture and leadership, the studies by House et al. (2004) offer the strongest body of findings to date, published in the 800-page *Culture, Leadership, and Organizations: The GLOBE Study of 62 Societies*, known as the GLOBE studies. To describe how different cultures view leadership behaviours in others, GLOBE researchers identified six global leadership behaviours: charismatic/value based, team oriented, participative, humane oriented, autonomous, and self-protective. Across all 62 societal cultures, the “autonomous” CLT is rated from a low of 2.3 to a high of 4.7, meaning that business people in most societies believed it to moderately inhibit good leadership. At the level of the 10 societal clusters, Eastern Europe yielded the highest mean score of 4.20, closely followed by Germanic Europe at 4.16; both are barely above the scale’s neutral mid-point. Therefore, for the Eastern European countries, an ideal example of a leader would be a person who was first and foremost independent. Based on the GLOBE findings, *autonomous leadership* is the selected approach and refers to independent and individualistic leadership, which includes being autonomous, innovative and unique for the Western Greece region. For this reason, PDEDE suggested a new hierarchical structure to the Greek Ministry of Education, Religious Affairs, Culture and Sports. Based on a decentralized approach, and suggesting the regional decision making to become more related to the regional needs, PDEDE as well as the regional Educational Directorate of Crete suggested for the European Projects teams (EU PDEDE) to become more flexible by acquiring a unique internal structure. Based on the success of acquiring 1m Euros for the schools in Western Greece for the academic year 2011-12 from the LLP Programme, the innovative proposition would provide the EU PDEDE members flexibility and autonomy compared to the main systematic and rigid hierarchical and thus bureaucratic hierarchical structures as indicated by the Greek system. In this way, transitional levels between primary, secondary and the higher education would be customized as needed in the region taking advantages individual talents and competencies and relate educational with local economy and prosperity.

Preparing Future Higher Education Students and Citizens

The beginning of the 21st century found everyone in a crisis reflected in different areas of everyday life. As Greece is in the centre of the European crisis the higher Greek education system is called to respond rather than reacting for innovation and change. As this change needs to be related to each educational level in a transversal way, the Regional Director of Primary and Secondary Education in Western Greece (PDEDE) and the European Projects Team (EU PDEDE) employed several methods and techniques to develop students’ new competencies so to bridge the gap between higher

education requirements and the future market. Such evolutionary transformation is anchored in authentic in-situ problem solving and in particular in Project-Based Methodology for European Projects for a student-centred approach that also prepares citizens for lifelong learning and local community innovation. In order to do this and following recent leadership research, autonomous leadership was selected to address these needs on a regional level. Following this perspective, PDEDE suggested a new hierarchical structure to the Greek Ministry of Education, Religious Affairs, Culture and Sports for the regional decision making to become more related to the regional needs; also, based on the successful pilot implementation in PDEDE which brought about 1m Euros to the schools in Western Greece, the European Projects Team to become part of the official hierarchical structure employed for all Greek regional education offices. In this way the opportunity for innovative international projects and authentic learning via real problem solving can develop new competencies based on the European Qualifications Framework. Nowadays, the demand for quality higher education that meets the market demands continues to grow. Higher education is currently seen as a driver for innovation and economic development, a path to unfold opportunities for each individual related to employment, and most importantly, a tool for personal empowerment and citizens' engagement. In this digital era of networking, 21st century challenges can only be addressed through international collaboration by individuals and institutions with international capacity, skills and knowledge; therefore, higher education institutions must prepare students to operate in an environment where people, ideas, technology, and information are flowing ever more rapidly across borders. However, this can only be successfully implemented if Universities and Schools share these common principles, beliefs and values tied to democracy, innovation, autonomy and economic prosperity. To put it in a different way, Universities, National Ministries of Education, Regional Educational Institutions and local schools could explore more intensively their relations with regard to educating future citizens working and innovating on an international level. Such citizens need to be competent to develop autonomous leadership, knowledge and skills, even, in demanding situations and enable themselves to promote educational, economic and social progress and international engagement in their societies and communities as well as to unfold their talents and pursue their own individual goals. In this way, the future Greek students will be qualified to meet the radically altered external educational environment which impacts citizens' future in Western Greece.

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Lambropoulos N. – Reinhardt R. – Mystakidis S. – Tolis D. – Danis S. - Gourdin A.: Immersive Worlds for Learning eXperience+, engaging users in the zone of proximal flow in Second Life

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Virtual Collaboration in Immersive Worlds

Education is generally acknowledged as one of the crucial components of personal and professional development. The integration of Information and Communication Technology (ICT) in education as well as the social and collaborative nature of the Internet provided another medium for communication and training. In his foreword for the UNESCO report (2002), Daniels said that within a short time ICT has become one of the basic building blocks of the modern society. The current shift occurring in the Web from a static content environment where end users are the recipients of information - defined as Web 1.0 - to one where they are active content creators - defined as Web 2.0 - can be described as a transition to a more distributed, participatory, and collaborative environment (Delich, 2006). Web 2.0 is a platform where “knowledge-working is no longer thought of as the gathering and accumulation of facts, but rather, the riding of waves in a dynamic environment” (Downes, 2005). To Berners-Lee (2007), the Web is not only a technological tool but also a social phenomenon that enables collaboration and creativity. Nowadays, the term Web 3.0 has been used for a variety of applications which have widened the classical Web 2.0 platforms. One of the Web 3.0 definitions includes 3D environments that can be modelled entirely by the user. Since the experience of moving in such virtual places can be described as “immersive”, a general term of “Immersive Worlds” has been set for software such as Second Life, Open Sim etc. or a combination of A/V communication tools. As the primary aim is collaboration and learning as a consequent outcome, Web 3.0 support virtual collaboration for quality group work and learning.

The Immersive Worlds LANETO group (<http://immersive-worlds.com/>) builds on Web 3.0 virtual collaboration for online, onsite and blended interaction for group-work and co-creation. Virtual collaboration is the basis of sociability as acting together in the pursuit of shared goals. Therefore, collaboration is a coordinated, synchronous activity that is the result of a continued attempt to

construct and maintain a shared conception of a problem (Teasley & Roschelle, 1993). Collaboration is an interactive process that engages two or more participants working together to achieve outcomes they could not accomplish independently (Salmons & Wilson, 2008). Consequently, virtual collaboration allows many people *to share* in both synchronous and asynchronous time and as such, taps into collective intelligence. Today's globalised markets, with their distributed corporate functions and complex supply chains, old boundaries – physical, cultural, and organizational – are melting away. Virtual collaboration enables flexibility, creativity and innovation without benefit of a physical environment associated with traditional organizational structures of the 20th century. The ICT as the mediator platform for virtual collaboration in Immersive Worlds is mainly used for interactive meetings, virtual training, decision making, group co-creation, innovation management, creating communities of practice to name a few. Software tools and solutions like Voice-Over-IP, web meetings, virtual classrooms and virtual worlds enable a strong potential for synchronous collaboration experiences which are highly engaging. In addition, such activities include a great potential for joyful learning within groups.

Immersive worlds are multi-user virtual environments that facilitate users from both public and private sectors for creative group virtual collaboration. Immersive Worlds means upgrading the reality and pushing the boundaries of space as well as imagination, with quality services bundling the whole life cycle of synchronous online collaboration, from the planning, via preparing necessary items, running sessions and following-up such activities. Quality refers to fitness for purpose, and in this context it examines its relationship to socio-cultural collaboration, associated design and learning as a derived outcome. As such, we propose the following taxonomy model for Immersive Worlds Virtual Collaboration (Fig. 1).

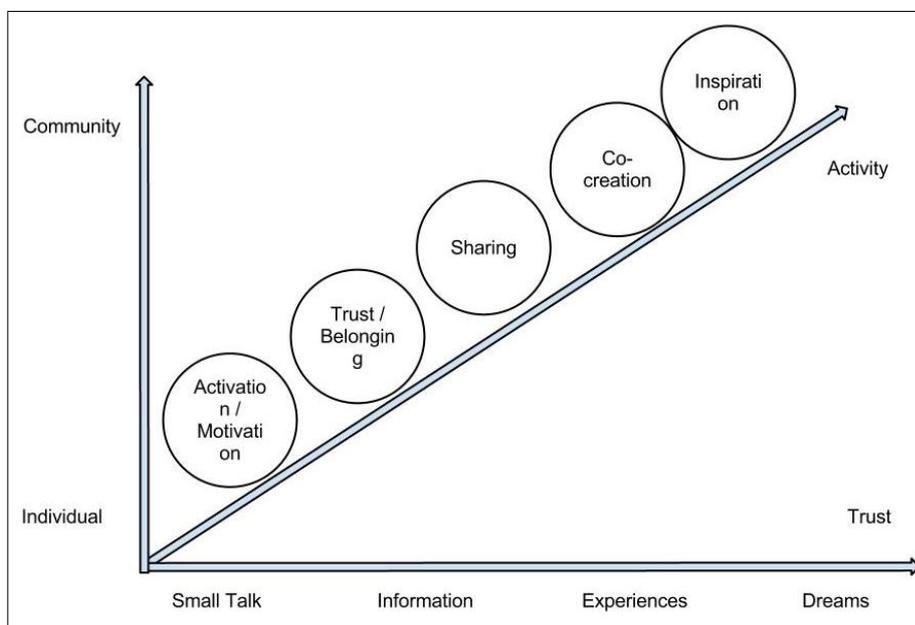


Fig. 1. Immersive Worlds Taxonomy

Depending on the different users'/students' needs the proposing evolving taxonomy supports virtual collaboration and co-creativity for small group, network as well as community members for sharing information, experiences and ultimately converge their dreams. This is possible by the active

engagement in the planned activities via the steps of activation/motivation, building trust and belonging for sharing and co-creation that will lead to further inspiration and imagination. Such taxonomy can be applied to diverse working and learning environments successfully, for short and long term sustainable results adding value to every member's activity and task with the organisation or company. For such taxonomy to work the mediating virtual environment is of crucial importance as it provides opportunities as well as presents constraints that need to be considered for planning and appropriate execution.

3D Virtual Environments and Immersive Worlds: Learning Experience+

Immersive Worlds are being leveraged to add value to enterprise learning and collaboration; therefore a 3D learning design is essential. Learning in 3D can be used for any learner such as executives, managers, faculty members, students and anyone on lifelong learning. 3D virtual worlds include multi-user virtual environments such as Second Life (SL); these are digital representations of the real world where human-controlled avatars evolve and interact (Lambropoulos et al., 2011). Second Life consists of viewer software that can be downloaded and installed; the program is booted each time the user begins a new inworld session within Second Life graphical worlds. There are two ways to access such environments, via a browser and via an installed viewer. In our course implementation we used Second Life installed viewer.



Fig. 2. The Immersive Worlds Team in Second Life

Course implementation in Second Life is anchored in initial immersion in the environment based on virtual collaboration. According to Corder and U (2010), virtual collaboration requires soft competencies such as effective communication, and the ability to build trust and understanding; such competencies are essential to build upon group common aims and directions. 3D virtual environments such as Second Life would not only enhance users' experience, but could provide the solution for socialisation, collaboration and synchronous communication as well as building development of intercultural competences. Emails and discussion boards 'lack the immediacy' for relationship building and create sustained bonds that are necessary for group activities for richness in

human interaction.

Dynamic interactions take place via users' Avatars working as alternative egos facilitating the development of empathy among the users; supported by such enriched environment, they also aid in building immediate strong ties between the group members. Such acceleration of the socio-cultural part of learning leads to rapid immersion for virtual collaboration. In SL, all educational material is integrated into the tools provided; also virtual interactions are immediately seen by all participants. Thus, SL unlocks different training possibilities for advanced Learning eXperience+ (LX+). Next, we are going to discuss each of the previous key elements and their implementation in Second Life building on the Zone for Proximal Flow:

1. *Repeating as in trial by error*: Multimedia educational material is inserted in the tools available in Second Life being available for the users/learners to study at their own convenience, repeating their own activities towards shared objectives until they reach them, within a specific timeframe.
2. *Engagement in immersive educational practice and ZPF*: Immediacy, profiling, self- and group- presence (Lambropoulos et al., 2010) facilitated in Second Life activates empathy. In this way the group members pass the first social threshold for their own actualization; on a second level, group active engagement is enhanced and accelerated and thus the group members can stay longer in the ZPF.
3. *Purposefulness as providing meaningful targets for the skills in need*. Shared goals visions and objectives lead to shared dreams for the group, network or/and community to reach.
4. *Strong, Direct, Immediate & Measureable Feedback*: Feedback is the key to improvement; 360 degrees quality feedback (also called Multi-Rater Feedback, Full Circle Feedback or Upward Feedback) enables individuals to work towards overall effectiveness for permanent improvement.
5. *Learning Experience+*: All of the above key elements contribute to enhanced experience that can lead to learning. Enhanced experience in Immersive Worlds creates a strong vibration to remember, change of behaviour is the ultimate learning result.

Learning results in the change of thinking, understanding and behaviour that can be measurable compared to specific indicators before the virtual collaboration intervention. Learning Experience+ (LX+) is the creation of immediate, deeply immersive, meaningful and memorable learning experience in Immersive Worlds. Thus, it is appropriate, satisfying, successful, and related to the educational and humane values, also directed towards the specific learning objectives for each course or session to suit three types of workers or students: the ones who show up and do exactly as they are told; the ones who show up and do the tasks exactly as told as well as work and push themselves and reflect getting better than the previous ones; and the ones who show up having thought about how today's session fits into the larger goal and picture. They work very hard, pushing themselves into the discomfort zone over and over, with full commitment, they reflect/analyze/critique their performances trying to achieve "the quantum leap" within the Zone of Proximal Flow (ZPF), which is discussed next.

Zone of Proximal Flow (ZPF)

Distance training is accelerated and deepened engaging trainees within a learning zone, called the

Zone of Proximal Flow (ZPF). In ZPF peer-to-peer learning occurs between the borders of creative challenge and anxiety for innovative thinking. Nowadays innovation via virtual collaboration occurs within groups where the mix of 'older' and more experienced with 'younger' and less within coherent framesets is of great importance. In fact, it has been proven that such perfect mix is the foundation of great success (Lehrer, 2012). Knowledge acquisition and symmetry are needed in such groups are based on the alignment of asymmetrical interactions between more capable peers (Vygotsky, 1962). Vygotsky introduced two significant concepts, the "zone of proximal development" (zpd) and "scaffolding"; the individual could reach a higher level of development with the help of a more capable other. Socio-cultural learning attached significance to the level of symmetry/asymmetry between the members of a group. Creative flow is the self-engagement in virtual collaboration activities which require skills just above their current level. Thus, for Csikszentmihalyi (1996), exploratory behaviour can be explained by an intrinsic motivation for reaching situations which represent a learning challenge. Internal rewards are provided when a situation which was previously not mastered becomes mastered within an optimum amount of time: the internal reward is maximal when the challenge is not too easy but also not too difficult. Creativity is a combination of personal interest and a sense of discordance in the environment, and thus the creative process is a search for interest and novelty by changing the environment to reduce discordance (Martindale 1990).

In small group collaborative eLearning taking place in 3D Immersive Virtual Environments users/learners interact with the environment as well as between them or/and the tutor (i.e., human-human interaction). 3D Immersive Virtual Environments provide the space to curiosity, desire to learn, and ability to gain imaginative insight into a domain. This demands a proper integration of the conative dimension. As we conceive it, conation is a central aspect of the creative imagination, which, while certainly involving cognitive and affective aspects is clearly not exhausted by these. The Zone of Proximal Flow (ZPF) is the area where flow occurs within the zone of proximal development. In this way learners' interest and engagement counteract the anxiety experienced in the creative flow. However, in order for the learners to experience ZPF for an enhanced learning experience, immersion is required.

Capturing attention to promote deep engagement facilitates students' involvement in mental state of flow. Flow happens when a person in an activity is fully immersed in a feeling of positive energized focus, full involvement, and success in the process of the activity. Ultimate individual or group performance occurs when harnessing the emotions and positively enhanced, channelled, energized, and aligned with the task to promote ultimate learning and performing. There are ten factors to promote flow and not all of them need to happen simultaneously to experience flow: 1. Clear goals where the challenge level and skill level should both be high; 2. Concentration and focused attention; 3. Loss of feeling and 4. Distorted sense of time as in immersion; 5. Direct and immediate feedback; 6. Balance between ability level and challenge (the activity is neither too easy nor too difficult); 7. Sense of personal control over the situation or activity. 8. The activity is intrinsically rewarding, so there is an effortlessness of action; 9. Lack of awareness of bodily needs; and 10. Absorption into the activity.

There are also three conditions that are necessary to achieve the flow state: (a) Orchestrating activities with a clear set of goals so to provide direction and structure to the task; (b) Balancing between the perceived challenges of the task and own perceived skills. One must have confidence

that he or she is capable to do the task at hand; and (c) Providing clear and immediate feedback to adjust performance so to reach the targets.

The Innovation Management eCourse: Virtual Collaboration for Creativity and Open Innovation

The markets are more and more segmented leaning out for individual customized solutions and more and more the “client” is also “producer” involved in the international value chain. This new reality reflects new competencies needed by university students powered up by co-creativity and innovation co-construction and peer production (Leadbeater, 2007). This is also stressed by the European Qualification Framework (EQF, 2008); learning outcomes are specified in three categories – as knowledge, skills and competences. To get an effective the cooperation between actors holding different culture is not “an easy thing”. As experience can show projects can be slowed or stopped by intercultural discordances (D'Iribarne, 2012). Intercultural cooperation especially in online education is now a reality for many of our students at ITIN and perhaps it is a coming future for many institutions, educational organisations and training companies for Computer Supported Collaborative Work and Learning (CSCW/L). The innovative aspects of the Innovation Management eCourse are the following:

- Promote entrepreneurship and innovation knowledge and skills in action
 - Apprenticeship within authentic environments
 - Activating the multiple intelligences
- Reduce transactive cost for virtual collaboration
 - Accelerate team-based work and learning by condensing a semester in a week
- Create sense of belonging in a working group
 - Define specific purpose within a specific time span
- Orchestrate collaborative learning convergence
 - Activities coordination and knowledge team building
- Promote synergy for direct fit between
 - Social needs, working demands &
 - Virtual collaboration and educational tasks, methods and tools
- Use 3D Immersive Worlds to enhance two ways communication for virtual collaboration

Conclusions and Future Trends

In the late 20th century and early 21st century numerous organizations started taking advantage of virtual collaboration employing 3D Immersive Worlds advantages such as the feeling of space, the immediate familiarisation with the participants based on emotional intelligence, small interventions in existing courses can make a difference, people's behaviour in a realistic way among others. Organisation and Planning in Immersive Worlds are of great importance to orchestrate and enhance knowledge, skills and competencies acquisition in a very short time such as within a crash course. Such accelerated virtual collaboration which can result to learning is possible only with careful and detailed planning and preparation as well as use of appropriate tools. The next technological step will go through the integration of Virtual and Augmented Reality Technologies at our fingertips as 3D Immersive Worlds evolution (Morris &, 2012; Tang et al., 2012; Hedman, 2011). Thus, by providing the user more immersive multisensory stimuli (e.g. touching, movement capture, haptic sensor) the emotional channels (affective computing) will be enhanced resulting in the ability for the systems to adapt to diverse users creating novel and unique immersive experiences.

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Lane A. – Darby J.: Fostering communities of open educational practice: lessons from the Support Centre for Open Resources in Education

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Introduction

Open educational resources (OER) have become a notable feature of worldwide debates in higher education ever since MIT launched their Open Courseware initiative in 2001⁴⁷. This has recently culminated in the 2012 World Congress on OER in Paris sponsored by UNESCO⁴⁸. However in more recent years there has been as much discussion of how OER are used rather than how they are published and that they are an enabler of a wide set of open educational practices⁴⁹.

Another ever present feature of these debates and discussions is the sustainability of OER and OEP. While early debates focused on institutional business models (e.g. Wiley, 2007) there has been an equal level of interest in how educational practitioners would accept and embed open resources into their practices (Geser, 2007). While there may inevitably be tensions between the requirements of institutions and practitioners in being open and in sharing the production, use and reuse of resources both groups need to be involved for significant progress to be made. Equally, since sharing is at the heart of the philosophy OER and probably OEP, collective and cooperative activities between people and institutions are likely to be a key factor in the sustainability of such practices. And one way to think about such collective and cooperative activity is as communities and/or networks of practice at the individual level (Lane et al. 2009) and in terms of open innovation at the institutional level (Van Dorp and Lane 2011; Lane 2012a) where as noted by Gassmann *et al* (2010) '*Institutional openness is becoming increasingly popular in practice and academia: open innovation, open R&D and open business models.*' Open innovation, as discussed by Enkel *et al* (2009) has three core processes:

1. The *outside-in process*, where the organisation enriches their own knowledge base through external knowledge sourcing – a process made easier for Universities with open access publishing;
2. The *inside-out process*, where the organisation gains revenue by bringing ideas to market and

⁴⁷ <http://ocw.mit.edu/about/our-history/>

⁴⁸ <http://www.unesco.org/new/en/communication-and-information/events/calendar-of-events/events-websites/World-Open-Educational-Resources-Congress>

⁴⁹ <http://www.oer-quality.org/>

multiplying technology by transferring ideas to the outside environment – early adopters have benefitted from the release of OER through increased enrolments and new grants;

3. The *coupled process*, where there is co-creation with (mainly) complementary partners through alliances, cooperation, and joint ventures during which give and take are crucial for success – many ventures such as OCWC and OERu depend on this.

However the focus of this paper is on collaboration between individual educational practitioners more than between educational institutions.

Communities and networks of practice

In recent years there has been a growing interest in Communities of Practice (Wenger, 1998) and Networks of Practice (Brown & Duguid, 2001; 2002) in connection with informal knowledge gathering, notably in the fields of education and both knowledge management and innovation within organisations, but also in fields such as healthcare and computer science (Hildreth and Kimble, 2004). These concepts have been used both as an analytical framework and as an intervention tool (see, for example, Koliba and Gajda, 2009). Part of the appeal of these concepts is that they may also be viewed from a very practical viewpoint to think about ‘real world’ situations, rather than simply as academic devices.

Although the idea of communities of practice has been around for many years, it was first made explicit by Lave and Wenger in their work on apprenticeship and situated learning (1991). Around the same time the notion of networks of practice originated in the work of Brown and Duguid (2001), who applied the term to the relations among groups of people with looser connections than expected in a Community of Practice. Lave and Wenger (1991) define a community of practice as “*a set of relations among persons, activity and world, over time and in relation with other tangential communities of practice*” (p. 98). In simple terms, communities of practice are groups of people who share a common pursuit, activity or concern. Members do not necessarily work together, but form a common identity and understanding through their common interests and interactions. Many different communities of practice exist and we may all be members of several, for example, through our work or hobbies. They are often informal and self-managed. For some communities of practice we may be a core member, whereas for others we may sit on the periphery. Communities of practice are repositories of explicit or formal knowledge as well as the less tangible tacit, informal knowledge, and hold the key to any form of change process (Brown and Duguid, 2001). They are inherently stable and it is this stability that allows learning within and around the community to take place. Wenger (1998) identifies three aspects of communities of practice that work together and that may either hinder or enhance learning (Table 1):

Table 1 Three aspects of Communities of Practice

Aspect	Features
Mutual engagement	Members come together because they are engaged in actions whose meaning they negotiate with one another. They develop shared practices and are linked through their mutual engagement in such activities.
Joint enterprise	Members work together, explicitly or implicitly, to achieve a negotiated common goal, which may or may not be officially defined.
Shared repertoire	A common history and culture is generated over time by shared practices, stories, tools, concepts and repeated interactions. Writing, routines, rituals, ways of doing things and so on, become a common repository.

There has been a growing academic interest in what happens beyond communities of practice, in the informal or formal organisational networks within which a community of practice may sit. Podolny and Page (1998) define networks as *“any collection of actors that pursue repeated enduring exchange relations with one another and, at the same time, lack a legitimate organisational authority to arbitrate and resolve disputes that may arise during the exchange”* (p. 59). Many networks are viewed as having a structure whereby at the core are those members who are closely tied to each other and at the periphery are members who have more ties to core members than to each other. The concept of networks of practice is distinctive in that it recognises that there may be people beyond an organisation within which an individual is situated, who share their practice or may influence that practice through their own practices.

Networks of practice have the same features as communities of practice (their subset) but may have weaker ties. What binds the network together is shared practice, and extensive shared practice leads to extensive shared know-how (Brown and Duguid, 2001, 2002), although some of that knowhow may come from exchanges with others outside the network. In relation to innovation, Deroian (2002) drawing on the work of others, argues that individuals (and potentially institutions) are embedded in a relational network and the opinion of potential innovation adopters is thus subjected to social influence. Through interactions with other potential adopters, opinions on new technologies are formed and shaped. Therefore, much more is involved than simple information transmission in the adoption of an innovation; it involves revisions of judgements, discussions in a wider practice related or socio-economic system, and an individual’s receptivity to influence.

It is with this theoretical perspective that we now examine a case study of a successful community/network of practice around open educational practices – The Support Centre for Open resources in Education – looking in turn at the context before it started, the work of the Centre over its 3 years funding and its continuing legacy.

The context: OER at The Open University and in the UK

The Open University in the United Kingdom (OUUK) was prompted by the MIT initiative to consider what OER meant for its mission and in 2006 launched OpenLearn the first and biggest of a number of

OER projects (Gourley and Lane, 2008; Lane, 2012b). Through this wide range of projects the OUUK quickly became the major force in OER at HE level in the UK. This source of expertise was recognised by the Higher Education Funding Council for England (Hefce)⁵⁰ as was the need to pump prime OER activity across the sector. This Hefce, in 2009, funded two major initiatives. The first of these was the UKOER programme⁵¹, jointly run by the Joint Information Systems Committee⁵² and The Higher Education Academy⁵³. This has gone through three phases and involved over xx individual, subject community focussed and institutionally based projects and over £13 million of funding. The second was the Support Centre for Open Resources in Education (SCORE)⁵⁴ at the OUUK. Before 2009 there were only two UK universities with their own OER websites plus a small number of other initiatives and projects run under other grant schemes such as the Reusable Learning Object Centre of Excellence in Teaching and Learning⁵⁵ and the Digital repositories programme. Furthermore the sector had had access to a national repository of (closed to HEIs) resources known as JORUM⁵⁶ (this repository has since gone open to all and mainly accepts OER, partly in response to the success of OpenLearn).

The Support Centre for Open Resources in Education (SCORE)

SCORE was part of a wider OUUK National Role project whereby the University worked closely with other English Universities on issues of common interest. In terms of the OER part of this wider project the original business plan submitted to the Higher Education Funding Council for England noted:

SCORE will work to identify and promote good practice and effective strategies across the HE sector and within the OU. Central to the work of SCORE will be visiting fellows, drawn from existing or new OER projects across HE, who will work at the Centre on their OER projects, either full or half time, over periods of three to twelve months. [...].

There will be a vigorous programme to foster engagement and dissemination with events taking place in various parts of the country. Web 2.0 technologies will be used to build virtual communities and stimulate debate and exchange of ideas. The aim will be to support a community of practice at both an organisational level as an OER alliance and at an individual practitioner level, using networking to leverage the impact of the diverse set of activities. [...].

The funding for SCORE amounted to some £3 million over 3years from August 2009 to July 2012.

SCORE outputs

Over the three years of funding SCORE had three main strands: events and workshops; fellowship programmes; and OER publication.

⁵⁰ <http://www.hefce.ac.uk/>

⁵¹ <http://www.jisc.ac.uk/whatwedo/programmes/ukoer3.aspx>

⁵² <http://www.jisc.ac.uk/>

⁵³ <http://www.heacademy.ac.uk/>

⁵⁴ <http://www8.open.ac.uk/score/>

⁵⁵ <http://www.rlo-cetl.ac.uk/>

⁵⁶ <http://www.jorum.ac.uk/>

Events and workshops

SCORE was the host for 21 one day dissemination events and workshops at which there were 280 participants present but, as many of the events were also recorded, there have been another 630 people viewing the recordings. In addition SCORE supported 15 training days in media use with 100 participants from twenty HEIs and SCORE staff also participated in many other events, sometimes as an invited speaker or workshop facilitator.

As well as the one day workshops SCORE was also the sponsor for two major conferences – OER11 and Cambridge 2012 – building on OER10 which was the final major activity of the aforementioned RLO CETL. OER11 was held May 11-13 2011, in Manchester, UK with 130 attendees from 63 institutions. Cambridge 2012 was a joint conference, nominally both OER12 and the Global Meeting of the OpenCourseWare Consortium⁵⁷. This latter conference was held April 16-18 2012 in Cambridge, UK with 236 participants from 136 institutions. As well as organising these two conferences many of the SCORE fellows (see below) presented their work at these and other conferences.

Fellowship programme

The fellowship programme came in two parts. The first was what we termed full fellowships where an educational practitioner with some prior knowledge or experience of OER at an English HEI could apply to do an action research project involving OER lasting a few months. There were 31 such fellowships over the three years covering 24 HEIs. Details of their projects and all the publications that resulted are shown on SCORE's website. This includes most of them writing up a series of case studies on OER for the Higher Education Academy⁵⁸. The second was the short term fellowships whereby educational practitioners new to OER received a one week face to face residential course with preparation beforehand and further work to do in their institutions afterwards. There were 5 presentations of this course involving 58 participants from 32 HEIs.

OER publication

The final strand of SCORE work was the publication of further OUUK and other educational content of relevance to the sector through OpenLearn (amounting to some 1400 hours of OUUK and 960 hours from other sources). More specifically, a consortium of HEIs was involved in the development of two targeted websites called 'Ready for Research'⁵⁹ and 'Digital Scholarship'⁶⁰ based upon 115 and 27 hours' worth of existing OER, that went live July 2012, and both of which were constructed from 80% OER and 20% 'free to view' materials in areas where no suitable OER could be found making totals of 140 and 40 hours.

⁵⁷ <http://www.ocwconsortium.org/>

⁵⁸ <http://www.heacademy.ac.uk/resources/detail/oer/oer-phase-3-case-studies>

⁵⁹ <http://readytoresearch.ac.uk/>

⁶⁰ <http://digitalscholarship.ac.uk/>

Impact

Some quantitative impacts have already been noted but the depth of impact can also be seen in qualitative responses in terms of both solicited and unsolicited feedback on event and activities:

'The SCORE residential course was a brilliant, well organised and enlightening week'

'I thoroughly found the course interesting and engaging, it opened me up to the concept of OER; its benefits and potential integration within an institution, yet also the harsh downfalls and issues in the implementation of OER'

'A cross culture between different institutions. It reveals different and similar approaches of OER and Social Learning'

'Some really fruitful discussions around community building'

'The networking, the great quality of presentations and panels'

'More people and institutions are active in OER than I thought'

'To mix metaphors: we've passed the inflection point; we've passed escape velocity; the movement cannot be stopped'

In addition to such internal evaluation there has also been an external evaluation of both SCORE alongside other HEFCE funded OER initiatives (largely the UKOER programme) which will be used to inform further policy and practice by all those involved. At the time of writing the full review had not been completed (expected completion October 2012) but in a draft interim report from June 2012 the evaluation and synthesis team noted:

'We anticipate significant cross-over between the various UKOER and SCORE communities and activities and expect final reports and documents from this review to reflect an holistic picture of the benefits of engaging with open practice and OERs across several sectors in the UK, including various educational sectors, NHS and government sectors, 3rd sector, public sector, and private sector (including publishers).'

Impact can take many years to fully work through although SCORE can be said to have been a qualified success in that it met or exceeded its set targets and worked well in concert with other projects and programmes. However impact can also be measured in part but what happens next and not just what has happened so far.

The sustainable legacy

It was made clear at the very beginning by HEFCE that the grant was pump priming money that would not be renewed. The Open University itself then had two long term options: to continue supporting SCORE if it could attract external revenue to cover its costs or to focus on a range of

bilateral and multilateral OER projects rather than run abroad service for the sector. It also had to take account of how JISC and the HEA would continue to support OER and OEP beyond their HEFCE funding. However the changes to funding within the UKHE landscape in those three years has meant that HEFCE, JISC and HEA have all had their structures and remits revised while the HEIs themselves have had major adjustments to make as well. This was not a good time to launch a new fee paying service and so for the OUUK the decision has been to focus on the bilateral and multilateral grant funded efforts⁶¹.

However money is not everything. Having established many connections and having inducted many people into OER and OEP over its three years SCORE has facilitated a viable community of practice able to continue working together and seek new members. In particular an Open Education Special Interest Group⁶² has been established under the auspices of the Association for Learning Technology⁶³, the UK's leading membership organization in the learning technology field with over 900 individual and 225 organizational members. This Open Education Special Interest Groups thus benefits from being embedded in a wider network of practice but also provides a focused community of practice (131 members and rising) that aims to support and encourage OEP, represent OE practitioners, influence OE policy and connect with other OE initiatives worldwide. The first activity of the SIG was to promote a statement of commitment to open education⁶⁴ and the second has been establishing a planning team to organize and run OER13⁶⁵.

Conclusions

SCORE had three years to establish a community of practice. Table 2 provides our assessment of how that community matches up to Wenger's 3 main aspects of such communities outlined in Table 1. That this community will continue in the short term through the OESIG and OER13 with limited funding is not in doubt. Whether it will survive as is in the medium to long term is another matter which may be partly due to whether OER and OEP becomes mainstream rather than a specialist issue but there is little doubt that the nature and duration of the SCORE activities has provided the strongest possible base on which such a community can prosper. If it fails it will be yet another example of where initial investment is wasted because it takes more time to build communities as opposed to things.

⁶¹ <http://www8.open.ac.uk/about/open-educational-resources/&samsredir=1343646168>

⁶² <http://www8.open.ac.uk/score/open-education-sig>

⁶³ <http://www.alt.ac.uk/>

⁶⁴ <http://www8.open.ac.uk/score/make-commitment-open-education>

⁶⁵ <http://www.ucel.ac.uk/oer13/index.html>

Table 2. How SCORE activities related to the three aspects of Communities of Practice

Aspect	SCORE activities
<p>Mutual engagement Members develop shared practices and are linked through their mutual engagement in such activities.</p>	<p>Both the short and full fellowship programmes have brought together a focused scholarship and teaching practice programme. This has not just been individual links but many people have been linked to each other through both SCORE and other projects or by having their SCORE projects linked within related clusters. Fellows met as a group every month while some also taught on the residential course. Some short term fellows came from outside the UK.</p>
<p>Joint enterprise Members work together, explicitly or implicitly, to achieve a negotiated common goal, which may or may not be officially defined</p>	<p>This was implicit throughout much of the three years through the shared activities and aims of SCORE but was made explicit through the statement of commitment</p>
<p>Shared repertoire A common history and culture is generated over time by shared practices, stories, tools, concepts and repeated interactions.</p>	<p>The wide variety of SCORE events and activities meant that many participants were involved in several of them and over long periods of time. Once a SCORE fellow always a SCORE fellow was one saying that is carrying forward into the OESIG. The strong focus on action research and the scholarship of teaching and learning has meant that a rich story and history is unfolding.</p>

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Malik B. – Cacheiro M.L. – Mata P.: Students' profile and competencies in networked curricula-the main actors

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Introduction

This paper is based on one of the chapters of the Handbook on Networked Curricula, one of the products of the European project *Networked Curricula – fostering transnational partnerships in Open and Distance Education and Blended Learning (NetCu)*, funded by the European Commission under the Lifelong Learning Programme and coordinated by EADTU (which has been presented earlier). Dealing with several issues relevant in the setting up of networked curricula, one of the chapters focuses on students and their characteristics. The chapter was written by the authors of this paper, reviewing the relevant literature and extracting information from the questionnaires that had been previously elaborated by some of the partners and filled out by all partners in the consortium, regarding their own networked curricula.

We address the profile of the users of networked curriculum programs, that is, the students. As target groups, they must be at the centre of any decision made throughout the whole process of design and obviously they will be the main stakeholders, along with the academics and administrative staff, during the implementation of a program. On the one hand, students must fulfil a series of pre-requisites before entering a program, and on the other hand, they will develop a series of competencies as a result of their learning process. Thus, it is important to know what type of students follow the program, and also to define very well what is offered to them. We first refer to the profile of distance and blended education students in general, and then, based on the information drawn from the questionnaires used to collect data during the first phase of the NetCu project, we propose some categories which describe essential aspects concerning the students in the networked curricula of the consortium. The last two sections briefly point out some potential problems and suggested solutions or actions; as well as decisions to make in relation to students when planning a curriculum with other institutions.

Student profile

It is very important to be aware of the diversity of students: language, work context, and other dimensions listed further ahead. Obviously, students must fulfil the entry requirements which will depend on local / national / European / international legislations and also on the institution's policy. Besides the administrative issues (qualifications required for entry into a certain level of studies, payment of fees, etc.), there are, besides the specific academic demands, also some basic skills or previous knowledge that the students must master upon entry (specified in the entry requirements or in the study guide of each course), or be willing to acquire before completion of the study program.

But the programs must also fulfil certain conditions and take into account some basic features of potential students. According to García-Aretio (2001), when we refer to an *adult* distance education student, we speak about “...an individual who is usually a mature person, with a life full of experiences, knowledge, capacities, habits, attitudes, behaviours and interests in his (her) own educational process, characteristics that condition, filter and predictably improve future learning” (p. 157). These students are also autonomous in their learning although also quite collaborative with other students. Even though the profile of distance education students has changed over the years, and there are increasingly younger students accessing studies based on this methodology, many recently graduated from secondary education, this description of an “archetypical” distance education student is still true, whether a mature adult learner or a young adult, and it also depicts students in blended learning. This does not mean that students in exclusively face to face environments do not have these attitudes and experiences, but those in distance and blended education are more likely to show this pattern. In a further study we should also include specific characteristics of mobile students.

In the case of postgraduate distance students (Alvarez & Lozada, 2009, pp. 20-21), these are mostly adult students who know what they want and sort it out, their study goals are clear and they value the importance of knowledge, of personal achievement and self-fulfilment. They are also usually self-aware about their needs and abilities, and have a good command of time management skills for study periods and for the delivery of their assignments, which makes them more successful in the pursuit of their studies.

Students in distance or blended education usually share the following characteristics, which must be taken into account in the planning and development of any program (Alvarez & Lozada, *op.cit.*):

- They are very *heterogeneous* in age, occupation, motivation, experiences and interests, to which we would add different abilities, languages, and learning styles.
- They usually have *professional, family and personal responsibilities*, in addition to their courses' demands.
- They generally maintain *a high level of motivation* for study and demand a high level of tutoring and quality throughout the educational process.
- They are seriously *concerned about the outcomes of their learning*, show great *responsibility for their studies*, and in many cases they have a developed sense of guilt about unfulfilled expectations.
- They immediately *integrate their knowledge into their professional and daily environment*, which makes them very critical about all learning.
- They *place emphasis on learning being practical*⁶⁶.
- Their learning experiences and their previous knowledge influence their attitude towards new studies.
- *Difficulties* in their study process such as: *shortage of time, tiredness, fear of failure* or not reaching expectations, may hinder their learning, and make it slower.

Among the main principles of student-centered learning considered by the European Students Union (Attard *et al.*, 2010), we can highlight the following:

- Students have Different Learning Styles
- Students have different needs and interests
- Choice is Central to Effective Learning (students like to learn different things and hence any offer should involve a reasonable amount of choice)
- Students should have Control Over their Learning
- Students have Different Experiences and Background Knowledge

In the design of a study program it is necessary to include the learning outcomes, which is what a learner is expected to know, understand and/or be able to demonstrate after completion of learning. They are defined by the academic staff, but this process should also involve student representatives. Competencies are obtained or developed during the learning process by the student / learner. They represent a dynamic combination of knowledge, understanding, skills and abilities, and can be classified in three types (Tuning, 2006):

- Instrumental competencies: cognitive, methodological, technological and linguistic abilities.
- Interpersonal competencies: individual abilities such as social skills.
- Systemic competencies: abilities and skills concerning whole systems – combination of understanding, sensibility and knowledge.

These competencies cover both generic and specific skills. These will depend on whether the program is graduate, or post-graduate (as skills will differ for a Master's or Bachelor's student), and in the case of specific skills, it will depend on the nature or area of study of the program. The Tuning

⁶⁶ As evidenced also in the NetCu Project case studies: "*Students highlighted the need for more practical skills, and a good balance between theory and practice*" (**Digital Library Learning**).

project has defined different competences according to the level of studies.

In order to promote good practices in higher education environments we share with UNESCO the following idea, which should be at the basis of any program, besides the specific content of the studies, if this is the kind of society we want:

“Education for global citizenship embraces the ideas of peace, tolerance and mutual understanding, human rights education and related educational themes (...) promoting intercultural understanding, inter-faith dialogue, respect for diversity and empathy.”
(UNESCO, 2011, p. 23)

As highlighted in the Anadolu University-Empire State College, State University of New York e-MBA Program Project: *“Some of the characteristics of successful candidates include a strong academic record, international awareness, strong interpersonal skills and self-awareness”*.

From the analysis carried out in the project (consortium examples), in the following section we describe several dimensions in relation to characteristics of students in networked curricula.

Examples from practice (analysis of the questionnaires)

The student’s characterization is based on the data obtained from questionnaires provided in the selected cases in the Net Cu project. Among the different aspects included in the questionnaires the following categories have emerged: mobility, intercultural competence/awareness, multilingualism, autonomous learning, employability, ICT skills & transferability of skills, among others.

Mobility

Student and faculty mobility promotes excellence throughout the European Union and other third countries. Student’s mobility can be analyzed in relation to its added value and from the logistical requirements necessary to be carried out effectively. There is a full chapter in the Handbook on this issue, nevertheless, it is also included here due to its relevance regarding students, and to emphasize the fact that students who enter networked curricula should be willing to engage in mobility at some stage of their study program. For those who have serious difficulties in moving to another city or country for a period of time, there is the possibility of engaging in virtual mobility, not yet fully extended, but which is gradually being considered as a feasible and desirable option.

A) Mobility as an added-value

Mobility is one of the processes that enables an immersion in the cultural values of different institutions, promotes students’ relationships with their teachers, raises awareness about the idiosyncrasies of institutions and countries where they operate and constitutes a strong experiential learning. Some examples of this characteristic are:

“Importance to improve personal relationship between students.” (Bachelor of Science Wirtschaftswissenschaft Project).

“Mobility certainly contributes to the success of the program, as it brings people (professors, students, administrative personnel) together. In this way, new ideas, new innovative solutions and new methodologies are transferred from one partner to another.” (OUC-SLU Educational Studies Project)

“The mobility is useful for the cultural growth of the student and to let him/her get the capability to operate in a wider (international) context.” (Information and Communication Technologies Engineering Project).

“A broad knowledge of different higher educational systems (...) giving students qualified skills and a title recognized in Europe and abroad, to allow a better access to an employment.” (Euromime 1 Project).

“Both students’ and staff’s virtual mobility are motivated by the need to bring a diversity of disciplinary, socio-cultural and geographical perspectives.” (LECHe-The Lived Experience of Climate Change e-learning Project).

“Students experience different national cultures as well as academic cultures and different ways of learning and teaching and remain at the same time the joint community of practice.” (Digital Library Learning (DILL) Project).

Part of the added-value of mobility is the networking opportunities for future personal and professional activities. As pointed out by the European Commission (2011, p. 10): *“Networking has become one of the central capabilities in mobile, knowledge-based societies”*.

B) Mobility logistics

When there is mobility involved, the logistics and administrative issues (visa, travel, accommodation, tuition fees, evaluation, etc.) are very important and must have explicit support starting from the time when students are selected and throughout their stay.

The implementation of international mobility requires to be aware of the logistics needed to facilitate the legalization and translation of the necessary documents (entry degrees), student visa (which must be renewed some cases during the stay or applied again if moving to a different country), travel, accommodation, opening bank account, etc., which implies a high commitment by students, tutors, administrative staff in the universities and the Ministries and Consulates involved. Some examples of the importance, given by the projects to this theme, are:

“Without good leadership and management even the program with high level content and reliable experts could fail.” (Digital Library Learning (DILL) Project).

“Need to develop an online unified system to manage the enrolments and some other administrative aspects (the exams scheduling, the student's career).” (Med Net'U – Mediterranean Network of Universities).

Intercultural awareness

One of the student’s characteristics should be the “ability to understand and empathise with other cultures and a willingness and ability to appreciate the limitations of one’s own national context – in short, the development of intercultural competencies” (European Commission, 2011, p. 15). They should have the disposition to interact with other students and academics, with different worldviews. But even if they do not have these abilities or attitudes at the start of the program, they can become intercultural competent, or at least aware of different perspectives, as a result of the program. It is thus very important to plan activities, besides the regular interaction among students and academics, and to give opportunities for reflection on diversity issues to promote this competence.

The students’ stay in different universities (or through virtual contact), offers them the opportunity of having a broad knowledge on different approaches to knowledge, and developing their Intercultural skills. In networked curriculum programs, they can share their understandings about each other’s’ cultures and envision solutions to questions and problems raised.

Some examples of these characteristic are:

“Both students and staff’s virtual mobility are motivated by the need to bring a diversity of disciplinary, socio-cultural and geographical perspective.” (LEChE The Lived Experience of Climate Change e-learning Project).

Multilingual

The students in international and interuniversity programs are in contact with different languages in personal and academic contexts. In Europe there is evidence that the external practices as part of academic curriculum encourage and facilitate learning a foreign language (European Commission, 2011, p. 68). Some examples of the importance of this issue are:

“The online tutoring system is available in four languages and tutors from several countries has been trained to perform the tutoring service in different languages (English, French, Italian, Spanish, Arabic).” (Med Net'U Mediterranean Network of Universities Project).

Employability

First-hand knowledge of the work context through internships gives students qualified skills and a degree recognized in Europe and abroad, allowing a better access to employment.

Internships provide practical learning and additional knowledge from the experience of those responsible for the application of the training the students are receiving. Some examples of this issue are:

“Students highlighted the need for more practical skills, and a good balance between theory and practice (...). Stakeholders have been invited to organize seminars and training activities and they are mentoring students during their internship period.”(Digital Library Learning Project).

Participation in networked curriculum enhances employment opportunities, and can help graduates/post-graduates to find a better job or to promote in the current one, as it provides the students with a broader background of meaningful experiences, interaction with others, and it increases the network of professional contacts.

“The workbook for each module supports the interaction between students and the exchange of experiences.”(LEChE-The Lived Experience of Climate Change e-learning Project).

Autonomous

A key student characteristic for success in their study and career is to develop a positive attitude towards lifelong learning using different methodologies: autonomous, face to face, distance and blended learning.

Some examples of the importance of the different methodologies and the opportunities for students to contribute with their different experiences and expertise are:

“One important aspect which can be considered as very satisfactory is the maturity of

students. Most of them are working as active teachers or school principals. An aspect which should be further improved is the poor attendance of these students in the various extra-curricula activities organized by the Open University.” (OUC-SLU Educational Studies Project).

“The program has been designed to offer ways that integrate traditional strategies with methods offered by the new technology for teaching and learning.” (Digital Library Learning (DILL) Project).

There is a great diversity of candidate’s profiles, from recent graduates to professionals. Some projects promote the combination of recent graduates along with working professionals (*Euromime 1 Project*). In other projects, candidates hold managerial positions or are responsible for teams of people in their institutions of origin, as for example the *Gate University International Department Management Project* in which candidates are Directors of External Relations Departments and/or Coordinators of international projects from Universities; or in the International Master in Heat Treatment and Surface Engineering (MINSE) project addressed to graduates wishing to obtain a Master’s qualification and individuals involved in the sector needing to upgrade their knowledge.

ICT Skills

Information and Communication skills are part of the general skills that students need to put in practice during all phases of the curriculum. The use of Learning Management Systems, web resources, communication tools (synchronous and asynchronous), etc. are general skills students must master in a networked curriculum. Some examples of the importance of student’s ICT skills are:

“The technological platform is important to implement easily all online open distance learning/teaching activities. It enhances a true sharing of resources of the partners.” (Doctor’s Degree in Digital Media-Arts (DMAD) Project).

“LMS is an important tool in the learning process used for the delivery of study material, communication tools, materials, student’s activities, additional resources, forums, quizzes, ...” (Konstruktivismus Project, Support Systems in Distance Education Project).

“A chat system was implemented in the web-platform as a synchronous tutoring online instrument, to be adopted by students to discuss about didactic aspects of the courses and to discuss in deep questions that may arise during the course delivery.” (Med Net'U –Mediterranean Network of Universities Project)

“Importance of the tool (Facebook) in the learning process: community building and teacher-students interaction.” (Digital Library Learning Project).

“The Community Portal gives students the opportunity to create their own profile, explain in what projects they are involved, discuss in groups, (...). The opinions of the learners with respect to the module are gathered using questionnaires after each run.” (Free Technology Academy Project).

“Use of interactive tools for students and professors. The main factor of success for students lies in the speed and effectiveness of responses to their questions and their problems. Particular organization of the mentoring support and tutors work.” (Science Économiques Project).

“Synchronous activities are organized using a blended model: video conferences and web lectures, student presentations, real life teacher exchanges.” (LACE - Literature And Change in

Europe - Project).

"Video lectures broadcasted." (Distance Learning Systems and Theory Project).

"The idea for a European Virtual Seminar was based on the experience of the Open Universiteit in the Global Seminar, a worldwide seminar supported by video conferences enabling students from all over the world to engage in 'live' meetings." (European Virtual Seminar on Sustainable Development (EVS) Project).

"Students present their individual works in personal e-portfolios." (Digital Library Learning (DILL) Project).

Finally, the **transferability** of skills is also mentioned in some of the cases as important within networked curricula. Students must be able to transfer the skills and knowledge gained in the program to other contexts, such as work or other areas of study. On the part of the institution, it is also important to guarantee the recognition of credits and contents in the knowledge area involved. These key/core characteristics of the student profile are essential for success in international and intercurriculum experiences.

Some suggestions to take into account when designing or implementing a networked programme

- When you plan or design a program for the first time, and if you have not done so already (i.e. as part of a project), conduct a needs analysis in all the institutions taking part in the networked curriculum, including a section about potential students and their interests/needs.
- Take into account all the aspects mentioned in this paper (and throughout the handbook) when planning the activities and methodology in general, as well as other recommendations.
- Carry out an evaluation during the program, and in the final stage (with the first promotions). Include the students as informants of this evaluation.
- Conduct a survey with students each time the program starts, or ask them to send you and the rest of the students /academics a presentation with basic information. Bear in mind the evaluation results from the previous year /course.
- Elaborate the contents in cooperation with the partner institutions, and consult the student body through its representatives when setting up the program.
- Produce a detailed study guide of the whole networked curriculum, and if there are several subject courses or learning modules, one for each one, so that students know what to expect, and to help them monitor their own progress.
- Integrate extra-curricular activities in the curriculum to ensure attendance and social interaction among students, if there is the opportunity to set up such activities (i.e. face to face sessions).
- Provide for ample collaborative work and for activities that promote and facilitate participation in the virtual settings. It is very important, however, to make sure that students know how to work collaboratively, providing some previous training to acquire the necessary skills. It is usually taken for granted that they are competent in this methodology, but it is not always the case, leading to many problems and misunderstanding throughout the course.

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Mar Desco M. - Antoranz J.C. - Rodríguez-Pérez D. - Arias-Zugasti M. - Santa Marta C.: Do you still consider your students as your customers?

Strand: **New Markets**

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Introduction

“The university is an autonomous institution at the heart of societies differently organised because of geography and historical heritage; it produces, examines, appraises and hands down culture by research and teaching” [Fout! Verwijzingsbron niet gevonden.]. The European Space for Higher Education (ESHE) has as one of its goals “to promote European citizens employability” [Fout! Verwijzingsbron niet gevonden.]. However, around one fifth of young people with higher education qualifications are employed in jobs not usually requiring a higher education qualification [Fout! Verwijzingsbron niet gevonden.].

The transposition of the ESHE to Spanish universities has introduced a new model of education, a student centered model. The student is the University’s costumer and the University has to put to work all means required for him to achieve the goal: a work-enabling accreditation. This view of the University as a “factory” producing a high quality task-force is often alluded by policy makers, above all in the current context of economic crisis. However this is not the Carta Magna Universitatum definition of University. Universities have to switch to a new business model in order to survive.

The business model is described by the offering, activities, partners, costumers, distribution channels, costs and revenues of an enterprise. A management strategy to make it work (and improve) is also required.

The objective of this paper is to find out the business model of a public distance learning university in Spain, UNED, and exemplify this model in our Medical Physics Master (MPM).

Method

We will use the well-known Osterwalder’s business canvas model in order to analyse the key elements of our business model [Fout! Verwijzingsbron niet gevonden.]. Osterwalder’s analysis is based on the identification of the key elements in a business:

- the value-added products
- the customer's target, relationship and distribution channels
- the infrastructure value configuration, capabilities and partnerships, and
- the financial aspects: cost structure and the revenue model.

The clear identification of the former two is needed to establish the entire model.

Results and example

There are two products the University is expected to produce: Carta Magna's "culture" (by research and teaching), and Bologna's "qualified labour force". In both cases, the ultimate receptor is society. We could think of a different product: the "cultural qualification" or the "labour qualification". Then, the ultimate receptor would be the student. Thus there are two possible products and two possible customers, and both determine the kind of University model (and society) we are in.

What is our value-added product at the MPM? We provide knowledge on the Physics of Medicine to people with a background on Physics or Medicine. What is our advantage with respect to other Masters (our added value)? We do not (only) provide specialized knowledge, but ways to reach it, including a first leverage course. Moreover, in the second specialization course, many course assignments come from the research experience of the Master teachers. This provides the students a direct contact with state of the art research.

And, who is our client? The knowledge (or the accreditation) we provide to our students does not enable them for working at a hospital. In fact, many of our students are already professionals working in health related areas. Does that mean that we are selling our clients something they do not need? Or is it that these are not our clients? Who gets advantage of our value-added product? Clearly, whatever we see as the University product, "culture" or "qualification" or new knowledge, i.e. research, it is not (only) single individuals (i.e. students) who take benefit from our product, but the society (and not only current, but also future society). Thus the picture gets clearer if we keep this in mind: the client is the society, and our students are our best way to reach it, our best distribution channel. Using a medical metaphor, if researchers were the lungs where oxygen is introduced inside the body, the heart pump would be the University, the students the red blood cells in the circulatory system, and the entire body the whole society.

At the MPM, we select our students based on their capabilities to successfully accomplish the demanding activities of the Master. We have introduced an admission test and kept the number of our students within a reasonable ratio student-teacher, to improve communication. In the second specialization course, our students are assigned a tutor. By the end of our Master, students are offered to continue their PhD studies with some of the Master teacher's advice. Our distribution channels will be our students (in their respective works), our participation in national and international forums on the subject (research and education) and our scientific cooperation with our partners.

What are our value-adding activities? If our product is knowledge and our customers the entire society, our activities must be directed towards creating new knowledge (i.e. research), and searching for new ways to deliver knowledge (i.e. not only teaching technologies and social diffusion of knowledge, but new perspectives on available knowledge).

At the MPM (in the second course of specialization), we propose our students open problems to be

solved based on state of the art literature. They are, thus, learning by doing and many times, contributing interesting solutions to those problems, i.e. creating new knowledge: papers and small devices that have already been presented in scientific and engineering meetings. We also participate in many national and international forums about medical physics (research and education). We are always searching for new channels to make known and opportunities to deliver our products.

What is our infrastructure and who are our business partners? We are using the infrastructure of the distance learning university (UNED) to develop our product. UNED is itself our partner (from the point of view of the MPM) although we require the cooperation of external institutions.

An the MPM we not only cooperate scientifically with the Gregorio Marañón Hospital (some of our teachers do), but also have an agreement with that hospital to organize presential sessions where the Master students get in contact with current technologies and techniques they have studied at a distance before. This cooperation is a value-added activity of the MPM.

The financial aspects will be left out of this brief analysis. Just to say that our economic sustainability (no profit is intended) is covered by the students' registration fee in a 10%. How does this account for in our business model? Our only answer is that our students are investing in the firm, because our activities are not profitable enough. We should probably improve our account balance, in order to be more self-sustainable.

Discussion and conclusion

We have identified the business model key elements of our MPM. The society, and not the students, are the true customers and those who get advantage of our product: knowledge. Our business model is logically consistent, but in one point: the new university fees require our collaborators, the students, to pay a not so small amount for their job.

Using this analysis, we have identified some weakness: we are using traditional ways to deliver our product (students, research and some diffusion through vulgarization) but we need to explore (we are just beginning to) new ways to deliver our product to the society. Only then our product will be valuable and our customers will be willing to buy (i.e. invest) in it.

University is a service for the preservation, transmission and augmentation of knowledge, this 16th century motto, is more than ever true in the 21st century information society. Neither teachers (geocentric idea) nor students (heliocentric idea) are the center of the universe: it is the whole society (galactic idea). Going back to the medical metaphor, we must not mistake between a red blood cell and the whole body.

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McGreal R. – Anderson T.: Disaggregating the University

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Introduction

In recent years, the emergence of low-cost, no frills, alternatives to many of the major service, transportation and manufacturing industries has had a major impact on different industries. No frills “economy cars” became available as early as the 1950s (Vance, 2008). No frills supermarkets and supermarket products and no frills holidays have been with us for some time. More recently we have even seen the growth of no frills prisons (Finn, 1996). One of the most well-known disaggregations has been in the airline industry, with the establishment of low cost carriers competing with established airlines. Significantly, there is also a major trend for established companies themselves to set up no frills alternatives, so as to remain competitive and retain market share across both traditional and no frills markets. Alternative lower cost services have also emerged in banking, travel agencies, accommodations, mobile telephony, stock brokering, and many others. Education has been relatively immune from such disruptive technologies perhaps because of the cost of entrance (building campuses), the support and loyalty of alumni, government funders and the conservatism and anti-commercial culture of many academics and academic leaders (Christensen & Eyring, 2011).

The existing full-service higher education model is expensive and continues to become more so. Tuition costs for students and government subsidies to higher education institutions have continually increased above the rate of inflation in most western countries. For example, in the USA, between 1981 and 2011 the increase in inflation for all goods and services totalled 115% while increase in tuition costs during that time was 498% (Wadsworth, 2011). This increasing tuition cost has not been ignored by private sector entrepreneurs - as evidenced by the rapid growth of many for-profit postsecondary companies - notably the Apollo Group that owns the University of Phoenix, the Capella group with Capella University, and many others. Response, to these entrants into the postsecondary sector from traditional public and non-profit providers has normally taken the form of censure, complaint to public funders and derision of the product (Complaints Board, 2011). Nonetheless students, acting as consumers continue to subscribe to their services.

In this paper we argue that public and non-profit institutions would be well advised to follow the lead of many other main stream service providers and create or partner together to develop and offer ‘low cost or no frills services’. These providers can benefit from the shared branding and selective

service provision, while serving to maintain market share, gain economies of scale on differentiated services, reduce costs to students and at the same time stimulate innovation in the traditional full-service side of the organization. The danger of course is that students will abandon the full-service offering and be attracted to the discount service, thus reducing even further the demand for, and profitability and sustainability of the mainstream service. However, in other sectors the activity of low cost providers has served to induce innovation but rarely to kill off mainstream providers (for example the banking sector in many countries).

Unbundling of educational services

Provision of quality post-secondary educational services in general and especially those provided at a distance consists of a complicated set of service provision, with many complementary and sometimes integrated services. These include content development, and related instructional design services, student support services, distribution and sale of learning resources, provision of library services, support for full time research faculty and graduate students, direct instruction, tutorial support, registration services and sometimes social services such as networking opportunities or face-to-face social services. Many of these services are mirrored for on-campus students, but some such as athletic services, social clubs, pubs and restaurants are not normally provided to online students - creating potential, but rarely passed on cost savings to distance students. Typically, online provision is regarded as a revenue generator by campus-based institutions, created (in part) to generate surplus funds and thus subsidize full service campus operations. For example the Chronicle of Higher Education reported that online courses at the University of Southern New Hampshire posted a substantial profit margin in the 2011 fiscal year. The university plows the surplus into buildings, salaries, financial aid at the traditional campus, and online program improvements (Parry, 2011).

The multifaceted nature of the services and costs centers associated with this aggregation of function and service provide the context for the possibility of disaggregation and removal or outsourcing of selected component pieces of this complex education system. This unbundling could form the basis for the cost advantage of many online institutions.

In the next section we examine each of these services, showing existing and emergent services that could be unbundled, eliminated and/or outsourced to collaborative partnerships or to more effective private or public service providers. We are not arguing that there is as yet any single best solution for such unbundling, but rather that institutions should look both strategically and critically at all components of their development, delivery and accreditation systems and decide which should remain in-house and which are either not core business or which cannot be provided cost-effectively. We believe that such a thorough examination and re-engineering of higher education can result in cost savings for institutions, but more importantly could reduce the tuition cost barrier and thus increase access to quality educational opportunities.

Analysis of Higher Education Cost Centres

Research: We begin with the cost centre that is potentially the most controversial, but also the one that has at least the second greatest (behind in some cases the cost of teaching) impact on learning cost - that of supporting research in the University. To many faculty, administrators and government funders, the most important function of the modern university and the defining feature that distinguishes the university from community colleges and other educational institutions is the production and dissemination of new knowledge by faculty through their research. While not denying or arguing against this important role, there can be little doubt that it is expensive and often encumbered with traditional rights and responsibilities of tenure, promotion, commercialization and mobility of faculty members. In the past two decades many universities have attempted to capitalize on the research endeavour and recover some of the costs of research through the establishment of commercialization services such as support for market analysis, securing of patents, promoting partnerships and providing incubator facilities. However, few universities have been successful at generating revenue from this commercialization. On the contrary, in many institutions, technology transfer offices have not even been cost recovery and have increased costs to university budgets (Chapple, Lockett, Siegel & Wright, 2005).

One of the most pervasive arguments for research propagated in the academy is the belief that good teaching is correlated with good researching. Or even the claim that unless one is doing active discipline research, one cannot be informed enough or competent to be a university teacher. There is little evidence to support this argument. In an extensive meta-analysis of the relationship between research and teaching (Gibbs, 1995; Hattie & Marsh, 1996), each found that there was no or very little relationship between teaching and research excellence. Hattie and Marsh (1996) concluded that "the likelihood that research productivity actually benefits teaching is extremely small or that the two, for all practical purposes, are essentially unrelated. Productivity in research and scholarship does not seem to detract from being an effective teacher and vice versa" (p. 529)

This belief in the correlation of research and teaching productivity and excellence is now very pervasive among university faculty and administrations, yet it is not a factor that defined universities for most of their existence. The classical medieval Universities of Bologna, Paris, Oxford and Cambridge, were initially funded and controlled by students, who hired professors whom they believed had and were capable of sharing knowledge. Later universities, were established to train professionals - notably Harvard - for training ministers of religion and Edinburgh for training medical doctors with little emphasis on faculty research. In later times, research was carried out mostly by gentlemen and amateur 'natural philosophers who created a research system referred to by McNeely & Wolverton (2008) as the "Republic of Letters". It was not until the 19th century that Wilhelm von Humboldt established German universities with an explicit aim of generating new knowledge and thus the laboratory became a fixture of university infrastructure. Thus, it is mistaken to argue that research has always been a defining feature of university life. However, it must be said that research and the costs of supporting that research is currently a major focus and rationale for public, government and in some countries corporate support of the modern university.

Provision of the next generation of scholars: Every institution strives to maintain and reproduce itself. In the case of the university this involves the training of the 'next generation' of researchers and teachers. It is arguable how well the university trains its faculty at teaching, and there is a tendency for professors to be unimaginative pedagogues who 'teach as they were taught' (Pocklington & Tupper, 2002). Nonetheless, if the university abdicated the training of replacement faculty (as is done by most of the private universities) there certainly will need to be alternative means created to undertake this important task. The failure of modern universities to disentangle teaching and research, especially as regards influence on both tenure and promotion, makes it very difficult for the University to induce, monitor and reward excellence in teaching and too often important personnel decisions are left to measurement of research productivity alone.

Provision of Course and teaching materials: The first generation of distance education institutions placed great emphasis on the creation of excellent teaching resources, in first print and later multi-media formats. This was in contrast (both in terms of time and money expended and resulting quality) to resources committed to classroom teaching. Typically classroom teachers, with the aid of a textbook or two and a set of informal lecture notes (now augmented by Powerpoint slides) produce individualized courseware, of variable quality and little or no editing or distribution. Both classroom and distance education courses are most often built upon the unbundled provision of a text book, created by commercial publishers and paid for, usually in addition to course fees, by the student.

The provision and widespread distribution of Open Educational Resources (OER) is beginning to disrupt both classroom and distance education models of courseware production and distribution. At present there are thousands of full post-secondary course modules available as OER online and tens of thousands of lesson modules in repositories such as the MIT-sponsored OCWC site, Rice University's Connexions, the Saylor Foundation, MERLOT, the Washington State Open Course Library, ARIADNE in Europe, and many others (Hylan, 2007). In addition, the US Department of Labour has made \$2 billion available over four years for training initiatives that must use an open access license (Department of Labour, 2011). Access to this rapidly growing font of usable learning materials has already increased the quantity and quality of informal learning. Seely (2011) notes that OER have had "the most visible impact" on individual learning however increasingly classes of students are using OER materials. The MIT OCW site alone has more than one million unique visitors a month. According to their statistics, 45% are self-learners and nearly 42% are students at other universities (MIT, 2011). These numbers do not count other OER sites or even MIT OCW mirror sites. Tufts University estimates that more than half of their visitors are independent learners (Lee, Albright, O'Leary, et al., 2008). As the quantity and quality of OER increases, they will become readily used by faculty. Already there is a large movement towards the use of open textbooks, primarily driven by their growing costs (US Government Accountability Office, 2005; Allen, 2010; Beshears, 2010).

Provision of Student Services: Most on campus and distance education institutions provide a host of services to their students. These include course and academic counselling that is designed to ensure students enrol in and succeed at courses that match their goals and aptitudes. Testing and counselling services are designed to assist students in uncovering and dealing with personal or psychological challenges. Financial services are also provided to help students budget and obtain loans, scholarships and bursaries to help them finance their education. The actual cost of these scholarships and bursaries is often covered by donations, but the solicitation for and administration

of these scholarships is a cost component of student services. Finally, many campus-based organizations provide support for clubs, social and recreational activities. Recently online institutions are beginning to offer similar services using social networks (Anderson, 2004) - though we have yet to see virtual university football teams in the Rose Bowl!

Academic teaching and/or tutoring: The provision of direct teaching and establishment of 'teaching presence' (Garrison, Anderson, & Archer, 2001) is a major cost for universities and the one that has been shown to be associated with student satisfaction, learning outcomes and persistence (Martin & Mottet, 2010; Shaw, 2009). Most of us can recall the dramatic impact of at least one teacher in our time as a university student and mostly we remember the positive impacts. Although it has taken some time, there is a growing consensus amongst researchers, teachers and students that effective teaching presence can be established online (Gunter, 2007). The provision of interactive web conferencing, continuous monitoring and participation by teachers in asynchronous forums and the capacity for teachers to monitor student activity using learning analytics tools affords opportunity for very personal, attentive and interactive teaching presence. However, such high intensity teaching is expensive, time consuming for teachers and a major barrier to online teaching reported especially by new and inexperienced online teachers (Berge & Muilenburg, 2000; Shea, 2007).

University Administration: One of the largest complaints from academics is that university administration expenses are growing even faster than those associated directly with teaching and research. University hierarchies continue to grow with more deans, chairs, vice presidents, and a host of other roles (usually accompanied with support staff). This spending on administrative growth has outpaced the growth in expenditures for teaching since the 1930s (Bergmann, 1991). Unlike in other economic sectors, few universities have chosen (or as yet been forced by economic exigency) to flatten their organizations, merge, share services or otherwise drastically reduce administrative overhead.

[Do we need and can we afford the full bundle?](#)

In the remainder of this paper we suggest which of the services can be unbundled to create a model of university education provision that entails much lower costs for students – and/or potential for profit by private interests. We examine first the most expensive and most highly-valued service (to faculty at least) of the modern university -the discovery and dissemination of knowledge.

Quality research is expensive and there have been many good arguments demonstrating the positive economic and social benefit to the production and application of new knowledge. We are reluctant to suggest that research should be eliminated from the core function of the university, but do argue that it must be rationalized, strategic and focused. We are likely past the point where individual curiosity, unencumbered by social need, relevancy and cost efficiency can be the major driver of research funding in most universities. Recent developments using networks however promise considerable cost effectiveness in research that has not been realized in many disciplines (Nielsen, 2012). The interest in 'open science', that compels or induces researchers to make transparent and available their data and the processes by which they discover new knowledge, is the basis for increasing collaboration and reducing unnecessary competition (Mukherjee & Stern, 2009). Network

connectivity and software also greatly enhances the capacity for creating new networks of researchers, sharing and archiving data, linking multidiscipline inquiry, discovery and filtering information and in other ways making research collaboration more effective and efficient.

The cost to institutional libraries for scholarly journals has resulted in a throttle on dissemination and grossly high profit margins enjoyed by commercial journal publishers (Monbiot, 2011). Open Access publishing of peer reviewed articles is growing in all disciplines and both universities and governments are taking efforts to at least encourage, and sometimes to compel, faculty to disseminate their research results in ways that are accessible globally, at little or no cost to end users.

In 2003, one of the authors published a paper (Anderson, 2003), describing an interaction equivalency theory. By this we meant that interaction - long the most important but costly component of any teaching system, from a student perspective, is generally of three types student-teacher, student-content and student-student (Moore, 1989) The first proposition of this theory is that "deep and meaningful formal learning is supported as long as one of the three forms of interaction (student-teacher; student-student; student-content) is at a high level. The other two may be offered at minimal levels, or even eliminated, without degrading the educational experience." (Anderson, 2003). In traditional print based forms of distance education, the reduced or absent student-teacher and student-student interaction is compensated by very rich student-content interaction with sophisticated learning materials. Similarly intense one-to-one tutorials with a teacher, may be sufficient for high quality learning without much peer or content interaction. The quality of such intense student-teacher interaction is exemplified by a quote attributed to James Garfield in reference to a former president of his college "the ideal college is Mark Hopkins on one end of a log and a student on the other." Finally, intensely collaborative interaction among students as emphasized in many forms of problem-based and collaborative learning can afford much-reduced student-teacher and student-content interaction.

A clear way to reduce costs, without necessarily reducing quality then, is to reduce one or more of the these three forms of interaction. The most popular form of interaction and also the most expensive for institutions, is student-teacher interaction. The broadcast media have been (and still are) used in this way to 'can' teacher lectures, discussions or experiments and thus convert these interactions into student-content formats. The reduced cost and ease of creating video and podcasts as evidenced on YouTube and especially educational channels and services such as the Khan Academy, have taken this conversion from the work of studio technicians into an end-user production technology. A second way to reduce the costs of student-teacher interaction is to substitute most or all student-faculty interaction by increasing the quality and frequency of student-student interaction. Network technologies, and especially social networks, immersive environments and low cost synchronous and asynchronous text, audio and video conferencing are now bringing the technical provision and mastery of these services down to the consumer/creator level. Two of the biggest challenges of this substitution relate to student attitudes toward and learning competence with student-student interaction.

However, these two solutions are not easily implemented. Students enrolled in formal education programs have come to expect student-teacher interaction and teacher feedback. In numerous

studies student-teacher interaction has been rated by students as the most important and helpful form component of the instructional package (Swan, 2001, 2002). Especially in countries where authority, and seniority carry very high cultural value, it seems unthinkable to develop education courses or systems without the real - or virtual interaction and feedback from a teacher. By analogy, passengers on airlines had come expect a variety of free movies to be enjoyed during a flight. However, recent policy changes from some discount airlines, that include charging for movies, show that the number of passengers willing to pay for such service is much lower, than those who watch or profess their value when they are provided free of charge.

In addition decades of research has shown the value of student-student collaborative learning in terms of increased learning in addition to the development of communication skills, improved attitudes towards formal learning and increased time on task and persistence (Gokhale, 1995; Johnson & Johnson, 1996). Yet many students and in particular many of those who are attracted to online learning, are not comfortable with or even interested in engaging in intense student-student interaction. A number of studies have identified issues of fear of freeloading, difficulty in project management and different expectations of effort and reward as creating challenges to effective group work (Swaray, 2011). Both of these factors need to be addressed if student-student interaction is to be used effectively.

The University Of the People - with the moniker the *World's First Tuition -Free Online University*, requires students to take a first course designed to improve their capacity to collaborate with, support and network effectively. There are also a number of promising web 2.0 tools with integrated versioning control, project management, notification and communications tools that are designed to enhance the technical support of student-student interaction. But perhaps most important is that students must be given a strong and compelling advantage (in this case likely drastically reduced cost) and compatible, trialable, simple and observable tools, techniques and systems (Rogers, 2003) to make a transition from student-teacher to student-student interaction.

Another means of reducing the high cost and allowing scalability is to increase student-content interaction. Dunlap, Sobel, & Sand (2007) argue that "student-to-content interaction is the key way in which students acquire new knowledge, skills, and abilities, changing students' understanding or perspective." p. 22. Thorpe and Godwin (2006) provide us with one investigation in which they conclude that it is not helpful to favour either interpersonal or content interactions, noting that there were positive and negative aspects to each. As evidenced by the strong emphasis on teaching people how to read, it is generally accepted that reading content is a reasonable and effective method for gaining knowledge, with or without the intervention of an instructor or mentor.

The MOOC (Massive Open Online Course) phenomenon, first implemented by George Siemens of Athabasca University and Stephen Downes of the National Research Council is a clear demonstration of scalable interactive courses in action. MOOCs take full advantage of the power of networks to provide learning opportunities to distributed learners using open content. MOOCs are highly automated allowing for interactions among and between learners and instructors (Mackness, Fai, Mak & Williams, 2010).

The three ways overviewed above are means to reduce the costs of formal education. However,

implementing these changes in interaction models does not ensure a quality educational experience. Since time-on-task often resulting from student motivation and time availability, has long been associated with success in both face to face (Stallings, 1980) and online teaching (Castle, 2010), it is likely to remain a key determinant of student success. Students must be actively involved for learning to occur. Thus, efforts and research should focus on ensuring student-student and student-content support that induces commitment and the motivation to learn.

Assessment and Credentialing

We are not suggesting that student-teacher interaction needs to be, or can be, totally eliminated. Rather, we should be examining means by which we can reduce the cost of this service. One of the most important functions often bundled with student-teacher interaction relates to assessment. Without assessment and demonstration of learning, no credible institute of higher education will offer credentials or otherwise certify the learners capacity to hold the degree or diploma awarded. Distance educators have for a long time been challenged with the difficulty of assessing students, whom they rarely or never meet face-to-face. The usual means of overcoming this difficulty is to have students attend campus for an examination or ship the exams to a regional testing centre or to an individual invigilator/proctor, where a supervised examination takes place. More recently sophisticated systems that include locking down students' computers, observation by web cam and keystroke identification and other forms of recognition through biometric authentication have become available. Finally there is a pedagogical trend towards the use of many forms of authentic assessment that do not require real-time invigilation including e-portfolios and project assessment in both online and classroom environments.

Universities rightfully are very protective of their role and responsibility in assuring identity, output, competency and capacity before issuing credentials that attest to these accomplishments. We have seen generations of 'diploma mills' offering bogus degrees and certificates and are well aware that the reputation of the university and value of the credential to students, potential employers and the university cannot be compromised. However, the issue is complicated by the social value of scarcity. If too many people attain a degree from a particular institution, then some may feel the value and certainly the exclusiveness of the award is decreased. Open universities have long struggled against this elitist restriction on higher learning, but the proliferation of credentials and massification of higher education and supposed 'credential creep' still inhibits many institutions from expanding their credentialing capacity.

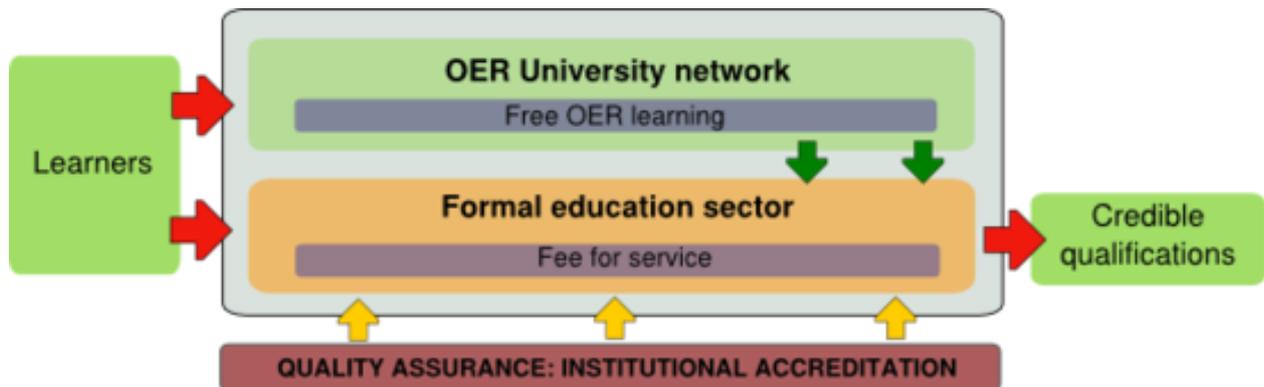
However, it must be remembered that from a student's perspective, with students fees and assessment must come accreditation. We next turn to one example of an initiative recently started by accredited universities from around the world, to pilot a radically more cost effective expansion of their education provision.

The Open Educational Resources University (OERu) Alternative

The OERu initiative is a collaboration of 13 universities on four continents that is designed to increase access to higher education by drastically reducing the cost, while maintaining quality and relying on the credentialing capacity of recognized or accredited public institutions of higher learning. The aim is to “design and implement a parallel learning universe to provide free learning opportunities for all students worldwide with pathways to earn credible post-secondary credentials” (Mackintosh, McGreal & Taylor, 2011)

The OERu model (Figure 1) seeks to leverage and support development of courses (North America) or units (Europe) built from, or created as OER. Students are encouraged to access particular courses or any combination of learning resources (high quality student-content interaction) and to create a wide variety of peer and network liaisons (high quality student-student interaction) to learn and acquire relevant skills. Partner institutions in the consortia create or acquire OER content, examinations, activities and processes by which this learning opportunity is provided, assessed and eventually accredited. This credentialing service is to be offered at prices determined by each partnering institution depending on their specific circumstances. But, in all cases the price will be considerably lower than the normal tuition rates.

Figure 1. OERu Model from Macintosh, McGreal & Taylor, 2011



Though simple in concept the OERu faces a number of operational challenges. There are, at present, sufficient OER available now to offer general Bachelors programmes. However, this is not the case in many specific subject areas. In addition, the OER may have to be localized or adapted for different cultures, translated to other languages or further adapted to different levels for a wide range of institutions. Although each institution will be offering their own credential, there will be a growing need to accept the credentials of other participating institutions.

OERu Raises a number of challenging questions – both for its partners and other institutions. Can one time or end of course testing really test competence, learning and capacity without reference to any particular learning textbook or resources? Of course high stake testing for LSAT, GREs and many professional schools is not novel, however many faculty resent the lack of interaction associated with credit awarded exclusively by successful challenge of final examinations. Secondly students will put

pressure on institutions to accept transfer credits and even lifelong learning accomplishments for credit, that may not to be allowed under current university regulations. And finally to return to the issue of low cost service provision, will the OERu alternative disrupt or even destroy the current model of the partner institutions that is based in large part on students paying high fees for their courses and credentials?

Others are already implementing open course delivery models with some attempt at accreditation using “certificates”. In the Fall of 2011, professors at Stanford University offered courses for free to large numbers of learners, providing a letter to successful learners, independent of the university though a private company called Udacity, which hopes to monetize the students’ skills (Lolowich, 2012; Whittaker, 2012). And, in early 2012, the Massachusetts Institute of Technology has announced the formation of MITx that will offer course content and grant a certificate to successful learners, although not one from MIT (News Report, 2011).

Conclusion

Network technologies and resulting social and economic innovations present disruptions to all organizations. Some industries like the sound recording and movies, retail and publishing industries have been forced to drastically re-engineer their processes and products in order to survive competition from net based alternatives. The net is a profoundly disruptive technology. As Christenson (1997) noted, disruptive technologies are often offered at very much lower cost to traditional customers, thus opening the door to new (often low-end) markets. However, disruptive technologies, though initially providing services that are of low functionality or quality to traditional offerings, over time, improve in many dimensions, while maintaining low cost or other competitive advantage. Thus initial customers are not often attracted to the disruptive technology but over time they realize that an equal or better product is available at lower cost through use of the disruptive technology. We have seen this in the move to electronic watches, tablet computers, cameras, movie and sound recording products, low cost airlines, brokerages, online retailers and other services to mention just a few.

As a concrete example of this the two faculty members sponsored a full, open online course in 2011. They were both surprised and nearly overwhelmed when over 160,000 students enrolled in the course - more than the entire student body at Stanford. Although most of these students did not complete the course 248 received perfect scores on all assignments and tests- an achievement not equalled by any of the traditional students who the course on campus As evidence of the potential disruption of this innovation the on-campus course dwindled from “200 students to 30 students because the online course was more intimate and better at teaching than the real-world course on which it was based.”(Salmon, 2012)

We think there is opportunity (and accompanying challenge) for educational institutions to be early adopters of low cost and no-frills model to avoid the on-going spiral of increased costs coupled with decreased government funding and increasing student resistance and incapacity to pay high tuition fees. To make such a transition challenges many of the traditional ideals and systems of higher education institutions based on pre-net ideals and technologies. Many will fail to adapt and go out of

business; some may continue serving an elite that can afford the high costs.

The open universities have a particular challenge and opportunity to embrace these disruptive technologies and pedagogies as these initiatives speak directly to their mandate of increasing access. If both public campuses and online systems do not adapt and move to exploit these network affordances, then it leaves a tremendous opportunity that can be filled by private, for profit entrepreneurs. Whitesides (2011) tells that the race may not be to the swift, but to the cheap, noting that "affordability in the future may be the first requirement not an afterthought."

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Monge F. – Malik B.: UNED 40th Anniversary - Universities under change

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Introduction

In only 40 years of existence, the Spanish National University of Distance Education (UNED) has become Spain's largest university, forged strong links with Latin America and Europe, and set its sights on cooperating further with institutions world-wide. Founded in 1972 to provide quality higher education to any person with the capacity to undertake higher education studies, regardless of place of residence, background or physical condition, it is nowadays among the first options for many students recently graduating from high school, as well as for the working adults pursuing additional qualifications, and those without previous qualifications seeking access to higher education. UNED is a nation-wide, state funded university (Ministry of Education), and has the same entry requirements as other Spanish universities, awarding the same level of qualifications. It is also oriented towards teaching, research and extension activities.

Continual expansion and proximity

UNED's headquarters are in Madrid, and since its creation in 1972, associate centres in Madrid and other cities in Spain were established. The network was consolidated during the 80's, and gradually increased over the years. There are currently 62 associate centres all over Spain, 136 extension classrooms, over 400 AVIP Multimedia classrooms, and an international campus with support centres in 13 countries across Europe, Latin America and Africa.

In addition to the associate centres in the different regions of Spain, the support centres abroad (*international campus*) were initially established in countries in Europe or America where there were a lot of Spanish expatriates, although the profile of our students has greatly changed over the past years. We have a strong collaboration with Latin American institutions and are now looking at forging

links in non-Spanish-speaking countries.

Due to its 'proximity'⁶⁷, its high rate of employability and its clear social orientation, it is the university with the highest number of students in Spain.

The success of Spain's open university (CUSU, 2012) is reflected by the fact it has more than 250.000 students, over 1,400 faculty members plus around 1,400 administrative staff in nine faculties and two engineering schools and almost 7,000 tutors, management teams and administrative staff in the associate centres. Students can choose between 27 bachelor and 49 master's degree programmes adapted to conform with the European Higher Education Area (EHEA), which incorporates the European credit transfer system, as well as 39 doctoral programmes. There are also 28 degrees with the old system, which are gradually being extinguished and replaced by the EHEA programmes.

Wide experience: Blended Learning

UNED places a strong emphasis on blended learning, which combines the use of a virtual platform⁶⁸ with face to face activities and tutorials at the associate centres, in order to guarantee educational inclusion. Currently, technology plays a major role in the delivery of teaching, although face to face tutoring still takes place and is widely used by students. There is an average of 20 to 30 tutoring hours in the associate centres, depending of course on the centre, and there is also a very large offer of virtual courses.

Two of our greatest strengths, and areas in which we are undertaking outstanding research and development activity, are internet sciences and the development of virtual learning environments to enhance the teaching, learning and evaluation processes, as well as interaction and collaboration in research projects. Our use of INTECCA's AVIP (AudioVisual tool with IP technology) is a milestone in this area, enabling students in multiple venues to follow tutorials online. These can also be recorded, so that those who are unable to participate in a face to face session can follow it afterwards. They are available at INTECCA's website and accessed through the students' campus, once identified. Other videoconferences are also held not only for lectures and giving guidelines on a subject, but also for conferences, project meetings, etc.

Face to face exams are an essential aspect in the evaluation of students, in addition to other assessment activities, guaranteeing the reliability of the assessment process, and allowing the students to meet professors from the headquarters face to face. A total of 311.196 exams were taken in February 2012 by students all over Spain and in the centres abroad. Faculty members from the headquarters supervise the exams in all centres, there were a total of 821 lecturers / professors travelling to the different associate centres nationwide and abroad, and tutors can also support the process.

⁶⁷ Besides the virtual courses and learning communities, there are centres in all autonomous communities and AVIP classrooms where there is no centre, so in spite of its methodology, UNED is generally perceived as being close to its students and staff.

⁶⁸ Alf- developed by a research team at UNED, it is an e-learning platform, used both for the virtual courses as well as for projects and other learning communities.

A team at UNED's associate centre of Barbastro, jointly with the Vice rectorate for Technology and other departments responsible for the exams, developed an important technological tool for their implementation: the virtual valise or *valija virtual*. Exams are encrypted and when the students pass their ID's through the scanner, the exam that corresponds to each session for the subjects he/she is enrolled in will be printed (there is a calendar with the subjects in each session for all degrees, for the access to university course, and for the exams of the Language Centre). When they finish and hand-in their responses, it is scanned, saved in the encrypted data base, and visible later on by the lecturers/professors, and the students themselves. Multiple choice tests are automatically marked. The written exams are afterwards sent to the headquarters and distributed to the lecturers/professors for their evaluation and marking, although they can also access them through their virtual campus. The virtual valise helps also to distribute the students in the room (assigning seats according to their subjects, so that those with the same subjects do not sit together), and it allows the examiners to have control all the time, when the student has entered the room, how much time they have left, etc., and if they should not hand in their exam, it is reflected on the computer. It is much easier to generate the exact data on how many students are in each session, how many exams for each session, the total number of exams, and any observations that need to be made if there are problems of any kind during the session.

Prestigious

There are more than 163 consolidated research groups, focusing mainly on five areas of research: Humanities, Social Sciences, Psychology, Experimental Sciences and Virtual Learning Environments, with some cutting-edge projects which have obtained important awards. Many lecturers / professors occupy relevant roles in other official institutions or in private practice at some point in their career, but mostly they are well known and acknowledged in their fields of expertise, and have excellent research and teaching records, with relevant publications and other achievements.

Besides the regular degrees (Bachelor's and Master's), the doctoral studies, and the access course for students over 25, there is a wide offer of other courses and programmes. There are around 600 postgraduate and continuous training courses, and 400 activities of university extension (face to face courses and other activities in the associate centres). The Language Centre offers 13 languages, with 14.500 students enrolled in the academic year 2011-2012: English, French, German, Italian, Portuguese, Russian, Arabic, Chinese, Japanese, Spanish (for foreigners), Gallego, Catalan/Valencian, Euskera (Basque Language). Other special programme will be mentioned in the next section. Each year there are also Summer Schools in different associate centres. In 2012, 160 summer courses have been offered in 32 associate centres.

Our textbooks and multimedia materials, which provide a useful self-directed learning tool, are widely distributed in Spain and some countries in Latin America. UNED has its own university press (Editorial UNED), publishing textbooks as well scholarly books based on research and scientific journals. Many books are now also being published electronically, as e-books.

The Centre for Audio-visual Aids (*CEMAV*) has a television and a radio studio. The programs produced

are broadcasted in a national TV channel, and radio stations (Spanish National Radio), and radio programs are also broadcasted in an international station due to a collaboration agreement with Radio Alma (based in Brussels). Some radio programs are specifically related to subjects taught, whereas others are aimed at a general audience. The teams at this centre also assist lecturers / professors in the production of multimedia TV programs and materials for their courses. A TV series is being produced focusing on research projects currently being undertaken. These are all available through *CanalUNED* (UNED Channel): www.canaluned.com, as well as the videoconferences that have been recorded.

Social orientation

Social responsibility is also an important feature of UNED's culture, placing a strong focus on environmental issues and responsible practices. Since its creation, UNED has had a clear social orientation, and besides striving to meet the needs of all its students in general, there are several programs aimed at specific target groups. The Access Course for students over 25 is an opportunity for those who do not have the former qualifications to enter university. This also exists in other universities, not only at UNED. Students can register in a one-year course, or take the exams independently without enrolling in the course. If they pass all the subjects, the qualification obtained is equivalent to a secondary education diploma and the entrance exam to university, so they can access a degree at UNED or in any other university, if they are admitted (students who have undertaken the course in that university have priority). There are two other options, for those over 40 and 45 years. In the first case (> 40), if a person can accredit previous professional or work experience in a specific field, related to one of our degrees, they can access that degree (only at UNED), and in the second instance (> 45), they can also enrol in a course or take the exams independently, but with fewer subjects than for those over 25 (only two), and an oral interview.

UNED Senior is aimed at citizens over 55, and it consists of short (up to 30-50 hours), face to face courses in the associate courses, with a wide variety of subjects (Psychology, nutrition, history, computer sciences, etc.). These have a diploma but are not official degrees. Citizens over 55 can access official studies through the options mentioned above (or directly, if they have the necessary qualifications: another degree or the entrance exam to the university), and of course they can also register in any of the continuous training courses, but the UNED Senior programme provides the opportunity of interacting with other peers in face to face courses, which are aimed specifically at them.

Another special programme is the agreement with the penitentiary system for Spanish inmates. There are over 1000 students in prisons, enrolled in several degrees at UNED.

Regarding students with disabilities, there are 7.686 enrolled. Exams are adapted according to their specific disability, and there are also other services offered, through the unit for students with disability (UNIDIS).

There exists a Welcome Plan for all new students entering UNED, and a specific welcome programme for immigrant students, in agreement with immigrant associations.

We also have an OpenCourseWare portal, with several open access courses (with no tutoring nor accreditation, but with up to date contents and self-evaluation activities) on a wide range of subjects, and the library hosts a digital repository where many reports, articles and other documents produced by professors and research teams can be accessed.

UNED holds the permanent secretariat and currently the presidency of the Ibero-American Association of Distance Higher Education (*Asociación Iberoamericana de Educación Superior a Distancia* -AIESAD) which has promoted IberVirtual, a project endorsed by the Heads of State at the XX Ibero-American Summit held in Mar del Plata, Argentina in 2010. The aim of this project, coordinated by AIESAD and managed by Fundación CESEV (Centre for Virtual Studies), is to promote inclusive education and social inclusion by strengthening distance education in the Ibero-American Higher Education Area.

University Cooperation to Development

Cooperation with other countries is based on the objectives set forth by the Ministry of Education, focusing on university cooperation (to strengthen education and research) and currently, UNED's cooperation plan has the following aims, among others:

1. To assist in the strengthening of provision of distance education in other countries, i.e. El Salvador, Honduras, and Nicaragua.
2. To assist in the training of specific audiences, such as teachers (i.e. Nepal, Haiti, Peru...) and facilitating access to higher education in Equatorial Guinea.
3. To promote international mobility of teachers and students, fostering virtual mobility as a means to increase opportunities to benefit from this experience.

Conclusions

In summary, throughout its 40 years of existence, UNED has been characterised by its rapid growth and expansion, its proximity, wide experience and prestige in distance education, with a clear social orientation, inclusive policies, and an innovating spirit, in constant change, committed to fulfil its mission with social responsibility and cooperating with others in the advancement of open and distance education, as a means to achieve social inclusion and excellence in education.

As Juan Gimeno, Rector of UNED states: *'Our policy is to strengthen and encourage social responsibility in the university and to develop our human capital by promoting professional development'*.

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Mortaki S.: Multimedia museums' applications, an open educational tool for further engagement

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Theoretical approach: Introduction – Museums in the digital age

Today's post-industrial society is based on information and communication speed and it is in that way rendered into a global village. Like television, radio, movies and videos, internet and press, museums produce and communicate a plethora of information. The sharp increase of information and its customers and also the globalization of means and networks have led to the emergence of centers that internationally impose certain living standards and that cause cultural degradation, marginalization of national civilizations, while, at the same time, discover new ways of improving the educative level of the broader social groups and of upgrading the role of national cultures. Museums are also called to respond to these current social demands (Martin, 2002).

Modern museums in developed countries have long ago realized the new conditions of rapid changes in media, the strong concerns in the exploitation of their new clientele along with the need to contribute in the treatment of negative situations, and have therefore adjusted their role (Papadopoulos, 1999). Modern museums are centers for information, communication, awareness and critical dialogue between the public and historical developments over time. Key concepts (memory, truth), major current issues (national identity, artificial insemination, environmental pollution) are embodied into the core themes of their exhibitions. Modern museums appear constantly to be innovative regarding their new ideas about their work, their topics as well as their educational procedures: the leaps in the field of knowledge, the significance of the time and the new technologies make that a necessity.

The educational role of the museums – historical background

The educational role of museums has been concerning specialists since the 19th century. Under the influence of the ideas of the French Revolution and the subsequent democratization of society, the museum has evolved from being the field of interest of the collectors and a limited elite circle of noble men and intellectuals into an institution that aspires to become accessible for the general public as well as serve the scientific developments. Main objectives of the museum constitute the

introduction to the specific cultural identity, the connection with the past, the development of intellectual or even artistic skills of the visitors, the knowledge of history, of the past and all the scientific developments (Kassarlis & Kalouri-Antonopoulou, 1988). The visitor's contact with its place's culture and art expressions and also with artefacts from other civilizations within the museum, offers the possibility to become a part of a specific cultural environment, to become better acquainted with the local as well as global history, to see further and evaluate the steady elements of the transforming modern cultural identity. The visitor can now determine and define the present meaning of the historical life of modern societies (Leontsinis, 2002).

Modern museums have become places that can offer unique educative experiences, based on the self-activity of the visitor/learner, the use of primary sources of information along with the contact with the real thing. The objects – artefacts constitute the basic educational tools, which are open to multiple readings. In the museum the learner meets human history, art and culture, that is materialized into immediate, effortless and natural knowledge. The activities that take place in the museum help the visitor to build knowledge through life experiences.

The experiential approach is achieved by engaging the visitor/learner with tangible objects and practical activities. He/she interacts with the exhibits, converses with them, observes, records, compares, seeks after, deduces, experiences the museum space and communicates with the exhibits by choosing the quality and the nature of that encounter (Dalkos, 2000).

Nowadays, social, political as well as economic reasons render Lifelong Learning indispensable along with the need to be provided outside the typical educational systems (Harrison et al., 2002). In Greece, museums are considered educational places since the legislative Decree of 1885 (Gazi, 1999). In that context they are transformed into active places of training, mostly historical (Xochelis, 2007), where non-formal training takes place and where learning is achieved within a socio-cultural context (Falk & Dierking, 2000). According to the conceptual model of learning of Falk & Dierking (2001) three factors with common characteristics, the personal, the socio-cultural and the physical, intertwine and influence the interactions and the experiences of the learners, who participate in the learning activities at free will. In particular, in museums the process of learning is directly connected to experience, which is activated by the exposed objects. Museum exhibits are offered for multiple interpretations and, therefore, may induce learners to seek their interpretation in order to discover knowledge (Hooper – Greenhill, 1999).

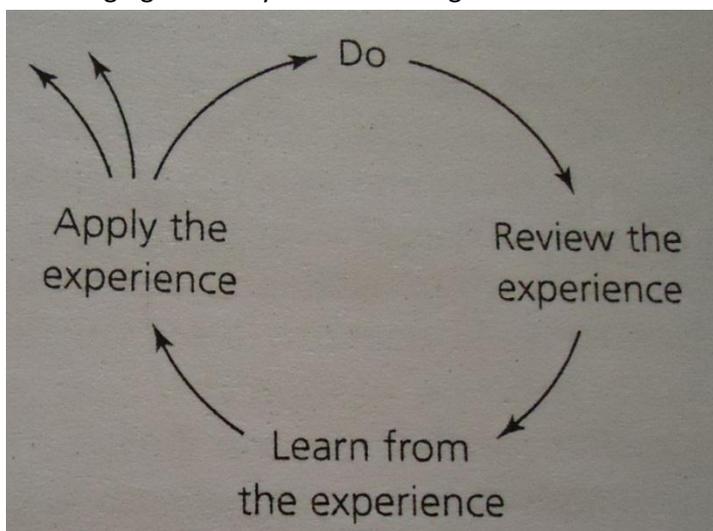
Information and Communication Technologies (ICT) in Education and Adult Education

Information and communication Technologies (ICT) render the learning process more effective and can be incorporated into the teaching of various subjects (Economou & Tost, 2008). The integration of ICT into the educational practice comprises certain advantages, as ICT:

- Promote personalized learning and learning through discovery.
- Contribute in the increase of the active and autonomous behaviour of learners.
- Promote group work.
- Confront the individual learning characteristics through differentiated activities.
- Support different learning rates.

For the role of ICT in education to be effective certain knowledge and skills from the part of the educator are required (Schoretsaniou & Vekiri, 2010).

The new technological as well as social conditions of the modern era have led to the revision of pedagogical points of view, the content and also the procedures of approaching learning. Training is conducted through a variety of approaches-formal and informal- where particular emphasis is being made on its connection to culture. The museum visit constitutes, according to the Greek Pedagogical Institute (2003), a good practice that should be incorporated into all forms and stages of education, since it becomes a purely participatory procedure. The museum contributes substantially to education, as its educational structure leads the learner away from the typical learning practices, while it encourages learning through interaction and discovery (Hooper-Greenhill, 1994). For that reason, it is argued that museum visits can be incorporated into Distance and Open Education as well, as will be explained in the following chapters. Adult learners especially are keen on learning procedures that trigger their interest. Museum artefacts, as primary learning sources, promote both research as well as critical thinking (Goulborn, 2001). In that way, learners not only process the acquired knowledge and ideas, but, most importantly, become activated to seek knowledge, ideas, values and believes in the context of the material evidence of their culture (Jarvis, 2004). In the following figure the cycle of knowledge within the museum environment is depicted.



(Source: Black, 2005, p. 133)

Museum education through ICT

The approach of the museum's content through new technologies constitutes them living learning, evolution and development centers. Thus, it improves significantly the museum's relationship with

the general public, as it becomes more accessible. New technologies constitute a valuable tool in promoting Lifelong, Open and Distance Learning both in the museum environment as well as in the assistance of teaching (Leligou, 2008). The use of new technologies in the learning process conduces that learners gain a more global view of the topic, aims at their mental orientation, their emotional involving, while it encourages them for active participation (Bounia & Nikonanou, 2008). Meanwhile, new technologies help to create a semantic and interpretative framework, which is not always possible to accredit with conventional means and that facilitates the understanding of concepts by causing emotional charge.

More specifically, the use of new multimedia technologies in the context of a museum visit in Open and Distance Education:

- Sensitizes other senses as well, except vision.
- Provokes the participants' active involvement by giving them the opportunity to explore those exhibits that trigger their interest.
- Provides options, so that the participants can adjust their visit to their own interests, knowledge and experiences, given the fact that adults construct meanings by using their experiences, knowledge, memories and imagination (Beddie, 2002).
- Appeals to people of different cognitive level and not only to the intellectual types that the institutions of formal education, like school, cultivate, in order to create experiences with resonance to a greater population (Gazi & Nikiforidou, 2008). According to Gardner (1983, 1990) each type of intelligence signifies that there are on one hand special perception skills about the understanding of reality and on the other hand different ways of learning.
- Supports successfully the social interaction between learners/visitors (Galani & Chalmers, 2008).

The museum visit (conventional or virtual) with the use of multimedia museums' applications can therefore be successfully incorporated in Open and Distance Education as a participatory technique, as it:

- Constitutes an active procedure of knowledge building through or centered to the actual objects/exhibits (Bounia, Oikonomou & Pitsiava, 2009).
- Promotes the active participation of learners, who are motivated both by their internal impulses and also the received external stimuli. Their actions create and shape their learning condition (Kokkos, 1999).
- A fruitful discussion is created and the learners' judgmental ability is nurtured (Kelly et al., 2002).
- Connects education with society and culture.
- Helps in the consolidation of knowledge.
- Provides the opportunity for the participants to observe situations, functions and applications that cannot be easily represented in the conventional classroom (Kokkos, 2005).
- Through multiple readings, it motivates the interest for further enquiry and learning, causing further engagement (Kyrdi, 2002).
- Contributes to the acquisition of skills that enable the participants to take control of the interpretative process (Oikonomou, 2004).
- Activates the learners' creativity, emotional expression and imagination (Kokkos, 2011).

The use of multimedia museum's applications for virtual visits and also museums' educational games contribute to the experiential approach of their content (Pyrpili, 2006), the interaction between the user and the means of information (ICOM, 1993) and the designation of the artefacts by functions that are activated by the user/learner (Charatzopoulou, 1999). With the use of new technologies in museum education an anthropocentric model of learning is achieved, which is based on the needs, skills, interests and learning abilities of the learner and where the educator assumes the role of the facilitator of learning (Bounia, 2010).

[The use of multimedia museum's applications \(MAApps\) for interdisciplinary approaches in open learning](#)

Museums as places of culture through virtual reality and multimedia applications have the ability to present and promote their content, in order to provide educative and informative services even to remote users (Bitros et al., 2010). Especially in the context of a module of art history the virtual tour of the museum can be used, as art is defined as a means of education without limits, which enables adult learners to gain a better understanding of themselves and of the reality that surrounds them (Koulouri-Antonopoulou, 1999).

Multimedia museums' applications as teaching tools are easy to use, can be easily adjusted to teaching needs and therefore can be smoothly integrated in it. Their utilization by individual users covers, to a certain extent, other aspects of learning (emotional, psychokinetic etc.), while at group level it helps in the development of new social skills by fostering participation (Michailidis, 2007). The computer is used in order to create a learning environment, where the new technologies are pedagogically being exploited as exploratory learning tools (Dimaraki, 2004). In that way, learners can gather the required information by freely surfing through the museum's exhibition parts, so as to

develop their personal learning style (Karabati & Patrinos, 2009). This approach is based on the theory of learning in the museum through the discovery of the artefacts and aims to actively engage the participants into learning, which, through laboratory-type activities, leads them to acquire knowledge without direct guidance and to draw their experiential conclusions (Hein, 1998). Moreover, it is based on Jarvis's (2004) theoretical approach on experiential learning, according to which the museum visit is considered to be a primary experience, where the participants enter carrying their personal expectations, intentions, experiences and values (Rogers, 1999).

So, the use of multimedia museums' applications in teaching in terms of knowledge aims to create the conditions for effective learning by increasing the active involvement of the participants. In that way, they will be able to draw all the necessary information regarding art history, the museum's history, materials or craftsmanship. Regarding skills, the diverse characteristics of the users can be designated and their critical thinking can be promoted. Also, the educative procedure will be interactive and therefore more interesting. In behavioural terms, the perception that multiple cultural forms can be incorporated actively in everyday educational practices, as they are part of the learning process, can be cultivated. As a result, the museum approaches and becomes accessible to diverse social groups, improving its relation to society in general. And lastly, through the use of these tools, a positive attitude towards culture can be fostered.

Teaching with museum's multimedia applications can become more effective by choosing the appropriate methodology based on criteria related both to the main characteristics of the learners and also to the aims and objectives of the didactic process. The type of the expected results, as stated in the goals of teaching, the course's content and the basic characteristics of the group (homogeneity or disparity), should be considered (Giannakopoulou, 2003; Zarifis, 2011). The available time is not an issue, since in open educational systems the learners are the ones who decide about the time as well as the pace of their study, creating, at the same time, their own educational personality (Race, 1998; Lionarakis & Lykourgiotis, 1999). More specifically, new technologies, apart from facilitating communication between users, create augmented opportunities for access to knowledge independently of the geographical conditions, according to the ideal of open education (Keegan, 2000).

Using multimedia museums' applications in the context of e-learning

The use of multimedia museums' applications exploits the possibilities of technology regarding the access to the educational material, in a synchronous or asynchronous way, and can be used in a flexible manner, depending on the didactic needs and demands (Mouzakis, 2006). Programs of open learning are based on the principle that each learner is characterized by special needs and expectations. Therefore, the suggested pedagogical approach for the use of the applications takes into consideration those needs, and also makes the most of the possibilities that new technologies offer in terms of organization, guidance, constant support, reinforcement as well as evaluation of the learning process (Wilson, 2004). It is deduced, then, that it is a multiform educational procedure that aims to create persons capable to learn through activities (Knapper, 1988). The fact that the non-linear organization of information gives the user the freedom to interfere in a dynamic way and interact with the multimedia applications, setting the order, form and speed in which the knowledge

is acquired, should be highlighted (Makrakis, 2000).

The use of multimedia applications and also virtual museum visits can be set in the broader context of e-learning (Ally, 2004), where the learners' support is not only of academic, but also of social character (Jelfs, Richardson & Price, 2009). According to the National Council of Open and Distance Learning (ODL) of the United Kingdom, ODL constitutes the most economical answer to the public demand for mass education, as set by the current demographical, economic and social circumstances (Alimi, 2009). For that reason, institutions that provide distance studies are constantly increasing and due to the increased operational costs they rely mostly on internet technologies (Shephard & Knightbridge, 2011). Modern e-universities, however, operate exclusively on the basis of e-learning and for that reason the Council of the Regional Committees for Certification in America has published a guide with the best practices for the realization of internet courses (Nazarinia Roy & Schumm, 2011). In that context multimedia museums' products can be creatively used in teaching.

In our days, society of economy has influenced deeply the educational sector, as technology of information has affected essentially education, teaching and learning in the context of globalized communities for the rapid transfer of knowledge (Clegg, Hudson & Steel, 2003). So, it is crucial that such multimedia or virtual educational tools are incorporated in the communicative process, as they can facilitate the contact between the trainer and the trainee (Saba, 2011 Sewart, 1993) and also enhance the learner's expression of self, since there is no immediate guidance (Tight, 1987). It becomes obvious that computer technologies and the internet not only change the way in which courses are delivered, but they also transform the context, in which learning takes place (Loh & Schrader, 2007).

Multimedia museums' applications: an open, interactive educational tool

As set by the Quality Assurance Agency for Higher Education (2012) the labour market of our time needs graduates with enhanced skills, who can be active and innovative in a global economic environment. That can be achieved by high quality online multimedia applications that enable and encourage interaction, creating a dialogic model of learning. These interactive learning environments are not just about the use of new technologies, but mostly they are about learning environments that, with the aid of technology, improve engagement in learning and, consequently, develop the users' critical thinking about learning (Greener, 2012). Online worlds are possible to provide more opportunities to engage their users in activities that become more real than their typical experiences in physical environments (Twining, 2010).

The technological advances have created new learning spaces and the fact that their users learn through their video gaming experiences is considered important in an academic level (Abrams, 2009). It is interesting that online users come closer to the museum objects than actual visitors that look at museum showcases, as digital literacy practices and virtual environments provide a meaningful learning context, enabling users to experiment with freedom, enhancing their critical thinking (Lewis & Fabos, 2000). This approach is based upon Vygotsky's (1978) viewpoint that people reconstruct and re-contextualize social and cultural experiences within new environments and experiences. So, the individual is regarded as an agent of change, who interprets and changes its understanding of

things through the interaction with multimedia instructional tools (Dahlin, 2001).

In that context, multimedia museums' applications offer a digital content that can be used for achieving specified educational goals in an individual or a collaborative level and that depends on the educational method that will be followed, in other words, if they will be used for self-teaching or whether collaborative activities will take place in a synchronous fashion. Either way, the use of technology and the internet improves the quality of learning by facilitating access to educational resources and services and also favours distance communication and cooperation (Bates, 2001). That is also highlighted by the Higher Education Funding Council for England (2005), which considers the use of such multimedia applications as a tool that supports learners, either as individual units or as groups, and facilitates them in the learning process. Moreover, the Council for Quality in Open and Distance Education states that the digital instructional material supports learning (Loh & Schrader, 2007) and therefore constitutes an open resource that can be used both in conventional as well as open and distance education (Larreamendy-Joerns & Leinhardt, 2006). Moreover, it may be attributed with different meanings, according to the broader context or the didactic purpose for which it is used (Holden & Westfall, 2006).

Learning from multimedia museums' applications in a Virtual Environment: a suggested approach

The use of multimedia museums' applications in teaching aims to replace the existing practice of the 20th century, according to which art history courses were taught in a large lecture format. It signifies the transition from the emphasis on delivering course content in the form of lecture to a focus on engaging learners in primary and authentic inquiry. Virtual reality environments support such activities and provide the adequate constructionist framework for learning. More specifically, these participatory environments support natural complexity of content, avoid over-simplification, engage learners in the construction of meanings that embody complex and diverse concepts, encourage collaboration and also place instruction within real world contexts, as they bring museum artefacts to learners (Barab et al., 2000). This means that they are used within a constructionist pedagogical framework (Papert, 1991), where technology forms the participatory learning environment for grounding and extending users' understanding (Barab, Hay & Duffy, 1998). Multimedia museums' applications constitute the material resources, which users are called to exploit and interact with so as to organize their ideas and discover new meanings.

Users' interaction within a virtual environment (VE) leads them to a synthetic way of acquiring information. Multimedia museums' applications create an immersive virtual environment (IVE) that surrounds the user or the group of users, creating a psychological state in which the individual feels that is enveloped by, included in and interacts with an environment that provides a constant stream of stimuli (Blascovitch, 2002). Thus, the user feels in control of the application in that experimental environment and acts with freedom within it. Nowadays, digital technologies have moved on from analog objects representations to create even more compelling virtual experiences. The use of these instructional tools in an IVE increases the feeling of the learner's actual presence in those technologically mediated social interactions, as it transmits various signals, the synthesis of which leads to a constructivist approach of learning, where the individual becomes more aware of the learning process. The interaction with other distant users attributes a social character to the whole

approach, where ideas and practices can be exchanged, criticized or adopted. That fact approaches the idea of collaborative learning as well as learning from others and it is a fact that Open and Distance Learning depends largely on multimedia and digital technologies (Panagiotakopoulos, 1999). It is argued that the incorporation of IVEs in education has didactic value, primarily as it gives users the opportunity to interact with the 'real' objects in three dimensions.

Setting the above in a conceptual framework, multimedia museums' applications create powerful learning environments, which aim to develop complex and competitive skills, deep conceptual understanding along with metacognitive skills, like the ability to handle and regulate one's own learning (Anderson & Day, 2005). MMApps are considered in that sense semiotic as well as cultural tools, which, when used within the specific disciplines described, facilitate the construction of meaning and historical interpretation, depending on the type and quality of the application, and also attribute to the users the sense of individual and social identity. In such dynamic environments, their conceptions of the nature and historical context of the artefacts, their ability to contextualize the material of study and the competence to view a topic from different perspectives are cultivated.

Museums' applications as educational tools are considered to be learning objects (Laverde, Cifuentes & Rincón-Rodriguez, 2007). As defined by the National Ministry of Education in Colombia (2003) learning objects are 'any digital resource that can be reused to support learning. Any learning material has to be organized meaningfully, related to a learning aim, and has to be related to digital entities and deliverable over the Internet. This material should have an identification information or metadata, which consists of a descriptive list that identifies the possible use of the object, its classification and interchange'. They are used in order to reinforce the delivery of academic content, as they incorporate ICT in different formative processes. Moreover, they are easy to use as study material in all forms of education, traditional, distance or blended and, most importantly, a high level of motivation is achieved that can be implemented to different learning styles (Keefe, 1988). We could also suggest that, apart from being study material, they are applicable as a teaching strategy.

Conclusion

New technologies have made it possible for museums to create and deliver a variety of educative productions, multimedia productions, virtual museum tours and online digital material, that can be used as teaching resources for art education either in the conventional classroom or in Open and Distance Learning. The surroundings of the museum and the context in which the artefacts are placed create the framework, from which concepts and historical knowledge are drawn. Sometimes, these productions can lead users to the real museum, as they become more familiar with the museum as institution and they no longer regard it as a formal elitist place, accessible only to a minority of people. In this way, the museum opens to society and offers its resources for educational purposes.

Museums have increasingly recognized the potential of innovative technology to help them meet the educational aspects of their missions. Technological evolutions and virtual environments are used to enhance the educational experience and promote interactivity and self-action of users, as if they were playing a video game. By using such an instructional tool learners undertake multiple roles and acquire multiple perspectives, construct their knowledge by exploiting their former experiences, in an individual or collaborative level, reflect and accumulate new information.

This paper constitutes a theoretical approach on the subject of the use of multimedia museums' applications and it primarily sets the academic framework in which they can be used in order to be

best exploited, since not all museums' productions are destined as educational material. They can, however, be treated as such since they are regarded as learning objects, where users learn from objects. Further research is needed in order to create an applicable descriptive model suitable for all types of education. This could lead to the creation of a certain typology, which would favour especially distant learners, when embodied in academic practices.

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***Pavlou M.¹ – Georghiades A. – Zaggoulos G.² – Pavlou C.³:
Telexetasis - Anywhere-Anyplace Reliable Cost-effective e-Exam
Presence Verification***

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Prologue

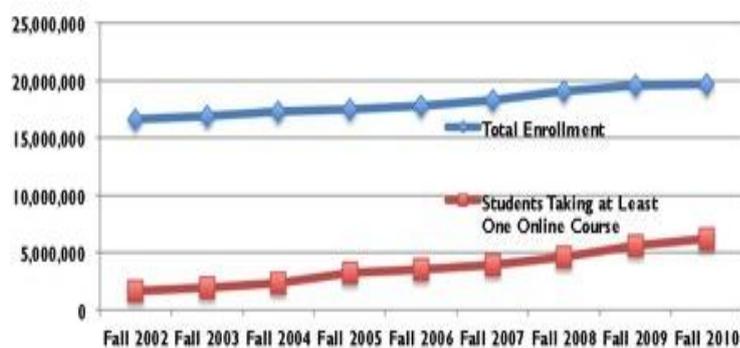
Despite the recent boost in ODL, summative assessments are still mostly written and carried out in examination centres, under controlled conditions and in the presence of invigilators. Yet, this “gold standard” of pen-and-paper exams, still dominant in academic curricula, has many repercussions on Institutions and students alike in terms of cost, effort and time. Moreover, it fails to reflect a commitment to openness and flexibility, the two core principles that underpin ODL. The first part of the paper attempts to explain this current state of affairs by focusing attention on security threats present in an online test environment and issues of quality assurance. Moreover, it provides an overview of proctoring styles currently adopted in ODL for high-stakes tests. The second part presents “Telexetasis,” a multi-modal, biometric system that will enable HEIs to conduct reliable and cost-effective e-Exams in diverse, non-supervised exam settings. Installed on students’ personal computing devices, “Telexetasis,” *qua* a personal invigilator, will continuously process information generated by the (built-in or external) camera, microphone and keyboard, in order to calculate a robust, presence-verification metric based on the examinees’ presence and activities throughout an exam, without violating, however, their privacy. The paper closes by comparing “Telexetasis” both with authentication methods currently used in ODL and proposed theoretical models.

Open and Distance Learning

The development in ODL during the last decade has been immense and, nowadays, there is a

plethora of Open Universities worldwide that cater to a huge number of e-Students. The UK Open University, a trailblazer in ODL, has more than 260.000 learners, the Open University of Australia 40.000, while the Hellenic Open University around 30.000. A number of conventional Universities, even reputable and high-profile ones, such as Oxford, Cambridge and Stanford, have also launched a range of online courses. MIT and Harvard have recently made a commitment of \$60 million for the set up and development of *edX*, a virtual learning platform intended for the delivery of *massively open online courses* (MOOCs).

The surveys conducted since 2002 by the Babson Survey Research Group and the College Board, the leading barometer of online learning in the US, clearly demonstrate that the number of students enrolled on online courses constantly increases. This growth is substantially greater (almost by ten times) than the overall higher-education (H.E.) enrolment increase and is expected to be even greater in the near future.



	Growth Rate for Online Enrolments %	Growth Rate of the overall student population %
2008	12.9	1.2
2009	17	1.2
2010	21	2
2011	10	2

Figure 1: Total & Online Enrolment in Degree-granting Postsecondary Institutions.

From *Going the Distance: Online Education in the United States*, 2011.
(Babson Survey Research Group and the College Board)

It is, for instance, noteworthy that from 2002 to 2007, US enrolment on online courses grew 19.7%, while from 2009 to 2010 it had a 9.2% increase (which translates into 560.000 students). In Fall 2011, almost a third of the students in H.E. in the US, that is more than 6 million, were enrolled on at least one online course. According to the International Council for Open and Distance Education, this percentage is expected to increase to over 50% by 2015.⁶⁹ Similar growth is observed in Europe and Asia, as well. To take the example of the UK Open University, one of the biggest Open Universities in the world and the number one mega-provider of undergraduate courses in the UK, the number of its

⁶⁹ Babson Survey Research Group and the College Board (2011). *Going the Distance: Online Education in the United States*.

students has increased by ten times since its inception in 1969.⁷⁰ It is also noteworthy that today there are more than 100 Open Universities in Asia, while there are 17 virtual universities in Korea alone (Jung 2007).

Online Assessment and Quality Assurance

Whereas Education is moving fast towards a digital future, one of the major criticisms by the opponents of ODL is the difficulty faced by higher-education Institutes (HEIs) in verifying and validating the identity of e-Students who are awarded degrees and academic credit (Apampa et al. 2010). As Rubiales et al. (1998) state with regards to the integrity of online courses: “local needs and constrained budgets, rather than concerns about quality, have been paramount in the decision to invest in distance learning programs, instead of enlarging traditional campuses.” Moreover, quite widespread is the view that distance learning enhances the levels of dishonesty, and that online students are more prone to cheating than traditional students (Grijalva et al. 2003; Stuber-McEwen et al. 2005; Lanier 2006), even though recent research seems to suggest that academic misconduct among web-based and paper-based exams is roughly the same (Stuber-McEwen et al. 2009).⁷¹

Discussions mainly revolve around unethical conduct, that is plagiarism, impersonation and cheating, present in an online, supervised or non-supervised, test environment. Whereas Institutions have managed to curb plagiarism through antiplagiarism technology, issues of impersonation and cheating are still pending and unsettling. Apampa et al. (2010) have identified three types of impersonation within a web-based proctored exam: Type A: when there is collusion between the examinee and the invigilator; Type B: when the legitimate student passes on his security information to an unauthorised person who then takes the exam on his behalf; Type C: when the authorised student taking the exam elicits unauthorised help from a third party.⁷² As far as e-cheating is concerned, this usually involves access to non-authorised websites, and e-communication via instant messaging tools and email. (Baker and Papp 2003; Levy and Ramim 2007).

These violations of academic integrity have even forced some Institutions to cease their online courses (Ramim & Levy 2007), and others to offer merely “certificates of mastery” and not degrees or formal university credit for their online components (e.g. Harvard and MIT). National Quality Assurance Authorities have also taken measures towards this direction and have proposed various benchmarks in order to ensure that the assessment methods employed in online courses meet the same standards of reliability as face-to-face education. In the Higher Education Opportunity Act (HEOA), enacted on 14 August 2008 in the US, it is explicitly stated that Institutions that offer online courses are responsible to apply certain standards and implement safeguards (secure login and pass code, proctored exams, etc.) in order to maintain the integrity of the academic system by preventing impersonation and cheating. Similar requirements are declared by the UK Quality Assurance Agency: “A providing Institution should be able to demonstrate publicly that summative assessment

⁷⁰ The Open University, UK (1971-2010), *Facts and Figures 2009-2010*.

⁷¹ The “epidemic” proportions of academic cheating in H.E. (not merely in ODL) have often been identified by researchers; see, e.g., Bjorklund and Wenestam 1999; Baker et al. 2008.

⁷² Types B and C apply to both proctored and unproctored web-based exams.

procedures used for programmes studied at a distance are appropriate for the mode of study, for the circumstances in which the programmes are studied and for the nature of the assessment being undertaken; that assessments are conducted and marked, and results promulgated, in a reliable and properly regulated manner; and that, in all respects, assessment procedures accord with the requirement to safeguard academic standards (19).⁷³

Current Proctoring Styles

Most Institutions active in ODL have taken actions to conform with these requirements and have tried to tackle cheating and impersonation by adopting a number of different proctoring styles:

a) Class-based proctored summative exams

Summative exams in ODL are still mainly class-based and proctored. Some of these exams take place at centralised on-campus residencies, even though the majority of ODL Institutes have tried to alleviate the difficulties that physical presence entails by allowing students to sit their exams off-campus, in certified testing centers, either in a different area or abroad. The exams are typically paper-based, even though during the last few years web-based assessments are constantly gaining ground, especially in the Sciences. In the US, there are various bodies that offer test administration services to students away from their campuses, such as the Consortium of College Testing Centres, which comprises 320 participating Institutions. In Europe, distance learning students may sit their exams in other nearby HEIs, embassies, or authorised bodies, such as the British Council and Goethe Institute. In the case when a testing centre is not available in their area, students can make arrangements to take their exams *in absentia* with a qualified proctor (e.g. a teacher, clergy, or a librarian) at a location near their home. This option is particularly widespread in the US and is adopted by many Institutions (e.g. Harvard).

By conducting proctored summative exams, HEIs ensure higher levels of security and reliability, thus safeguarding their academic integrity. Nevertheless, this proctoring style has many drawbacks:

⁷³ Quality Assurance Agency, *Guidelines on the Quality Assurance of Distance Learning*, March 1999. In a similar vein are the guidelines by the Scottish Qualification Authority.

- It undermines the “anywhere-anyplace” founding principle of ODL. In a recent survey (6-7 March 2012) conducted within the framework of the European Programme e-Excellence Next⁷⁴ at the Open University of Cyprus, “The students’ need to physically attend supervised locations for the final exams of each module” was specifically identified as one of the Institute’s main weaknesses in the axis of Curriculum Design.
- Proctored class-based exams presuppose the investment of a large amount of time and effort by both HEIs and students, in so far as they are administrative burdensome and require the students’ physical presence at a particular testing centre. Moreover, they are particularly costly; for instance, for the Open Univ. of Cyprus, which has around 2.500 students, the cost for conducting its final exams—rent of exam venues and postage fees for the delivery of exam scripts—ranges from €12.000 – €15.000, excluding the cost for invigilators. Furthermore, when students are allowed to take their exams abroad, they normally have to pay an extra amount of money that ranges from €40 – €250. (The British Council in Cyprus delivers exams or re-sits on behalf of the London External Programme and the Open University (UK) for €110 per subject.) The fees incurred for the recruitment of local proctors are even higher and are typically paid by students.
- Compulsory physical presence imposes additional practical difficulties upon disabled students, who often choose to study through distance learning due to the flexibility and convenience it offers. (It is noteworthy that more than 12.000 people with disabilities join the Open University (UK) every year.)

b) Alternative forms of assessment

Even though graded assessment in ODL is usually proctored and follows the traditional summative mode (Morgan and O’Reilly 2001), many online courses have adopted alternative forms of assessment. Instead of having to take mid-term or final exams, students undertake to write essays, reports, and reflective journals, compile portfolios, design online databases, work collaboratively, and perform a number of “authentic” tasks (Valencia et al. 1994). According to research, assessments with such formats and with collaborative orientation are more “educative” than summative exams, because they prevent rote memorisation and regurgitation, and probe higher-order thinking skills and learning outcomes (Wiggins 1998; Woodward 1998).

Whereas these diversified forms of assessment serve to hone student knowledge and skills, thus enhancing and promoting learning, the truth is that they are not always adopted on pedagogical reasons, but instead either for ease and convenience, or simply because the curriculum says so. Moreover, graded assessments that are not completed under examination conditions and within a fixed amount of time, render it difficult for Tutors to establish “paternity.” For instance, during the last few years, there has been a surge of online companies that offer custom written essays and projects. This online essay industry is thriving and it is estimated that it has a turnover of more than £200m in the UK alone. In contrast to plagiarism, which has been successfully deterred through the use of plagiarism-checking technology, paid customised essays can hardly be detected by antiplagiarism software and, as a result, most of them pass unnoticed. Even though this problem is

⁷⁴ *e-Excellence Next* is a quality-assurance instrument developed to address e-Learning specific issues.

not peculiar to ODL, it is easier for Tutors in face-to-face educational settings to trace such incidents, in so far as they can keep a better track of their students' overall performance. The problem is taking alarming proportions and steps should be taken for its prevention, if we do not want to sacrifice quality for pedagogical theory. No matter how good and "educative" essays are, if they put the integrity of online courses in jeopardy, their credit weight should be reconsidered. A possible solution to the problem could be the combination of proctored e-Exams (in the form of mid-term/final tests or, ideally, continuous assessment) with "unproctored" forms of assessment (e.g. essays).

c) Web-based summative exams

As technology advances, more and more HEIs turn to web-based assessments (WBAs). These computerised assessments, though, are used mainly for formative purposes and their summative role still remains limited. This occurs for two reasons: i) The perception that WBAs cannot meet the full range of learning outcomes of an educational programme and, hence, they are not suitable for high-stakes exams (Swithenby 2008; Rogers 2006); ii) The inability of HEIs to deal effectively with impersonation and cheating present in an online test environment (Rogers 2006).

Institutions have tried to overcome these obstacles by implementing various safeguards:

- Use of password and/or challenge questions before students can gain access to a secured assessment session (see Bailie and Jortberg 2009, on the example of the National American University).
- Preparation of timed online exams on the grounds that time limits provide a certain protection against e-cheating.
- Recording of student activity on the computer monitor. One such system is Tegrity's Remote Proctoring, currently used by a number of US Universities (e.g. Indiana State University, Western Kentucky University, and Florida International University). The system records both a webcam video of the examinees, and a video capture of their screen. The videos are reviewed after the exam by the course Instructors.
- Use of lock-down functions (e.g. the Respondus lock-down browser), which prevent students from visiting other websites, or using unauthorized applications.
- Use of uni-modal biometrics. One could include here the use of face and voice recognition systems (e.g. the voice recognition system by TeamEDU), fingerprint recognition and keyboard dynamics (Levy and Ramim 2007; Fior and Kowalski 2010; Apampa et al. 2010).
- Use of bimodal biometrics, i.e., systems that combine two biometrics in order to provide greater protection and more reliable user security, e.g. the combination of fingerprint recognition and keyboard dynamics (Apampa et al. 2010).

- Video recording, where the video is watched by a human proctor during or after the exam. This service is normally provided by online proctoring companies, such as *Kryterion* and *ProctorU*. Especially in the US, many Institutions have partnered with such companies (e.g. Troy University, University of Illinois, and University of Oklahoma) and their number is constantly rising. (Notably, since 2009, the partners of *ProctorU* have risen from 9 to more than 100).⁷⁵ Mention should also be made here to *Software Secure*, a company that provides non-real time proctoring through *Remote Proctor Now* and *Remote Proctor Pro*. These two services record all sound and video during an exam and deliver the data to *Software Secure* servers for post-exam review by Certified Video Review Specialists.⁷⁶

Even though the aforementioned technologies and tools provide, more or less, verification of a student's identity at the beginning and/or end of an exam, most of them are "vulnerable" and susceptible to security "attacks," because either they cannot offer continuous verification, or they are unable to detect whether the student receives unauthorised help during the exam (Huang et al. 2004; Pillsbury 2004). In fact, this is a thesis shared not only by research, but also by faculty members of Institutions that conduct e-Exams (Kennedy et al. 2000; Rogers 2006; Schaefer et al. 2009). Even biometric systems, which are considered by some as the ultimate solution for authentication, cannot deal effectively with all types of impersonation and cheating (Apampa et al. 2000). At present, the services offered by online proctoring companies are the most reliable and flexible, in so far as they:

- enable students to sit their exams from home,
- are more cost-effective than other solutions (e.g. use of an exam centre, or local proctors),
- can verify the identity of a student throughout the exam,
- deal effectively with instances of impersonation and cheating, and
- can interact with Virtual Learning Environments (VLEs) currently used in ODL (e.g. Moodle, WebTC, Blackboard).

Even so, this mode of online live proctoring is not ideal and, as it stands, cannot be widely adopted. For instance, the need for human proctors *perforce* keeps the cost of each proctored exam quite high (between \$20-\$25), while it also renders this service inapt for large scale and simultaneous exams.

The Proposed Model: "Telexetasis"

In what follows, we would like to introduce "Telexetasis," a top-notch proctoring application that seeks to fill the gap of currently available authentication systems by offering robust, automated, student-presence verification for the whole duration of an e-Exam. The system is currently under development and the prototype is scheduled to be ready within the first half of 2013. The finished

⁷⁵ See the full list of Institutions on www.proctoru.com.

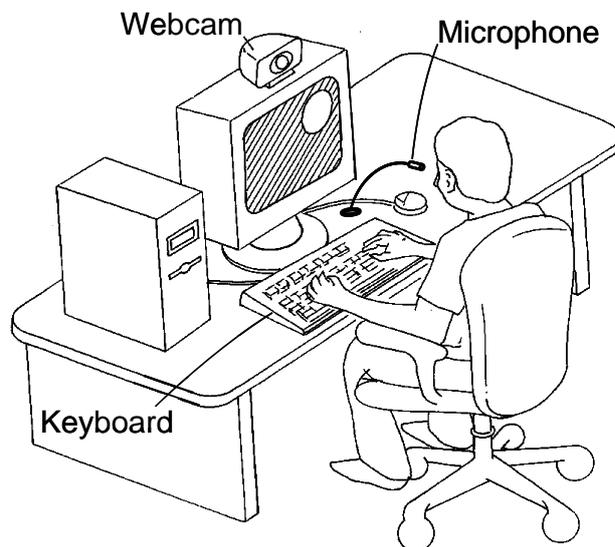
⁷⁶ For more information on these two services, visit www.softwaresecure.com.

product is expected to be officially launched in Europe and the US by 2014.

“Telexetasis” will be a multi-modal, biometric system that will enable HEIs to conduct e-Exams in diverse, non-supervised exam settings (including a student’s home office), in a highly-reliable, easy, and cost-effective way. In contrast to existing uni-modal biometric systems (e.g. VoiceVerified and the biometric mouse), which are, by definition, only partially reliable, the proposed system will utilize multiple biometric modalities, combining both physiological traits, such as face and speaker authentication, and behavioural characteristics, such as typing rhythm. In a personal computer setting, the biometric traits that can be used are the ones that are easily captured (measured) with readily available sensors, such as a web camera or a microphone, without active involvement of the student. These include the student’s face, iris, and possibly ear (captured using a web camera), voice (captured using a microphone) and keystroke dynamics (determined from the data provided by the keyboard). Such a system would provide, through the complementary nature of different biometrics, robust and reliable student presence verification, and strongly resist the many types of student cheating for the entire duration of a summative exam, taking place in a highly varied, and possibly varying, unsupervised, real-life environment.

Taking into account the differences in student ICT familiarity and literacy, as well as the stress that some students may experience owing to the testing format (web-based instead of paper-based), special attention will be paid to keep the whole process as simple as possible and render “Telexetasis” user friendly for both Tutors and students.⁷⁷

**Figure 2: Complementary Biometric Modalities
(face recognition, sound, keyboard dynamics)**



⁷⁷ It is important to note that according to research, ICT familiarity differences do not necessarily affect student performance; see, e.g., Taylor et al. 1998.

Actions Required before, during, and after an e-Exam:

Tutors will be able to construct WBAs by using either the functionality embedded within their Institution's VLEs, or some other more advanced system (e.g. Questionmark Perception), and then upload it on the educational platform, as usual. The only additional requirement for them will be to log on to the "Telexetasis" website in order to specify the exam regulations and set up the policy to be followed in an incident of unethical conduct. During the exam, if they wish, they will be able to monitor in real-time the metrics of each examinee. After the exam, Tutors will be able to collect the completed assessments from the servers of "Telexetasis."

Students will be able to use "Telexetasis" by following five simple steps, as described below:

1. Download the application from Telexetasis.com and install it on their computer.
2. Run the software and select their host Institution from a drop-down list.
3. Log on to their Institution's educational platform (e.g. Moodle, Blackboard) in a conventional fashion, find their exam, and read through the examination guide and regulations set up by their Institution/Tutor.
4. Select "Start" to take the exam.
5. Select "Upload" to submit the test for grading. Depending on the format of the exam (e.g. multiple choice, true or false), students might have their tests automatically graded and receive immediate feedback on their answers.

Before using the system for their exams, students will be able to take mock tests in order to familiarise themselves with the five-step process and receive individualised technical support, if necessary.

Monitoring of student actions:

When run on a computer, "Telexetasis" will lock down the testing environment within the educational platform in order to prevent e-cheating and plagiarism. As a result, students will not be able to print, copy, go to other URLs, or use any other application, except those required for the exam (e.g. to use a calculator, to watch a particular video, etc.).

The monitoring of students will be fully-automated and will be done through a biometric index. This index will consist of different metrics derived from the student's face detection and verification, activity recognition (through image, sound, and correlation thereof), and background monitoring (Fig. 3). If the calculated index is unsatisfactory, "Telexetasis" will annotate the incident and may either display a warning on the student's screen (e.g. if the student has been looking at a different direction than the monitor for a substantial period of time), or terminate the exam (e.g. if the student leaves the room). The exact policy for warnings/actions during each exam will be set by the examinees' Institution and/or Tutor (e.g. some Institutions may allow a 5-minute absence or break, some others may not.)

Even though the operation of "Telexetasis" will require storage of unique identifying characteristics of a student (image, biometric signature of voice, and keyboard dynamics), it should be noted that during an exam image and voice captured by the webcam and microphone will be recorded locally,

on the student's computer. The recorded video will be uploaded to the servers of "Telexetasis" only if the biometric index is not satisfactory (unless the student or his Institution opted otherwise). As such, "Telexetasis" will not "intrude" into a student's room like a "big brother." This is a very sensitive matter, which has not received adequate consideration in the design and development of web-proctoring systems. Indeed, being watched by a proctor or being recorded during an exam is likely to trigger stress and anxiety to examinees. Some students (especially female) who experienced online proctoring have actually reported finding the whole process obtrusive. Moreover, it should be noted that 50% of our respondents to a questionnaire regarding online proctoring systems have expressed concern regarding privacy. Student psychology and privacy are significant issues that "Telexetasis" will respect and will not violate in any way. From this perspective, our system will perfectly comply with the US Higher Education Opportunity Act (HEOA) of 2008, which makes clear that Institutions "should not use or rely on any technology that interferes with the privacy of the student" (H.R. 4137).



Figure 3: System in Operation – Two Instances.

Evaluation of "Telexetasis":

In light of all the above, compared to companies that specialise in online proctoring, as well as other proctoring systems, "Telexetasis" retains a clear advantage in terms of cost, functionality, reliability, and flexibility of use:

- "Telexetasis" will be fully-automated and, accordingly, it will not require human monitoring during, or after, an exam. As a result, it could be offered at a very low and particularly attractive price. This will also render it ideal for continuous assessment, which is considered the best way of assessing students, in so far as it provides timely feedback and a more reliable estimate of a student's capabilities (Kika et al. 1992). Full automatization will also increase reliability, in so far as a human proctor may be distracted or even collude with the examinee during the exam (Type A impersonation).
- In contrast to other proctoring companies/proposed systems that require the procurement of specialized hardware (with proprietary software), such as the combined omni-directional camera, microphone and finger-print reader by Software Secure, "Telexetasis" will be using existing (or readily-available) computer equipment and peripherals. Even though this equipment should comply with certain specifications, these are typically met by the hardware installed by major computer manufacturers.

- “Telexetasis” will be able to accommodate a large number of exam takers at a time, capacity that current proctoring companies cannot match because of their need for human resources. Consequently, it could be used equally well for both large audiences and simultaneous exams.
- Whereas other companies monitor student behaviour via live-streaming watched by a human proctor, or video playback reviewed after the exam, “Telexetasis” will monitor students automatically through a biometric index. In this way, students using the application will not feel that their privacy is violated or that a stranger “intrudes” into their vital space.
- Sometimes the process for online human proctoring can be as cumbersome as proctored, class-based exams (Bailie and Jortberg 2009, pp. 201-202, Figs 1a & 1b), in so far as students must arrange a proctored exam in advance. With “Telexetasis” no scheduling will be necessary.

At this point, it should be noted that after we had started working on “Telexetasis,” a theoretical model with similar features came to our attention, proposed by Sab et al. and presented at SETIT 2012 conference in Tunisia. Like “Telexetasis,” this theoretical model will be fully automated and will employ multiple biometrics (fingerprint taken by a mouse with a fingerprint scanner, keyboard dynamics, and video) for student identification and authentication. However, there are significant differences in the functionality and operation of the two systems:

- “Telexetasis” will not require any additional, specialized hardware, as the continuous verification will be achieved through face detection and verification using existing (or readily-available) hardware.
- The core algorithm of “Telexetasis” will be running on student computers and, as a result, much less data will be exchanged with the server through the Internet. The proposed model by Sab et al. will send all captured information to a centralised server for the required analysis and comparison, something that presupposes a much faster internet connection and a more powerful server.
- The video captured with “Telexetasis” will be uploaded to the server only if the metric is unsatisfactory. The other model will record all video shots on the centralised server, a practice that raises student privacy concerns.
- Whereas “Telexetasis” will perform online proctoring using data from a webcam, microphone and keyboard, as well as from the correlation thereof, the aforementioned theoretical model will analyse data collected by the different sensors separately.
- Unlike “Telexetasis,” the model by Sab et al. will not be using a voice metric and, as a result, speech or voice will not be allowed during the exam. As such, the system will not be appropriate for exams where students will be expected to speak or produce certain sounds (e.g. language or linguistic courses).

Although the system requirements of “Telexetasis” pose significant challenges, there are several factors that support the technical feasibility of our system:

- There are currently several, general-purpose, mostly uni-modal, biometric systems on the market (such as AurOra and Accenture)⁷⁸ implying sufficient maturity of the field.
- Various technical components required by our system, such as face recognition (Zhao et al. 2003; Abate et al. 2007), including face recognition under extreme imaging conditions (e.g. Georghiades et al. 2001), face detection (Yang et al. 2002; Degtyarev and Seredin 2010), video and audio correlation (Kidron et al. 2005), and visual activity recognition (Turaga et al. 2008; Aggarwal and Ryo 2011), are active research areas in Computer Vision, with a multitude of published results in the last few years.

Consequently, a realistic plan has been formulated for the design, implementation, testing, and deployment of “Telexetasis” by 2014, building upon the aforementioned research.

Epilogue

One of the strategic goals set by the UK Qualification and Curriculum Authority in 2004 was the universal availability of an e-assessment option in high-stakes exams. However, in spite of the rapid digitalisation of education and the advances in technology, this has not been implemented yet. Even in ODL, where great innovations have taken place in recent years and where flexibility and openness constitute a *sine qua non*, assessment methods have remained relatively static, and class-based written examinations still prevail. In fact, as Rowe (2004) remarks, “traditional one-location one-time face-to-face testing for much of the student’s grade *will need* [our emphasis] to be the assessment norm for distance learning in the foreseeable future.” The main reason for this “conservatism” has been the weakness of HEIs in dealing effectively with security issues and unethical conduct present in an online test environment. The system we propose aims to fill this gap, thus ensuring high standards of quality assurance for online courses.

As stated above, “Telexetasis” will be a value-for-money investment for both HEIs and students. On the one hand, by conducting summative exams online, HEIs can save a great amount of money and time, obviating the need for the setup of appropriate examination rooms in or off-campus premises, for the recruitment of invigilators, and for postage fees. At the same time, HEIs will be able to provide their students, especially students with disabilities, with better services that will render their studies more flexible and less expensive. On the other hand, such a system will also be beneficial to students, because with “Telexetasis” they will not have to travel and, therefore, waste both time and money, in order to take their exams. This is a huge advantage, considering that the majority of students enrolled on online courses work, have families, or run busy lives.

In addition to the above more practical advantages, we are confident that a system like “Telexetasis” could make a valuable contribution to the ODL of tomorrow. Far from being merely another piece of software, “Telexetasis” will be first and foremost an educational tool. For instance, as already mentioned, the particularly low price of “Telexetasis” will render it ideal for continuous assessment, which is considered the best way of measuring student performance. Moreover, by having at their

⁷⁸ Most of these systems focus on issues concerning Industry, Businesses and Government Bodies.

disposal a system that enables the reliable conduct of e-Exams, HEIs can also take advantage of the great potential of technology in order to design more dynamic and robust high-stakes assessments that will both measure student performance and promote learning and creativity. As recent research has shown, apart from being more economical and practical (rapid and tailored feedback, adaptive testing, etc.), WBAs can be more interactive and engaging because of the various test stimuli (e.g. speech and multimedia) that they can encompass (Barua 1999; Bennett et al. 1999; Butler 2003; Nguyen et al. 2006). Besides, in an era when pen and paper are hardly used in everyday life and people learn to think in the “cyclical” mode of the cyberspace, rather than in the “linear” mode of static paper, the conduct of written examinations is anything but “authentic.”

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Rosewell J.: A speculation on the possible use of badges for learning at the UK Open University

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Introduction

There has recently been considerable interest in the use of badges to recognise and reward informal learning, stimulated by the publication of Mozilla Foundation white paper on badges for lifelong learning (Mozilla, 2010). This in turn led to the Mozilla Open Badges project (<http://openbadges.org/>) and <https://wiki.mozilla.org/Badges>) and the funding from the MacArthur Foundation channelled through the 2012 Digital Media and Learning Competition (<http://www.dmlcompetition.net/>).

These badges can be seen as the digital equivalent of the badges worn by Scouts (<http://scouts.org.uk/scouts/badges/>). Each different badge represents a skill or competency, such as 'camp cookery', that the Scout has demonstrated to the satisfaction of a Scout leader. The Scout can collect a number of badges and display them on their uniform. Not only do badges like these provide motivation and focus for learning useful life skills, they have sufficient value that they may be used to support a university or job application.

Generalising from such examples leads to the idea of badges to recognise skills and achievements that are outside formal education systems, that can be collected by individuals and displayed as evidence of their skills and capabilities, and that would be valued by others. Although the current interest is in digital badges that are awarded and displayed online, the activities and skills that the badge represents could either be earned in the 'real' or online world. A Scout could still earn their cookery badge at camp, but receive a digital badge to display online as well as one to sew on their uniform. However, there are also possibilities in awarding badges more or less automatically as the result of a user's activities online. Such badges are used in online forums and Q&A sites such as StackOverflow (see <http://stackoverflow.com/badges>). For badges to have worth, their award must offer some measure of validation, although this is generally understood to be not as rigorous as the assessment required in formal, accredited learning.

The Mozilla Open Badge Infrastructure (OBI) (<http://openbadges.org/>) is a software infrastructure that supports the awarding, collecting and display of badges. The badges are represented by graphical images which also contain a link that explains the badge in more detail; this includes the identity of the issuer and a description of the badge, potentially with detailed evidence supporting the award. An individual can collect badges in a 'backpack' which gives the user some control over

the display and there is a layer of security to demonstrate that the person displaying the badge is the one who earned it. Badges are portable: they are intended to be shown on other sites, for example on social networks such as Facebook and LinkedIn.

Badges are promoted (for example Mozilla 2010, HASTAC 2011) as an opportunity to recognise and reward informal learning and reach non-traditional learners. They could therefore have a role in supporting the mission and core values of the UK Open University (OU) which includes 'making lifelong learning open to all, inspiring and enabling people to develop wherever, whenever and however they need' (Open University 2011). This paper explores some of the issues that should be considered. It emerges from experience in iSpot, an existing project which has its own badging system and which is described below as a case study, and from a discussion meeting held with OU colleagues in May 2012.

Issues with badging for learning

Informal or formal learning?

Should badges be used only to recognise informal learning, perhaps in the Open University's open educational resource OpenLearn (<http://www.open.edu/openlearn/>), or should they also recognise success on the university's modules that lead to formal qualifications?

Badges seem a natural fit to informal learning and offer less to formal learning which already has widely recognised qualifications and awards that can be used to convey a person's achievements.

Badges seem a particularly good fit to learning based around Open Educational Resources (OER). Much OER focuses on content and, for an individual user, can lack the structure and motivation provided by formal learning. The role of assessment in engaging and sequencing formal study could be replaced by working towards badges in less formal study.

However, there may still be a role for badges in formal study. Many OU students sign their emails and forum postings with a signature that includes a 'course survivor' list of modules they have taken so far. Badges reflecting the modules they are currently studying or already taken would likely be attractive to current students, both for display within the OU community and in the wider world of Facebook and other sites. iSpot users (see below) who are students of the Neighbourhood Nature module received an OU module badge; iSpot users who study other OU modules have asked for similar badges. There would even be value in a general OU badge (or badges for a current student and alumnus) that could be displayed on social network sites; this could link directly to the student's academic transcript. Module badges would have value for the many OU students who study individual modules for personal or career development without proceeding to a full qualification.

Perhaps of particular value would be badges that form bridges between the informal and formal domains. This might reflect preparatory work, for example a badge could be earned by completion of the 'Are you ready for...?' quizzes used to ensure that students meet prerequisites for modules. An alternative might be to offer accreditation of prior learning where a collection of badges could be recognised as evidence of learning: these badges might in turn have come from independent study of OER material.

Audience

Who will be motivated to acquire badges – existing students or the general public? Can badges provide a route for access to higher education, offering low-stakes tasters that will encourage

prospective students to embark on higher education? Do badges offer a way of encouraging lifelong learning?

Again, there seem to be two possible applications of badges. They could be used to recognise stages on an OU student's accredited study, or be used for informal learning linked to OpenLearn and other projects. It is the second that has the potential for engaging a new audience, or retaining undergraduate students as lifelong learners. Here the fit to the OU public offering through OpenLearn, iTunes U and other channels is a good one. OpenLearn content combines extracts from OU modules with broader-reach material, particularly that associated with BBC/OU broadcasts.

Types of material

What types of material might promote engagement and motivate people to earn badges?

The issue here is less the subject content than the type of activity involved. A badge could reflect acquisition of content knowledge, for example reading learning material on OpenLearn (perhaps evidenced by VLE activity tracking), or light-touch assessment such as an online quiz. Alternatively it could reflect other types of learning, particularly social and constructivist approaches. This might be evidenced by participation in a forum, creation of content on a wiki, or activity on SocialLearn, the OU's new social learning platform (<http://sociallearn.open.ac.uk/public>).

There is an overlap between badges and reputation systems. Badges are used to reify reputation in online trading systems (e.g. eBay) and in online discussion systems (e.g. StackOverflow); badges reflect expertise in iSpot (see below). Acquiring reputation and social capital is one motivation that can be captured by collecting badges. Such badges also have a notion of progression or ranking – medals might be a better metaphor – and this is another clear motivation, for example on iSpot. Additional privileges may be given to those acquiring certain badges and this reward introduces aspects of gamification. However, it is not clear what privileges would be appropriate for learners engaging with the OU.

Value

What is the perceived value of badges to learners? Will badges also be perceived to have value to others – to friends and family, to peers, or to employers?

To motivate learners to collect and display badges, they must first of all reflect activities and achievements that learners themselves value. Secondly, the learner must be able to articulate this value to others around them, perhaps starting with their friends and family and their peers. Peers in this context might mean fellow students for those who are already studying with the OU, but would have to be understood more widely for those who are prospective students or members of the wider public engaging with outreach material through OpenLearn, for example.

Finally, for the aspirations of the Mozilla Foundation and other promoters of badges for learning to be fully met and for badges to have lasting societal impact, badges should be valued by employers. People might use badges as evidence of skills or experience that are not captured by accredited learning.

Readability

How will people 'read' the meaning of a badge – what subject, level, and extent of study or learning does it represent?

Badges are being promoted in part because their flexibility allows them to be used for many different purposes, with issuers being able to create badges to suit their own purposes without reference to

external agencies. Of course, the flip-side of such flexibility is that it is less easy for anyone to understand what the purpose of the badge is. Although the Mozilla Open Badge Infrastructure allows a badge to link to accompanying statements and evidence, a badge should ideally be understandable without the need to follow these through in detail. To take an analogy in formal education, a student whose CV lists a "BSc (Hons) Mathematics (1st class)" is making a claim about the subject and level they have studied that is readily understandable without recourse to a detailed academic transcript.

If the OU were to offer badges for material that relates closely to the standard formal offering, for example for material originally written for modules but now available as OER, then the subject and level can be described easily. The 'extent' is also sometimes available as a notional figure for study hours. Presumably a similar approach could be extended to preparatory material, and even at a stretch to material produced to support outreach, such as interactives that accompany BBC/OU broadcast programmes.

Badges are of course graphic images, and so readability must also be thought of in terms of graphic design. As the iSpot example discussed below shows, this can be quite a challenge. A traditional Scout badge is a far simpler proposition: sewn on to the uniform of a Scout, it need only convey the subject since the issuer and level are taken from the context. Any OU badge would have to convey at the least:

Issuer: the OU, or an OU-related project such as iSpot?

Subject: broadly: arts, science, maths..., or at finer detail: English literature 1500-1700?

Level: OU level: (0), 1, 2, 3, 4, or with reference to national qualification frameworks?

Extent: hours of study: 1, 10, 100?, or credit points: 1, 2, 10...?

Radical or conventional?

Can badges, by escaping the constraints of traditional syllabuses and quality assurance frameworks, support radically different educational experiences? Or will they be used simply to recognise smaller chunks of otherwise conventional study?

The rhetoric around badges (see for example Mozilla 2010, HASTAC 2012) strongly encourages badges to recognise 'new skills' that are not well captured by conventional education and assessment (although this perhaps says something about the constraints of standardised national tests in the US education system).

In the OU context badges could be of particular value for projects, such as iSpot, that are outside the bread-and-butter offering of the OU. However, badges also seem a good fit to OER such as OpenLearn. Here much of the OER content is extracted from existing or past modules and so associated badges are more likely to recognise small chunks of conventional study.

Granularity

What should the granularity of a badge be? Should it reward a small chunk of learning, perhaps the equivalent of a few hours of study, or the hundreds of hours of study required for a traditional university module?

The OU has developed a well-understood (at least by its students and staff!) system based around credit for modules that make up qualifications. While students might like to display badges corresponding to modules they are studying or recently passed, badges are probably more suited to smaller chunks of learning that are not recognised by current structures. Most modules offered by the OU are 30 or 60 point and the smallest are 10 point, equivalent to about 100 hours of study. This

suggests that badges might be appropriate for smaller chunks, perhaps corresponding to 10 or 20 hours of study.

However, this could mean a large catalogue of potential badges. OpenLearn for example contains material corresponding to 12,000 hours of study in over 600 units, and the OU channel on iTunes U has 3,000 tracks and 400 e-books representing 5,000 study hours (Open University 2012). Describing individual badges for these units, let alone smaller chunks, would be a challenge. A more workable alternative would be generic badges, for example one for any 10-hour chunk of first-level science. However, that might not be so attractive to a learner since there would be less incentive to study a second chunk if the badge received is the same. A badge backpack could become clogged with apparently identical badges.

One approach could be to support a system of badges that accumulate and can be traded in for a larger denomination. The analogy for the normal credit-bearing offering for the OU might be to think of a badge as equivalent to success at an assignment. While studying a module, a learner can measure their progress by how many of the continuous assessment milestones they have successfully negotiated. With the passing of an exam or other final assessment, all these are wrapped up in an overall module result, and focus is now at the module level, itself now just one step on the way to a qualification.

The notion of badges which can be collected and traded in also fits a design for learning focused around challenges. This sees a badge as a reward for a specific and limited goal, and large-scale achievement as the accumulation of successfully met challenges. This is in some sense the mirror image of describing a module in terms of learning outcomes, and one which might be easier for learners new to higher education to understand.

Assessment

What level of assessment is appropriate for a badge? Is it the case that a badge requires a less rigorous assessment than credit-bearing modules that lead to formal qualifications? Can methods of assessment be offered at sufficiently low cost to form an effective partner to open education resources? What forms of assessment could offer this low-cost basis: what place should there be for learner analytics, computer-marked assessment, peer assessment or self-certification?

Badges are intended to be validated indicators of achievement (Mozilla 2010; HASTAC 2011). This implies that learning should be demonstrated in some fashion before a badge is awarded, although badges could be awarded simply for participation and this could be as simple as tracking activity through VLE tools.

Rigorous assessment is an essential component of credit-bearing modules that lead for formal awards qualifications. Assessment should be reliable (consistent and repeatable), valid (an effective test of the intended learning outcome), fair (not disadvantage any particular type or group of student), and not be open to impersonation or plagiarism. Badges seem appropriate as recognising and rewarding achievement in a light-touch manner with less concern in meeting the above demands for rigour. The attraction for an institution is to find cost-effective means of rewarding achievement in informal learning without the heavy costs associated with the rigorous assessment required for accredited learning. A disincentive is the thought of lending the institution's reputation to badges which can be awarded trivially, or worse, are open to gaming or cheating.

At the extreme, badges could be self-awarded, an approach that implies zero on-going cost for the institution. Of course, the value of such a badge to others would be corresponding low because of the potential for misuse. Computer-marked assessment, for example in the form of banks of

multiple-choice questions, could be used at minimal on-going cost, but require considerable investment to create initially, and are susceptible to plagiarism. However, it is possible to envisage OU modules (or parts of modules) which include computer-marked assessment and which reach the end of their active life being transferred to OpenLearn, complete with computer-marked assessment. A sufficiently large bank of questions with random elements would provide some protection against plagiarism.

Peer assessment offers another option that is potentially of low on-going cost. For example, if an appropriate assessment is to write a short essay, this could be peer-assessed, for example by two or three other learners. A badge could be earned only if the learner had received an adequate score from their peers and had provided feedback to other students. Peer review and comment is used very successfully as a learning technique on several OU modules. For example [Digital photography: creating and sharing better images](#) (T189) and [Design thinking: creativity for the 21st century](#) (U101) use Open Studio / Open Design Studio to provide a structured environment in which students share and comment on each other's work (Holden, 2009). It would be possible to imagine extending this, or another system such as PeerWise (<http://peerwise.cs.auckland.ac.nz/>), to provide a peer-assessment system that would underpin the awarding of badges. However, peer-only systems could be subject to 'gaming' where learners collude to pass each other; moderation by teachers is usually required to provide a check.

The Mozilla Open Badge system does allow a badge to be supported by evidence. It might seem that requiring a self- or peer-certified badge to be supported by evidence would mitigate against problems of cheating or gaming. However, in practice this would seem to demand some level of checking before the badge is awarded. Once the badge is awarded, it is unrealistic to expect potential consumers of the badge to check the evidence against criteria, and difficult to see in practice how a badge could be revoked. Although OBI does support badge revocation at a technical level, the administrative arrangements necessary to ensure that such a process operates fairly could be onerous.

Brand and reputation

How could branding and reputation work in an ecosystem where an institution offers both formal study leading to qualifications and informal study that leads to badges?

Brand reputation of higher education institutions is a valuable asset. The Open University takes pride in a reputation for teaching quality which has been hard won in the face of some scepticism in its early years. This brand would therefore be a valuable part of any OU issued badges, offering an assurance of quality and value. Conversely, there is a danger to brand identity by applying the OU brand to badges that recognise learning that is of a different nature to the formal, accredited modules. This would be particularly true if badges were associated with learning at a different educational level or with much less robust assessment of performance than core modules.

One way to protect brand values would be for badges to be used only as another way of expressing existing accredited achievements, for example a badge for a successfully completed module. There would be value in making it easy for students to show their current achievements en route to a qualification, but this would be a very restrictive use of badges. An alternative approach would be to make a clear separation between formal credit recognised with conventional awards and qualifications and informal learning recognised by badges. In this scenario, badges would never be used for learning that is credit-bearing: there could be no 'currently studying' or 'course-survivor' badges. A compromise might be to use two visually distinct classes of badges but it is hard to see

how the distinction could be conveyed clearly.

It might be noted that iSpot (below) uses badges that reflect its own identity and brand, and not that of the OU. The OU shield is only used on iSpot to recognise formal OU study.

[A case study: Badging skills and expertise on iSpot](#)

The following is based on an existing badge system that is currently supported by iSpot (<http://www.ispot.org.uk/>) and a proposal 'Building Citizen Science: A Natural History Badge Ecosystem' submitted to the 2012 Digital Media and Learning Competition (Rosewell *et al* 2012a & 2012b). (This proposal was not funded).

Existing iSpot badges

iSpot is a public-access website hosted by the Open University. Its long-term aim is to encourage a new generation of naturalists by providing them with the support they need to learn the identification skills that underpin natural history. iSpot can be seen as a social learning community which is positioned as a bridge between informal and formal learning. Learning identification skills in an informal and social space is particularly appropriate because identification and natural history skills are as much the preserve of amateurs as of professionals, particularly in the UK which has a long tradition of expert amateur natural historians and where there is currently little teaching of such traditional skills in higher education.

iSpot is a social networking site where people can post 'spots' – interesting observations of wildlife, ideally based around a photograph and with date and place recorded. The iSpot community has approaching 20,000 registered users who have made 125,000 observations which include 6,700 different species. We can see how the community works and the role which badges play by following the learning journey of a new user, Alice.

Alice's interaction with the community starts when she takes a photograph, for example of a bird (Figure 9).



Figure 9 Alice uploads an observation

Alice uploads her photo to iSpot, saying when and where it was observed. If she can, Alice also adds an initial identification. Alice's observation will be seen by other iSpot participants; they may either agree with Alice's identification or suggest an alternative identification (Figure 10).

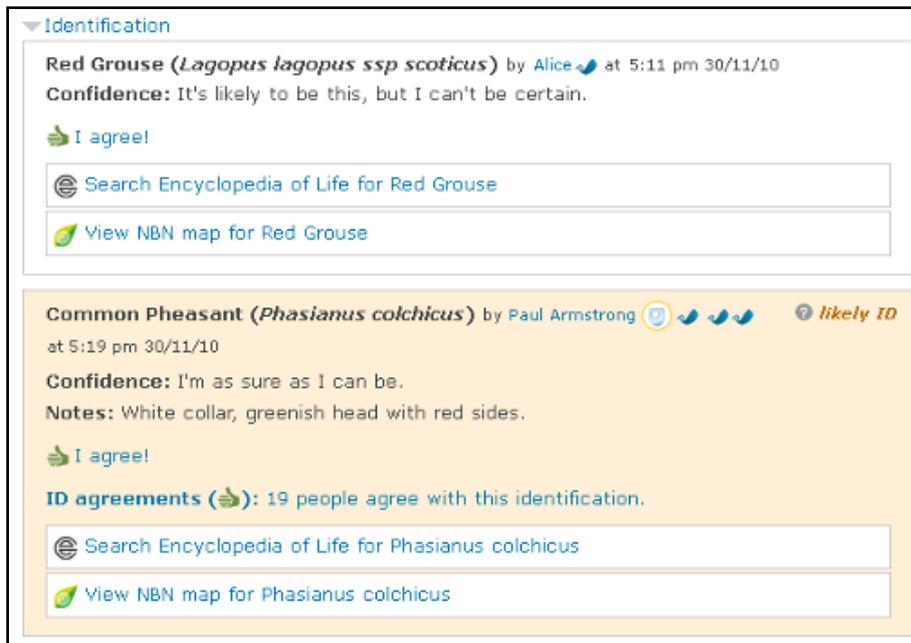


Figure 10 Paul supplies an alternative identification

Here, another user, Paul, has suggested a different identification and this has been confirmed by others (Figure 11). It is at this point that badges come into play. Every community member is accompanied by badges which reflect their expertise; badges are also used to show where a member represents a natural history society.



Figure 11 Users who have agreed with an identification

Bob is a beginner (shown by a single bird icon 🐦), RogerR has greater experience (🐦🐦🐦), and Charles is a bird expert, shown by his gold badge (🐦🏆), and his expertise is vouched for by a natural history scheme or society (his affiliation badge links to the society web site).

An identification with sufficient weight of expertise behind it becomes a 'likely ID'. The reliable name gives Alice a key to unlock learning about that species and its ecology; it provides other observations on iSpot of the same species and links to information on sites such as the Encyclopedia of Life (<http://eol.org/>) and the National Biodiversity Network (<http://www.nbn.org.uk/>). Alice has started her learning journey.

The fact that Bob and Charlie have agreed with Paul's identification also provides evidence of Paul's increasing expertise in correctly identifying birds. Every user such as Paul has an expertise score

(similar to a reputation score in other systems) that is increased when other participants agree with an identification that Paul has made. The increase is very modest if the identification has been agreed by a novice whose own score is low, but the increase is larger if the agreement is from someone who is themselves experienced or an expert and therefore has a high score. As Paul's expertise score grows, he is rewarded with higher badges (shown by multiple bird icons) at milestones. Of course, expertise in identifying birds doesn't necessarily imply expertise in plants; iSpot badges therefore track expertise separately in different biological groups (Figure 12).



Figure 12 A user profile on iSpot, showing expertise badges

Like Paul, Alice can offer agreements and identifications to other users, and engage in comment and discussion around observations; these contributions are also reflected in badges reflecting social activity.

Building Citizen Science: A Natural History Badge Ecosystem

iSpot's badge system predates and differs in some respects from the Mozilla Open Badge Infrastructure. iSpot badges are issued by iSpot and are currently not portable – they can only be seen on iSpot and only have meaning and currency within iSpot. However, we are currently considering a move to the Mozilla Open Badge Infrastructure (OBI) and entered the HASTAC DML competition with a proposal for a natural history badge system with a number of other partners (see Appendix 1) who run web-based projects in the area of natural history and citizen science. This proposal would allow users of all partner projects to display their natural history badges (wherever obtained) in their profiles, showing affiliations with organisations. People could also display their natural history badges on social networking sites, such as Facebook or LinkedIn. Projects would issue their own distinctive badges to mark specific skills and expertise and to reward engagement. Our sites would then begin to automatically recognise each other's badges and use them to influence the awarding of privileges and badges across the different sites.

For example, expert badges are issued on iSpot to individuals recommended by one of the many UK natural history societies. With an OBI, these badges could be issued directly by the natural history society and accepted automatically by iSpot (see Figure 13). Conversely, badges issued on iSpot could be accepted by other sites. For example, Encyclopedia of Life (EOL) is an aggregator of authoritative biodiversity information, reviewed by credentialed curators. OBI badges would enable EOL to recognize expertise developed on other sites such as iSpot and grant them curator status (see Figure 13). Individuals can thus develop their skills through participation and contributions across multiple

organizations and increase interaction among professional scientists and enthusiasts.

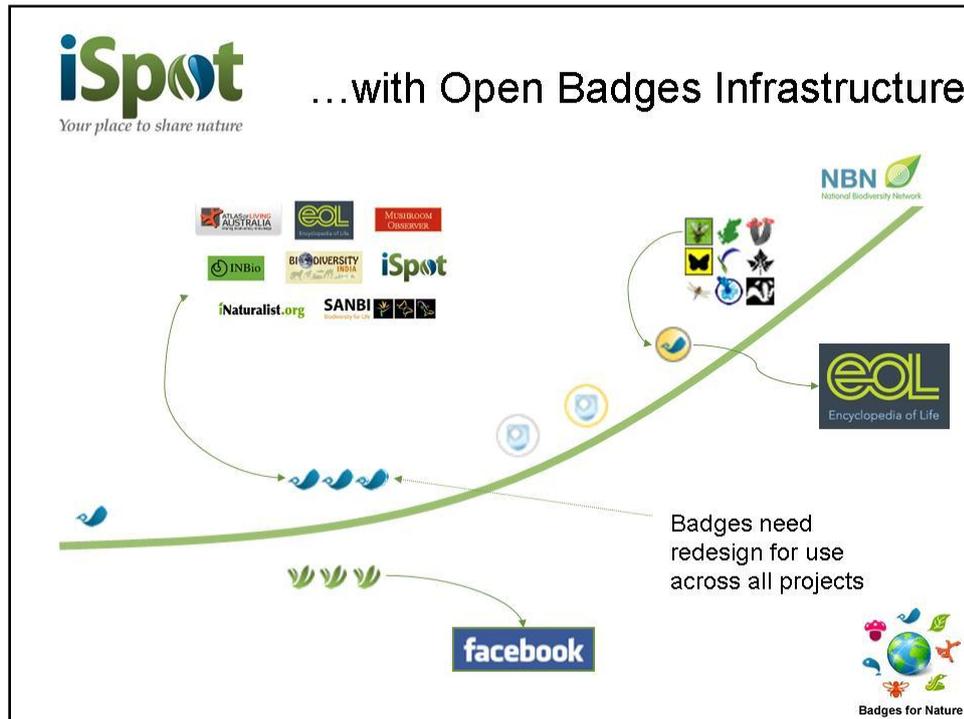


Figure 13 A user's learning journey on iSpot, showing badge acquisition and exchange

Badges on iSpot also reflect the transition between informal and formal learning. Students who studied the Open University module *Neighbourhood Nature* received an affiliation badge for that module (🐦), and a further badge (🐦) when they passed (see Figure 13). iSpot was used to support learning in that module and part of the assessment required demonstrating a level of participation on iSpot. Our natural history badge proposal envisaged badges on other partner sites that also reflect formal and informal learning. For example, the National Biodiversity Institute of Costa Rica (INBio) and the India Biodiversity Portal also target formal and informal learning. Their curricula include observation activities and problem- or challenge-based activities that encourage students to explore biodiversity. INBio's Cyberhives program (<http://www.cibercolmenas.net>) is an excellent use-case for developing badges that recognize growing understanding of applied science and technology skills related to biodiversity.

Note also these natural history badges reflect activities and skills that are both online and offline. iSpot reputation badges are earned by online activity and awarded by an automated system, but the expert badges reflect expertise brought from elsewhere and awarded by human decision. Badges envisioned for activities such as INBio's inquiry projects may be carried out partly online and partly offline and would be more likely awarded by a human assessment process.

Badge design

A 'Natural History' badge sounds an attractive prospect, but there are many devils in the detail. To begin with, the range of partners vary in both scope and focus within the field of natural history. iSpot focuses on identification skills, but other projects may stress wildlife recording, critical thinking or experimental design. Expertise in identification skill may be restricted to one biological group and to one geographical area. To address these issues, we envisioned a system of badges that reflects several different dimensions.

- **Skills** These would include identification skills (iSpot, iNaturalist, Mushroom Observer), data contributor (iNaturalist, India Biodiversity Portal, Atlas of Living Australia), science skills (INBio), eco-tourism and environmental policies and practice (India Biodiversity Portal) and content curation (Encyclopedia of Life).
- **Biological group** iSpot currently divides the living kingdom into a number of informal groups: birds, invertebrates, fish, amphibians and reptiles, mammals, plants, and fungi & lichens.



Figure 14 Informal biological groups used on iSpot

iNaturalist uses groups that are similar but not identical. A site such as Mushroom Observer may be focused on just one of these broad-brush groups but might record expertise at a finer level of detail.

- **Region** Because the species that make up communities vary so much, expertise in identification may need to be referenced to just one region of the world. These might be simply the continents, or Eco zones such as Palearctic, Neotropic, etc.
- **Level** This dimension reflects the learning journey between beginner and expert, providing a path for progression. As an example, the iSpot system provides five levels of earned expertise (e.g. a beginner in plants: 🌿 or a knowledgeable birder: 🐦🐦🐦) plus two levels (knowledgeable and expert, e.g. an expert in birds: 🏆) that are awarded by referees to acknowledge existing expertise.
- **Issuer** We proposed a coherent set of badges that could be issued and used across a number of collaborating projects. However, we are aiming at a decentralised ecosystem of badges, rather than a single issuing authority. It is crucial that the identity of the issuing organisation be reflected in the badge, as well as a unifying design to reflect the commonality across the collaborating issuers.

- | | |
|---|--|
| ◦  Amateur Entomologists' Society | ◦  The Mammal Society |
| ◦  Amphibian and Reptile Groups of the UK | ◦  The Marine Biological Association |
| ◦  Bedfordshire Moth Group | ◦  Merseyside BioBank |
| ◦  Bees, Wasps and Ants Recording Society | ◦  National Museum Wales |
| ◦  Belfast Hills Partnership | ◦  Natural History Museum |
| ◦  Berks, Bucks and Oxon Wildlife Trust | ◦  Natural Shropshire & Shropshire Biodiversity Partnership |
| ◦  Berkshire Moth Group | ◦  New Flora of the Isle of Man |
| ◦  Biological Recording In Scotland | ◦  Norfolk and Norwich Naturalists' Society |
| ◦  Biological Records Centre | ◦  Opiliones Recording Scheme |
| ◦  Black Country Biodiversity Group | ◦  Oxford University Museum of Natural History |
| ◦  Botanical Society of the British Isles | ◦  Pembrokeshire Coast National Park |
| ◦  Bristol Regional Environmental Records Centre | ◦  People's Trust for Endangered Species |
| ◦  British Bryological Society | |

Figure 15 Badges of some of the partner natural history societies active on iSpot

iSpot already has a use-case: experts in the community are validated by iSpot's partner natural history societies (Figure 15, see <http://www.ispot.org.uk/representatives>) and the expert user is accompanied by their sponsoring society badge which link back to the society's web site. Some societies now report significant traffic from these badges, showing the importance of allowing partner branding to be visible.

Our badges would therefore need to be composite to reflect all the above combinations, and this would be reflected in their graphic design. The image below suggests how this could work.

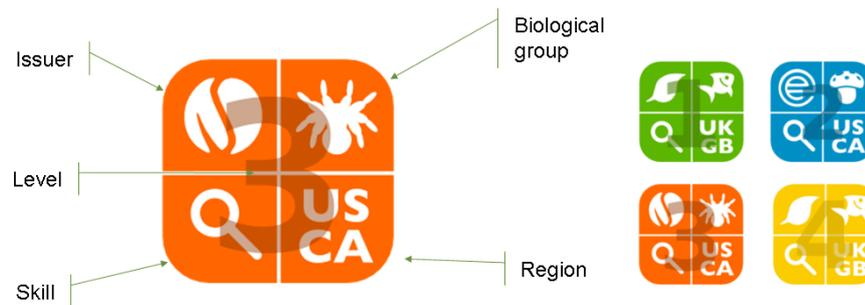


Figure 16 Left: A mockup of a badge reflecting a level 3 skill in identification of North American spiders issued through iSpot. Right: Other possible natural history badges, showing permutations of biological groups and issuers.

Conclusion

Badges are promoted as a good fit to informal learning. For the Open University and other higher education institutions, they would represent a way of motivating and rewarding engagement with a wider public, as well as providing bridges into formal learning and paths out into lifelong learning. Badges could be coupled with existing outreach and OER material where their flexibility and light-touch validation would provide a cost-effective means of providing learners with a tangible reward. (The task of providing suitable validated badges for the OU's extensive public offering is, however, a daunting one.) Keeping badges distinct from formal credit-bearing awards provides a way of handling the issues of brand and reputation, allowing the badge to be supported by the institutional brand without devaluing the core awards. Alternatively, badges that do not use the OU identity can be used for specific projects such as iSpot.

However, there is likely to be demand from our students for badges that represent their current and past study. The OU student community is a large and proud one, and it surely would enhance the OU brand visibility if students could easily show their OU badges on social networks. Using badges for both informal and formal learning does however raise a serious issue for managing brand and reputation.

Acknowledgements

I would like to thank my collaborators in the 'Building Citizen Science: A Natural History Badge Ecosystem' proposal and participants in the 'Badges for learning' discussion meeting, The Open

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Appendix 1

Collaborators in 'Building Citizen Science: A Natural History Badge Ecosystem'

Atlas of Living Australia		http://www.ala.org.au
Encyclopedia of Life		http://eol.org
iNaturalist		http://inaturalist.org
INBio		http://www.inbio.ac.cr
India Biodiversity Portal		http://indiabiodiversity.org
iSpot		http://www.ispot.org.uk
iSpot Southern Africa		http://za.ispot.org.uk
Mushroom Observer		http://mushroomobserver.org

Rutkauskiene D.¹ – Gudoniene D.¹ – Rutkauskas G.²: Mobile tool for education to implement collaborative language learning

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Virtual Mobility in practise

Virtual mobility refers to students and teachers in education going to another institution outside their own country to study or teach for a limited time, without physically leaving their home. It complements physical mobility where students travel to study abroad, such as Erasmus Student Network. The two forms of mobility together constitute academic mobility. Virtual mobility has been defined as an activity that offers access to courses and study schemes in a foreign country, allows communication activities with teachers and fellow students abroad via the new information and communication technologies.

The app's main target user is the advanced learner who is currently in the target language country: for example Erasmus students, migrant workers or students undertaking a vocational placement abroad. The app is intended to act as a personal learning tool, encouraging students to attend more fully to the language and culture around them and to continue to improve their language skills, even when they are functionally competent and possibly no longer involved in formal language education. The tool may, however, be equally useful for learners at other stages and in different settings. The project targets learners both directly and via facilitators such as teachers and commercial training providers.

The eight SIMOLA partners, drawn from five EU countries plus Norway and Japan, include developers of mobile and Web systems, researchers in mobile and e-learning, linguistics and language learning pedagogy and classroom teachers of foreign languages. This combination of interests, skills and knowledge allows us to ground our technical development in realistic learner requirements and to link our work with the current thinking in mobile learning and language pedagogy.

There are a number of Web-based services and applications demonstrate the foundations of the Web 2.0 concept, and they are already being used to a certain extent in education. These include blogs, wikis, and multimedia sharing services, content syndication, podcasting and content tagging services.

Lingobee for collaborative language learning

Lingobee is presented as an online tool for collaborative language learning. It is widely acknowledged that learning about the language and culture of another country is most effective in-situ, yet no technologies currently support learners' informal situated learning while staying in a target language country. The aim of the tool is to fill this gap in, by developing a collaborative mobile tool for learners to capture and share items of linguistic and cultural interest. Based on previous research with international students in the UK, the project explores the model on a European level with two different types of language learners, EU mobility students (Erasmus) and adult migrants.

Lingobee is the collaborative language learning application and consists of a mobile app, a web site and a range of cloud services to collect, edit, browse and share language- and culture-related content found in everyday life. Besides offering a platform for in-situ language learning, Lingobee also supports learner communities through user profiles, user groups, content ratings and other social networking functionality that helps to make language learning more collaborative and help to overcome isolation in a foreign country

Programme with a focus on developing innovative ICT-based content, services, pedagogies and practices. It answers this call by:

- creating mobile and web-based tools and services that enable learners to create, share and access content with their mobile phone, via a web site, or through a widget on their preferred social network,
- exploring how these tools can support formal and informal language learning in universities, migrant support centres and language learning groups across six partner countries, and
- making available the created tools, services and materials and disseminating findings across and beyond member states with the aim to maximise impact and promote best practice.

There is developed a crowd-sourced information system for situated language learning. The system allows language learners in a target country to collect, annotate and share language and culture-related content using their mobile phones and suitable web interfaces.

Mobile learning can be more relevant, because it can take place on a hospital ward, in an office, or at a client's location the very setting where the learning is to be put into practice. Of course, this flexibility also means that it can happen during down time such as while waiting to begin a meeting, waiting in line for coffee, or travelling.

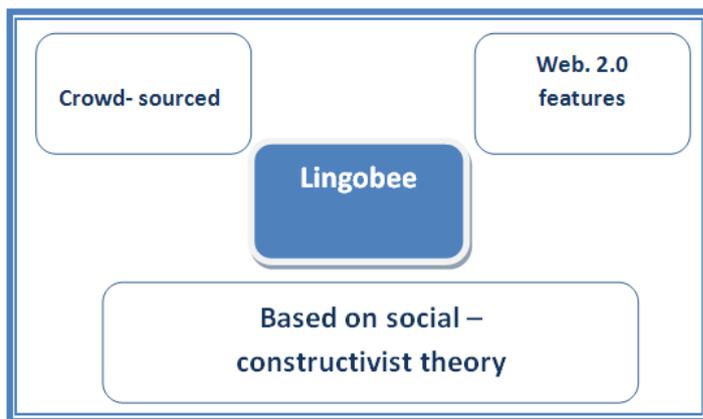
However, among the research findings there were some less obvious benefits.

For example, when using their own mobile devices learners are already familiar with the technology, thus eliminating the technological barriers that often exist when deploying new kinds of learning technologies.

Mobile learning helps:

- in studies;
- talking to people and integrate better in society;
- performing better in ones job;
- travelling;
- helping one find a job;
- understanding the culture of particular country better.

And because the devices typically are always turned on, the research found that learners are empowered to take the initiative and direct their own learning activities in a way that they had not necessarily done before.



1 Fig. Lingobee.

On accessing mobile learning, the inclusion of pithy “nuggets” (based on the assumption that nobody will do a lengthy course on a small mobile screen) ensures only a few points are made at a time. This leads to enhanced retention, probably as a result of minimizing cognitive overload. Then, when something is forgotten and needs referencing quickly, the ease of access to the learning was found to enable speedier remediation. When this happened just prior to performing a task of relevance to the learning, it led to improved learner confidence too. Additionally, the quick double-checking of learning helps to inform an imminent decision was found to result in better Professional judgements. There are benefits related to assessment as well. The portability and some functionalities of mobile devices make easier evidence collection such as collecting portfolio evidence via audio, photograph, or video. These tools also encourage reflection, especially the voice recorder, which offers effortless and instantaneous recording of thoughts and opinions.

Of course, there are the numerous social learning opportunities afforded by mobile learning: SMS texting reminders, knowledge sharing through micro blogging, and simply the ability to dial a number and speak to a peer, mentor, or expert to seek the answer to questions.

All these benefits have one exciting thing in common for the NHS: In addition to more effective training, the agency believes that mobile learning also may deliver improved patient care.

Extend that finding to a different kind of business, and more effective training and improved customer service is achieved.

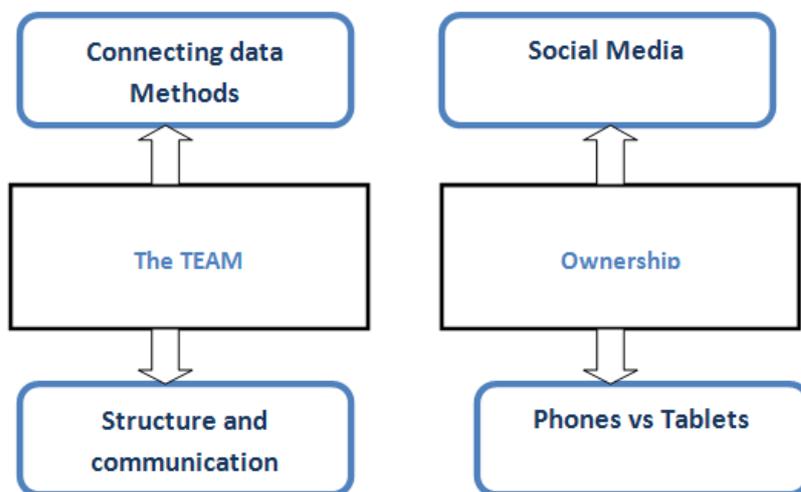
Key mobile learning challenges (and their solutions) states that learning on mobile phones, and increasingly tablets, is the panacea to all training ills, ignoring some of the challenges. Six main concerns were raised that underscored the challenges of mobile learning [3]:

- • gain buy-in from those resistant to mobile learning;
- • effectively design programs for mobile devices;
- • incorporate flash-supported media into Apple products;
- • prevent cheating;
- • track learners' progress;
- • keep costs down while designing programs compatible to different devices and multiple platforms.

An inevitable question about adopting mobile learning is: what about those who are resistant to learning this way?

Another challenge to overcome is determining how to create effective design for mobile devices, which is clearly different from designing for a PC. Epic's award-winning instructional design team identified three key solutions.

First, content must be broken up into appropriate chunks. This may require identifying an appropriate metaphor. For example, the metaphor of revision cards is a good one when offering revision on an entire curriculum: the learner can swipe through multiple cards on his mobile screen, and tap to delve deeper into the content. Second, content must be viewable without extensive downward scrolling. So, for example, when giving feedback to a question, design the feedback to pop up rather than requiring the learner to scroll down to read it. Third, give careful consideration to user input. Decide, if learners need to touch the screen with their finger or stylus, or record audio reflections.



2 Fig. Points to ponder.

Students use social media for learning, gaining the values of mobile learning. Instead of looking at an outright ban, wouldn't it be better to teach students how to use their smart phones to learn?

Lingobee is easy to use but powerful mobile and web-based system for Android phones. The application enables students to collect, annotate, and tag interesting or puzzling language- and culture-related content found in everyday life, including text, images, and other media, and to upload these content items to a repository. From the repository, the information can be syndicated, e.g. via RSS feeds/widgets integrated into websites, blogs and profile pages, and alerts to subscribing mobile

phones. The mobile application is complemented by a Web interface more appropriate for extensive editing and text-based communication, thus combining the affordances of the two platforms.

Learning scenarios

There is organized producing a lightweight and sustainable mobile and web-based system that meets the specific needs of language learners living in an L2 setting, the project will carry out empirical studies to measure the impact of the system on situated language learners' learning, meta-learning and attitudes. The particular learners that are targeted in the project are Erasmus students living in other EU countries and adult migrant learners of the language of their adopted country. Other learners will be invited to take part in the study as the project continues, recruited by conventional and digital channels.

These field studies will also help us identify and refine pedagogies and practices that make best use of the system. We will spread and test this knowledge as we foster adoption of the system through dissemination and integration with relevant projects and networks supporting language learning and teaching.

Pedagogical approach

In terms of pedagogy, the project is grounded in social-constructivist learning theory and draws on key ideas such as situated cognition, learning in everyday life and learning as a social system. There are noticed popular Web 2.0 trends such as user-generated content, recommenders systems, content tagging and social networking in general as harmonising closely with these approaches to learning.

The users are particularly interested in the use of digital tools outside the classroom, either as a complement to formal work or in completely independent mode (Tough, 1971). This type of learner situation tends to be overlooked in funded projects, given that by definition informal learners tend to be difficult to study or categorise. We are anticipating that social networking services will be a key factor in reaching and interacting with independent language learners.

The concept was generated with a learner-centred design approach, on the basis of use cases, which built on focus group findings about language learning preferences of the target learner group (Norman & Draper, 1986; Pemberton et al, 2005).

The process of designing the system involves language learners, language teachers and other stakeholders such as school managers and TEL researchers at all stages, drawing on the informant design model (Scaife et al. 1997) and the participant design model (Mumford, 1997). The detailed functionality and interaction/interface design of the system was developed in conjunction with a group of potential users drawn from international students in the UK, using a participatory design approach. Informant design involves stakeholders throughout the development of new software prototypes. Pioneered by Scaife et al. (1997), informant design questions the ability of stakeholders to contribute as equal participants in the software design process, and instead employs them as domain experts that are consulted by developers to inform the design process. Informant design

sessions were implemented as focus groups with teachers and international students, in particular during the requirements analysis. Questions discussed in this context relate to concrete functionality as well as wider user experience issues including trust, identity and privacy.

Participant design involves stakeholders as active and equal partners in the development process. Pioneered in Scandinavia in the 1970s (Mumford 1997), it is based on constructivist beliefs where knowledge about the software is constructed through interaction between the people involved. Participant design aspects were implemented as co-design sessions with groups of learners. Questions addressed in co-design sessions related to the concrete user interface, such as terminology, content layout, navigation mechanisms and rating mechanisms.

Issues

Lingobee is easy to use but powerful mobile and web-based system for Android phones. The application enables students to collect, annotate, and tag interesting or puzzling language- and culture-related content found in everyday life, including text, images, and other media, and to upload these content items to a repository. From the repository, the information can be syndicated, e.g. via RSS feeds/widgets integrated into websites, blogs and profile pages, and alerts to subscribing mobile phones.

The mobile application is complemented by a Web interface more appropriate for extensive editing and text-based communication, thus combining the affordances of the two platforms.

In terms of pedagogy, the project is grounded in social-constructivist learning theory and draws on key ideas such as situated cognition, learning in everyday life and learning as a social system.

The tool also encourages reflection, especially the voice recorder, which offers effortless and instantaneous recording of thoughts and opinions.

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Sangrà S. – Vlachopoulos D. – Guitert M. - Pérez-Mateo M.: Lifelong learning ecologies and professional development

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Introduction

The last ten years or more have been a period of intense change, both on a structural and general level. We live in a time of confusion, common to moments in time where there is a historical transition from one type of society to another. At times such as these, new concepts emerge which attempt to redefine the basic issues involved. The 'Net society' is one such concept: a society whose social structure is based on a series of networks activated micro-electronically, with information and communication technologies which are digitally processed and basically organized via the Internet Castells (2000, 2001, 2009). In a similar vein, Berners-Lee (2008) introduced the concept of 'social collaboration' where the Internet is perceived as something more than a tool for the transmission of data and documents. "The Web is humanity connected via technology", enabling people to receive, give and construct together in order to fulfil their individual and collective needs.

This situation has led to a substantial change in the professional needs, competencies and skills required by individuals in order to progress in the Net society. As stated by Area (2006), the characteristics of our current context demand that all professionals reconsider not only the activities they perform in the work place but their own professional profile and the way their profession works on a practical level. In other words, it is imperative for individuals to re-examine their professional development and the acquisition of new knowledge via processes which are different from those we have been familiar with up to now.

Faced with this situation, training is seen as the 'best way' to guarantee the development of highly productive work environments (Carnoy, 2001). According to Guitert & Area (2005:81) "the rapid technological changes, the emergence of new cultural habits, the increase in jobs related to the digitalization of information and the constant growth of scientific knowledge all create the need for a reconsideration and restructuring of the training models used hitherto". The European Commission (1996:22) states that "the crucial problem of employment in an economy which is constantly changing leads to the need for change in systems of education and professional training". Highlighting this point, Ferraté (2003), quoted by Guitert & Area (2005), emphasizes the fact that training, which overcomes the barriers of time and space, must be able to use and take advantage of

TICs in a correct manner and this can only be achieved via the necessary redesigning of the methodological content of training programs. This content must take into account three basic tenets of educational change (UNESCO, 2008a): basic knowledge of ICTs; a widening of knowledge and the creation of knowledge via the use of ICTs.

Formal, non-formal and informal learning in extended spaces

The updating of traditional training models is a topic currently undergoing much debate. In the past, some authors (Tourinán, 1983; Trilla, 1997; Sarramona, Vazquez & Colom, 1998) had already emphasized the importance of integrating elements of formal, informal and non-formal education in response to the need for updating professional training. In the current ever-changing context based on the use of ICTs, this aspect is even more necessary, as reflected by recent authors such as Attwell (2010a), Cross (2007) and Kamenetz (2010). Similarly, Siemens (2005) considers informal learning to be a significant feature of the overall learning experience. A key aspect of the updating of professional training and development is personalization: adapting policies to the specific needs of each individual, according to their style of learning. This has led to increased reference to *Personal Learning Environments* (PLE) (Attwell, 2010b) which highlight the move towards each individual now being responsible for taking his/her own decisions regarding the most appropriate models and learning resources; it is the individual who must now generate and determine his/her participation and implication in the learning process, rather than simply accepting those proposed by any formal or institutional model. It is thus in these personalized spaces where each professional encounters the most useful form of training, that which is based on the experience of other professionals and is most applicable and transferable to each individual's professional practice. These collective groups are often referred to as Communities of Practice (Lave & Wenger, 1991; Galarneau, 2005), Communities or Interest Groups (Tu, 2004) or, in general and when referring to educational contexts Learning Communities (McConnell, 2006). Levy (2004) introduces the concept of collective intelligence, seen as the ability of virtual learning communities to stimulate the combined intelligence and knowledge of its members, based on the premise that everyone knows something, nobody knows everything and so the participation of the whole group is fundamentally important. According to Walsh (1999), expertise and knowledge are being transformed and now function in different ways, due to the more open channels of communication which exist in cyberspace. And according to O'Reilly (2005), Web 2.0 is the ideal environment for this. We belong to a kind of stock company where each shareholder offers, as capital, his/her knowledge, conversations and capacity for learning and teaching.

The rapid expansion of social networks on the internet within the framework of Web 2.0 is part of this phenomenon. Authors such as Cross (2010); Downes (2007) and Siemens (2004) have described the benefits of informal learning, based on connectivism. The possibility of creating networks of contacts and communities, being able to access content and information not physically available to us and to partake in experiences being developed by professionals in far-off distant contexts has meant that individuals can now become a communication node which simultaneously gives and receives. These authors place great emphasis on the potentialities and benefits which these learning networks can provide for professional development.

In this context, it is clear that the use of ICT in education extends the potential learning space for professional development and updating of skills, thereby facilitating the concept of "life-long learning" Delors (1996) and supporting the policies of the European Commission (2005). But the

potential benefits of ICTs go much further than just life-long learning, as they also promote both “life-wide learning” and “life-deep learning”, concepts developed in studies (Banks *et al.*, 2007) carried out at the LIFE Center, USA. In addition to the time spent by each individual on his/her formal professional development, there is also the time spent on informal development via unplanned contacts and experiences (“*life-wide*”). Similarly, there is time dedicated to a more qualitative, deeper type of learning experience (“*life-deep*”).

These concepts imply that potential learning spaces are neither developed in a linear fashion nor linked to a specific geographical setting. Via the use of ICT, the space (Collis, 1997) or setting (Salomon, 1998) for learning aimed at professional development and updating of skills becomes greater and expands geometrically. Each professional is therefore presented with a wider and more varied range of possibilities from which to create a complex structure of interlinked relations and components which form his own learning ecology: his personal strategy for professional development and relations.

Learning Ecologies

The concept of ecology, developed by different authors such as Barron (2004, 2006), Brown (2000), Luckin (2010) or Uden, Wangsa y Damiani (2007) moves beyond Communities of Practice, Interest groups or Learning Communities and further even than social networks, given that these only exist as selected components of each individual’s learning ecology. From this viewpoint, we understand the concept of learning ecology to be ““a set of contexts made up of configurations of activities, materials, resources and relations generated in physical or virtual spaces, which provide opportunities for learning” (Barron, 2004:6).The conflict between physical or virtual, as they appear in this definition, has currently changed into a juxtaposition.

What is not yet clear is whether this framework of different contexts and mechanisms is really sufficient to solve one of the great challenges of the Net society: professional training and updating of skills (Landsheere, 1981, quoted by Salinas, 1999). Can learning ecologies really improve those formal systems of life-long learning which have been in use up to now? We should bear in mind the warning given by Madrigal (2007) in a study carried out by the CNICE, in which he reminds us that it is not enough to be connected and to be proficient in using technology. What is most relevant is knowing how to apply the technology in an appropriate and efficient manner in educational contexts. (UNESCO, 2008b)

Different questions arise in this context: Is the concept of learning ecologies a valid way to explain and increase levels of personalisation in life-long learning? How can each individual use his/her own learning ecology in order to improve his/her professional activity? Which success factors or strategies need to be identified? What role does ICT play in the setting up of these ecologies?

Teacher’s Professional Development

It is obviously impossible for one project to cover the whole range of professional profiles currently in existence. In our study we therefore plan to concentrate on one profession which is extremely important in society today: teachers, and in particular primary and secondary school teachers. Teachers have a crucial and complex part to play in the Net society. Hargreaves (2003) notes how

they are enclosed in a triangle of competing interests and imperatives: they are the catalysts of the knowledge society and of all its promised opportunities and prosperity; they are the counterpoints of the knowledge society and the way it threatens inclusion, security and public life; they are victims of the knowledge society in a world where ever-increasing expectations of education have to confront standardized solutions based on minimum expense. As highlighted by this author, teachers are the catalysts of the knowledge society and as such they need to create a new kind of professionalism.

In a similar vein, Area (2006) emphasises the challenges faced by teachers who need to move away from teaching models based on text books and transmission/ reception of knowledge to models based on the diverse use of ICTs and on learning tasks based on students searching for, analysing and reconstructing information for themselves. We are therefore faced with a profession which demands and needs training programmes which reflect the teacher's role in dealing with the challenges of education which exist nowadays, since the training they have received up to now, has been inadequate both temporally and structurally, to respond to the challenges faced by society as a whole and the education community in particular (Marcelo, 2002).

Authors such as Oblinger & Oblinger (2005), Palfrey & Gasser (2008), Prensky (2001), or Tapscott (2009) highlight the characteristics of the new generation of learners in our classrooms. While some authors argue that there has not been a generational change as such, but rather that changes have been determined by the context in which young people are growing up (Bullen *et al.*, 2009, Bennet, Maton & Kervin, 2008; Jones & Cross, 2009; Kennedy *et al.*, 2006; Romero *et al.*, 2010; Selwyn, 2009), it is clear that teachers are aware that their skills need to be updated to deal with the new scenario they face.

Some questions for a roadmap for research

Other researchers analyse the type of training teachers are receiving in the use of ICTs (Marcelo, 2001; Romeu & Guitert, 2004; Salinas, 1998; Sangrà & González-Sanmamed, 2004 and the creation of networks for teachers (Area, 2006; Marcelo, 2010; Romeu & Guitert, 2008). However, we believe that our research needs to go beyond the creation of these networks and we therefore ask the following questions: What role do learning ecologies play, throughout their lives, in the professional development of primary and secondary school teachers? Which elements converge to form the lifelong and life-wide learning ecologies of primary and secondary school teachers? What is the role of each of these components and how do ICTs contribute here? Which benefits can teachers find in the different components which constitute learning ecologies and which reach beyond traditional training models?

We have designed a project which begins with these initial research questions. Our aim is to analyze and understand the ways in which learning ecologies contribute to the professional development of primary and secondary school teachers throughout their lives. First of all, we will analyze the different elements which make up the learning ecologies of these teachers, with special emphasis on the role played by the use of ICTs in this process. We will then examine and identify how these ecologies can be organized and used in order to benefit and improve teaching practice.

A preliminary study has been carried out, using both qualitative and quantitative methodologies. First, identifying and deep-interviewing champions which have been selected from primary teachers, in order to determine how their ecologies are, how they use them, what they do to learn, and how they have evidences of learning. Criteria for selecting these champions have been based on their

highlighting performance in social networks, and use of ICT tools, results on changes and improvement in the classroom teaching and learning methodology, and good practice in time management

After that, key success factors have been extracted to build up a questionnaire to be applied to a significant sample of teachers to match their behaviour with the champions' one.

This paper focuses on the first qualitative part of this study. Several categories for analysis have been identified:

- Reasons for self-learning
- Most used tools
- Kind of self-learning actions
- Updating sources
- Follow-up and management sources mechanisms
- Given value of training: institutional, self-training 2.0
- Ways of methods of innovation transfer

In addition, some contradictions have been emerged, especially on the champions' perception of what they do and how important is what they do for other colleagues. Troubles on time management have also arisen.

In future articles, developments and results of our research will be presented.

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Santesson I. – Elf M.: How to achieve quality in practice-oriented education in an e-learning context

Strand: **Quality Assurance in E-learning**

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Introduction

Traditional nursing programmes have been devoted to campus education with only small elements of e-learning education (Pfefferle, Van den Stock et al. 2010). This system must change because today's higher education requires new methods to meet challenges in the education sector and in society (Högskoleverket 1999; Ossiannilsson and Creelman 2012). The population of students enrolled in higher education is growing, and there is greater diversity in the student population in terms of ethnicity, age, social class, study purposes and living circumstances (Högskoleverket 1999). Student mobility has increased, and students require more personalised and flexible methods of learning. In addition, many universities are decentralised and must collaborate with larger universities (Ossiannilsson and Creelman 2012). The changing labour market places new demands in terms of employment skills. Today, society and the labour market demand people who can communicate and manage information, and these needs also apply to the healthcare sector (Socialstyrelsen, 2010). These changes have led to the recent introduction of e-learning to nursing programmes in Sweden. The nursing schools have defined e-learning education in various ways, from merely the use of email and videoconferences in a traditional "face-to-face" educational system to "blended learning", which combines the two approaches (i.e., campus learning or e-learning, depending on the learning goals of a course).

Dalarna University has long maintained a profile as an institution for "next generation learning" (NGL) (Högskolan Dalarna, 2012), with an investment in e-learning technologies and pedagogy to educate the next generation of students. For individual institutions at the university, the venture has thus far primarily concerned the deployment of new technologies, such as learning platform systems and other technology support. This step has been crucial for development. However, the next step for

the nursing programme (with 400 registered nurses) is to fully integrate the idea behind e-learning (enhancing diversity and quality in learning) into the various programmes and courses. The goal is to meet the learning needs of students and boost personalisation with increased participation and responsibility for the learning outcomes of students. However, certain challenges are connected to the introduction of e-learning, such as juridical, pedagogical and competences as well as both technical and educational skills. Another challenge is that the nursing programme requires a large portion of clinical work and professional-oriented experience; thus, efforts to implement e-learning must consider these factors. These objectives indicate that we must systematically evaluate the quality of our e-learning education according to the content of courses, pedagogical skills and the manner in which students develop professional identities.

In this paper, we share our experiences from years of e-learning education, which has created new possibilities for students to be tutored and educated using innovative technical methods. In addition, we identify future challenges and strategies for maintaining and safeguarding the quality of this education.

Background and context

The nursing programme at Dalarna University has been utilising online distance learning (in which student and teachers are separated by distance, time or space and supported by information technology) for approximately 10 years, with support from the university and its NGL centre. Initially, the programme began with smaller study groups in the county/province, and it was possible to register on the programme as either a regular “face-to-face” campus or an e-learning student and to alternate options between semesters. We have observed positive and negative experiences in both “solutions”. The students who registered as e-learning students were interested in campus-based activities, and vice versa. In addition, teachers tend to prefer one system over the other, and the unease that certain teachers feel with regard to the distance programme can complicate and prevent development activities. We also experienced administration problems with two alternatives, for example, when the students had longer leaves of absence (e.g., sick leaves, pregnancy, military missions), which resulted in a mismatch concerning re-registration. The students who returned to studying in the “wrong” type of programme were required to either wait an additional semester or transfer to the other type of programme. In addition, some students in the campus-based programme wished to have access to the same instructional materials as the distance students, such as recorded lectures, e-learning meetings and seminars. In contrast, some campus-based students never became familiar with the digital equipment (e.g., webcam, web portal) that would have been valuable to them.

In 2009, we decided to allow only e-learning registrations, which have led to a new system. This change has facilitated our efforts and achievements concerning the development of the programme and the e-learning approach. The goal is to use all types of techniques and learning activities in every course, depending on the learning goals of single tasks and the type of course, to fulfil the specific needs of both teachers and students.

Our focus has been rather unique among nursing programmes in Sweden. Until recently, education

in nursing (nationally and internationally) has been designed in a traditional manner; that is, students attend classes and acquire information, and their knowledge is assessed by examinations. This education has tended to focus on producing material and lessons rather than on the students and the differences among their capabilities, learning skills and life situations. We believe that e-learning provides a means of achieving high-quality education and creating an environment that enables knowledge acquisition. The e-learning method both disseminates information and assists students in becoming empowered individuals (Forman, Nyatanga et al. 2002; Adams 2003).

Nursing education presents a range of learning activities, such as theoretical activities and clinical skills practice. To meet the demands that are required for safe and effective care, nurses must be able to integrate theoretical knowledge with clinical practice (Polit and Beck 2008). This integration should include the ability to use research in response to changing clinical environments and the changing needs of patients (Forsman, Rudman et al. 2010). In addition, student practice must include reflections concerning ethical issues and human relationships. This requirement increases the need for real-time student-student, student-teacher and student-patient interactions to meet the programme/course goals and allow the students to develop professional identities as nurses. Dalarna University has a special ward at the hospital for teaching and practising clinical skills.

Because nursing education results in the licensing of professionals, many laws and regulations must be considered (Socialstyrelsen, 2005), which, in addition to the large clinical portion of this type of education, may have traditionally prevented many nursing schools from fully implementing e-learning. We believe that the use of modern learning approaches prepares students for the healthcare system by developing, for example, their information technology (IT) skills.

NGL at Dalarna University

The geographic location of Dalarna University has accelerated the development and improvement of e-learning education. Approximately 65 % of the students at the university are studying in an e-learning environment, and the university strategy is driven by three important principles:

- improved interaction between teachers and students
- a superior and user-friendly technical environment in which pedagogical ideas are the focus
- the stimulation of students to become more focused and responsible for their learning activities and outcomes

The university has been successful in adopting new technologies and strategies for e-learning because the university has been required to find new and innovative ways of reaching students and collaborating with colleagues at other universities. Because of the width of Dalarna County (approximately 500 km from end to end), many of our students must travel long distances to acquire their education. By seeking new learning methods, such as e-learning and distance learning, Dalarna University discovered a great opportunity to attract students from the county and the entire country as well as from all over the world. The e-learning efforts have contributed to the recognition of the university as a well-known e-learning university on both the national and international levels and

have facilitated regional development by offering courses and programmes to students despite distances.

The NGL centre has systematically worked to implement and develop new techniques and e-learning pedagogy. The vision of NGL is that learning is based on collaboration and should be created from the perspectives of individual students, regardless of their learning styles, life situations and reasons for studying. The research section of the NGL programme consists of numerous activities that are focused on e-learning and technology-mediated knowledge processes (Högskolan Dalarna, 2012).

Healthcare and the need for e-learning

Rapid changes in the healthcare system require new and extensive competencies for nurses. Nurses must be competent in handling technologies to improve patient outcomes (Rigby, Wilson et al. 2012). Healthcare is a highly technical sector in both the treatment and monitoring of patient health statuses (Rigby, Wilson et al. 2012). For example, today, it is necessary to be able to access information in evidence-based databases and to use innovative communication technology, such as asynchronous discussion boards and professional blogs, to maintain clinical knowledge (Rigby, Wilson et al. 2012).

In addition, lifelong learning is currently viewed as essential to maintaining professional competency (Forman, Nyatanga et al. 2002; Rigby, Wilson et al. 2012). The majority of the workforce have families and work shifts. Thus, the demand for flexible, innovative access to continuing education has increased. Institutions must support learning for all students rather than merely supporting the learning of individuals who can be enrolled in a campus degree programme (Ossiannilsson and Creelman 2012). E-learning is viewed as an opportunity for students to enhance their learning and to develop the essential IT skills that are necessary for self-directed learning (Rigby, Wilson et al. 2012).

WHO (World Health Organisation) has emphasised that the use of a digital approach can enhance the likelihood of attaining adequate, equal and accessible health for all members of society (WHO 2012). WHO uses the term e-health to refer to IT solutions that can be used for treatment, research and education. The EU also uses the concept of e-health to refer to IT that is used for improvements in the health of both individuals and society (European Commission, 2012).

In sum, we possess significant experience in distance/e-learning education and have thus become strong and advanced in our use of this learning approach. The university has a progressive e-learning centre. However, after years of e-learning education, we now feel that it is appropriate to improve and fully integrate e-learning into the nursing programme. Through grants from the NGL centre, we will benchmark our e-learning progress according to the EADTU (European Association of Distance Teaching Universities) standards (Williams and Rotheram 2010). The aim is to develop the education programme to become a leading e-learning institution in Sweden. We consider benchmarking to involve more than simply comparing the nursing programme with the EADTU norms or standards. We will use benchmarking as a tool in a systematic method of identifying gaps in our learning performance and as a guide for making changes to ensure high-quality education. The results from the benchmarking can be used to strengthen our processes to achieve a quality nursing programme and to contribute to encouraging the staff to use a continuous learning approach. In addition, the

administrators and the NGL centre can use these data to design technology support for both students and staff.

Challenges

Sceptical attitudes concerning the full adoption of an e-learning approach in a programme such as nursing remain. Some sceptics have claimed that e-learning will dilute the academic rigor. It can be a challenge to convince the staff to use a new system of education. Our experience practising e-learning is lengthy, and the use of email and platforms is self-evident for our staff; however, the path from that level to the design of education based on the e-learning concept continues to be lengthy. In many situations, the traditional “active teacher–passive students” model is still employed with the assistance of e-learning techniques. The challenge will be to replace this traditional model with inclusive and participation-based learning. In addition, we must involve the entire institution to consciously shift from teaching to learning and to focus on student perspectives. The clinical training centre must also shift to an e-learning approach in a more advanced manner, for example, by using published and self-directed demonstrations on the internet and video-recording clinical practice situations.

Strategies

We have begun our journey towards the provision of high-quality e-learning nursing education. However, we will continue to encounter certain challenges in the future. The major challenge is to assure quality and improve the efficiency and effectiveness of e-learning in a practice-oriented nursing curriculum. We must develop and learn how to use new pedagogical methods and ideas to support the students in practising their clinical skills. In addition, we must incorporate the e-learning approach into the entire nursing programme and allow the learning goals to guide the pedagogical methods and technical support. The university’s e-learning goals (i.e., improved interaction between teachers and students, a superior and user-friendly technical environment in which pedagogical ideas are in focus and the stimulation of students to become more focused and responsible for their learning activities and outcomes) must be fully integrated into the nursing programme.

The next phase of our e-learning development will consist of the benchmarking process, which will provide an evaluation of the quality of our nursing programme in the NGL context. We have performed an initial rapid scan to demonstrate our existing knowledge. High scores were obtained for the student platform of receiving information, communication with teachers and technical support, including overall strategies and administration. However, areas that we must develop include the integration of e-learning into our courses to permit dialogue among students and teachers, the provision of personalised education and the encouragement of responsibility and participation among students and staff in e-learning education.

To achieve our goals of providing high-quality e-learning education, we must articulate and develop the following:

- the vision of the institution in relation to e-learning
- the quality improvement cycle (e.g., by benchmarking)
- the rights of students to design their own university
- assessment methods that enable students to design their own education using, for example, e-learning portfolios
- innovative methods of using e-learning in clinical practice
- a context that promotes the consideration of student perspectives

Conclusions

This paper explores the new challenges that are associated with nursing education and the adoption of an e-learning educational programme. These challenges extend beyond technical implementations to encompass the design and development of an educational system that is focused on learning rather than passively teaching students. The goal is to create an e-learning educational programme that combines an electronic approach to delivering information with important principles, such as student activities, participation and personalised learning. In addition, we want to create a learning milieu that promotes independence, allows flexible work hours, enables students to create their “own university” and provides them with opportunities to practise their computer and digital skills.

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Sotiropoulou I. – Papachristopoulos K. – Kanellopoulou A. – Kameas A.: Contextual and Motivational factors associated with learning outcomes in distance learning adult education - Testing a model of Self-Determination Theory in Hellenic Open University

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Introduction

Just as motivation is a key factor in learning and achievement when face-to-face educational strategies are used, so it is in distance learning environments (Jones & Issroff, 2005). Nevertheless, it is true that motivation has not received the deserved attention in online learning, despite its effectiveness on learning consequences (Rovai & Barnum, 2003); studies that explore motivation to learn in online contexts are relatively limited both in number and scope (Artino, 2008; Bekele, 2010). As suggested by Miltiadou and Savenye (2003), studies of motivation in distance learning environments have adopted various frameworks to underpin their research. Of these, intrinsic–extrinsic motivation theory has often been used to explore students’ behaviour (persistence or dropping out intention) in online environments (Martens, et al., 2004). A theory that explicates intrinsic–extrinsic motivation in depth, and also how contextual factors can influence the learning activity, is self-determination theory (SDT) developed by Deci & Ryan (1985).

Self – Determination Theory

Self-Determination Theory is a contemporary theory of situated motivation that is built on three basic needs of a learner: autonomy, relatedness, and competence. Recent research (Chen & Jang, 2010) has demonstrated that Self-Determination Theory provides a useful analytic tool for exploring the complexity of motivation in online contexts (Ryan & Deci, 2002). The theory assumes that different motivational regulations exist in the individual, or in the environment, each reflecting varying levels of self-determination.

Motivation has been theorized to fall on a continuum (Figure 1), from **external regulation** of behaviour to **self-regulation** of behaviour (Deci & Ryan, 1985). At the most controlled end of the

continuum lies extrinsic motivation and at the most autonomous end of the continuum lies intrinsic motivation. Beginning with the nonself-determined behaviour, Amotivation, refers to a perception that no worthwhile purposes or expectation for the specific activity exist, and hence results a complete absence of self-determination (Ryan & Deci, 2000). Then, **Extrinsic** motivation refers to partaking in an activity to attain an outcome separate from the activity itself (e.g. enrol to a course in order to gain more money). Extrinsic motivation can be further divided, in a descending order of self-determination. The more self-determined forms of extrinsic motivation include: **integrated** regulation (e.g. pursuing an activity because it is congruent with other aspects of the self) and **identified** regulation (e.g. undertaking an activity because one accepts the value of the activity). The less self-determined forms of extrinsic motivation include **introjected** regulation (e.g. engaging in an activity because of internal pressures such as guilt or shame) and **external** regulation (e.g. doing an activity because of external pressures or incentives). Finally, **Intrinsic** motivation involves pursuing an activity out of interest and enjoyment and without external contingencies (e.g. for the pleasure of expanding someone’s knowledge, for the satisfaction of fulfilling someone’s objectives).

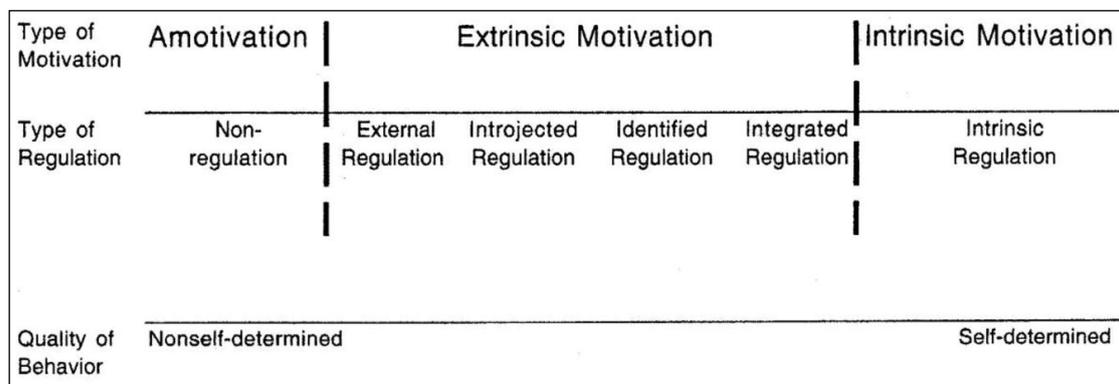


Figure 1. The Self-Determination continuum

Furthermore, motivations are indirectly influencing emotions. It seems that intrinsic or extrinsic motivations are activating the appropriate emotions as well, that is intrinsic emotions (more learning process enjoyment) and extrinsic emotions (task oriented satisfaction) (Pekrum, et al., 2002). Moreover, there is a slight difference among the types of motivation and gender, as research has shown, that women reported higher levels of intrinsic motivation and identification, but lower levels of external regulation and amotivation than men (Vallerand & Bissonnette, 1992).

Self – Determination Theory and Learning Context

Besides the psychological factors, Self-Determination Theory implies that self – determined behaviour can further be enhanced by autonomy supportive environments. For example, encouraging social agents (family, instructors, etc.), organizational stuff and educational material have a major impact on learning outcomes (achievement, course satisfaction, emotional state etc.). The notion of contextual support is especially valuable, as online learners need a variety of support from instructors, peers, administrators, and technical support personnel (Tait, 2003). Autonomy support is the interpersonal framework one person provides, in order to involve and nurture another person’s internally focused volitional intentions to act. When focusing on instructors, such behaviour is manifested when a teacher supports student’s psychological needs (e.g. autonomy, competence, and relatedness), interests, preferences, and values. This kind of supporting behaviour is

fundamental with respect to motivation, thus providing students with autonomy support, awakening their self-determined motivation (Vallerand, et al., 1997). Other characteristics of an autonomy supportive teacher are to listen more, to show empathy and to propel internalization (Reeve & Jang, 2006).

Due to the indirect perception of this supportive behaviour, the term most commonly used to describe the autonomy supportive context in SDT is **Learning Climate** (Williams & Deci, 1996). Reeve (2002) has performed a meta-analysis of the advantages of Autonomy Supportive Climate and found that these are: better self-esteem and feeling of competence, higher creativity and flexibility of thought, better conceptual reasoning and long-term memory, better school performance, and a more positive emotional state. Learners' confidence in their ability to learn is highly likely to affect their actual ability to learn. Learners' who are not confident may not feel they are capable of learning and this negative motivation may discourage them from allocating effort towards learning and subsequently performing with e-learning courses. Positive activating emotions, such as enjoyment of learning, may generally enhance academic motivation, whereas negative deactivating emotions (e.g. boredom) may be harmful for the learning activity itself. Positive emotions facilitate the use of flexible, creative learning strategies (autonomous style), while negative emotions lead to more controlled types of learning (Pekrum, et al., 2002). The warm relationship enhances not only the intrinsic motivation, but also the willingness to accept external goals – essential for learning in adult learning education (Eccles, et al., 2002).

Consequently, the autonomy supportive instructor's behaviour is linked with several positive learning outcomes, such as, student engagement to the course (meaning intensity and emotional quality of students' involvement during learning) high achievement and high course satisfaction. Whereas, controlled methods of teaching often lead to negative learning outcomes, such as amotivation, boredom, underachievement, and high dropout intention etc. (Connell & Wellborn, 1991).

Self – Determination Theory and Learning outcomes

The corporate e-learning environment is often not structured or controlled. Corporate e-learners are susceptible to distractions from both their work and social surroundings, which can reduce effort allocated to the task at hand. Research has typically shown that attrition rates are often 10-20% higher for online courses than for traditional, face-to-face classrooms (Holder, 2007). Dropout rate is an issue of concern for HOU as well, as more than 30% of freshmen quit their studies each year, mostly in undergraduate studies, whereas a smaller percentage exists in graduate programs (14%) (Pierrakeas, et al., 2004).

Although several studies have attempted to identify the variables that contribute to student dropout in distance learning courses, “the decision to drop out or to persist is a result of the interaction of both internal psychological variables and the external environment” (Morgan & Tam, 1999). Vallerand and his colleagues (1997), support that the dropout students had perceived their social agents (teachers, parents) to be less supportive about continuing their studies, and less autonomous motivating (low levels of intrinsic motivation and identification). Actually, there was a significant relation between high levels of amotivation and boredom among those who interrupted their studies.

Most studies in distance learning education focus on self-regulatory processes with regard to the educational procedure only. There has not been in depth research of the reasons for which someone enrolls in an adult distance learning course. Such a research could provide useful information about drop out intention rate in online adult education, especially when it involves learners who are also workers. It is true that, drop out in online courses should be evaluated carefully as the demographics for online courses are different from that of the traditional classroom. Students are adults and have some factor prohibiting attendance on a traditional campus, such as family and work overload and work - family conflicts. One of the internal factors that can be categorized as an individual factor is the lack of motivation (in other words, learning difficulties, miscalculation of time students need to study). External factors typically include environmental influences, such as organizational support as well as socioeconomic difficulties, or unexpected events such as health and family problems. Taking all these into consideration, we propose that Self-Determination Theory has the potential to address both positive and negative learning procedure outcomes, such as student's course satisfaction and dropout intention in the online learning environment.

Study objectives

In this paper, we present the results of a study we conducted among first year students of Hellenic Open University. The purpose of this study was to examine the relations between **personal factors** (e.g. motivation to enrol in a course) and **contextual factors** (e.g. learning climate) as well as **demographic data** of adult learners with some outcomes: **course satisfaction and drop out intention**. Based on a theoretical framework derived from social-cognitive theory, as well as previous empirical work, we test the research hypothesis that autonomous motivational beliefs of attending a course in Hellenic Open University, as well as autonomy supportive learning climate can positively predict course satisfaction and negatively predict drop out intention. The paper is structured as follows. The next section describes the methodology we used to conduct the study. Then the most important results of the study are presented, followed by a discussion on the findings.

Methodology

Context and participants

The sample of this study was one hundred and twenty four students (N=124). They are adult students in 6 undergraduate programs provided by HOU, who have completed their first year of study. Participants were randomly selected from the courses' catalogues, after had been categorized by two conditions: (a) they had selected only one course in their first year of study and (b) they had just sat for exams. That precondition was made so as to focus on one instructor's behaviour in order to avoid confusion and get more valuable results in the learning climate questionnaire (LCQ), which refers to a relationship with "...the instructor".

Hellenic Open University (HOU) is the sole public higher education institution that offers distance learning in Greece. By law, students that enrol in HOU must be older than 25 years of age. HOU

(www.eap.gr) is structured in 4 Schools, which in total offer 6 undergraduate and 36 graduate courses. To graduate from an undergraduate course, students have to successfully attend 12 Units; in graduate courses a student has to attend 4 Units and submit a Diploma Thesis. During each academic year, an undergraduate student can attend up to three courses; for graduate students, this number is 2. Students submit papers to their tutors throughout the year (on average, a tutor is responsible for 23 students; this number never exceeds 33). In order to successfully attend a course, students have to successfully pass the exams that take place each summer.

Procedure

At first, an application letter was submitted to the Managing Committee of HOU asking for permission to access the courses' catalogues, in order to select students with the same characteristics. The data was collected with the use of an online survey tool (SurveyMonkey®) and the internet version of the questionnaire was developed by an expert according to the principles of conducting behavioural research over the internet (Fraley, 2004). Data collection started one week after the completion of the course and lasted 20 days, so that the students would have substantial exposure to their respective courses. The research team e-mailed students on a weekly basis during the collection stage, providing them all the necessary information regarding to the survey, and encouraging them in order to complete the filling of the questionnaire.

Instruments

This study made use of appropriate tools to collect useful information about the demographical data, measuring contextual and motivational factors, as well as learning procedure outcomes. The composed questionnaire consisted of 43 items, distributed as described below.

Demographical data. A 9-item questionnaire was created in order to obtain some demographical data from the participants. These are: Gender, Age, Marital status, Area of Residence, Course of attendance, Occupational status, Working hours per week (0-20, 21-40, >40), and Studying hours per week for this course (0-4, 5-10, >10).

Contextual support. To measure autonomy supportive behaviours exhibited by Hellenic Open University professors we used Williams & Deci's (1996) **Learning Climate Questionnaire (LCQ)**. The original LCQ scale has 15 items, but for the sake of brevity the short 6-item version was chosen. The questionnaire is typically used with respect to specific learning settings, such as particular class. Students replied using a 7-point Likert scale (1- *strongly disagree*, 7-*strongly agree*), about the degree in which their instructor supports their autonomy. The LCQ has a single underlying factor with high internal consistency ($\alpha=.96$) (Williams & Deci, 1996). The questionnaire was translated and adjusted in Greek by the research team. In this study Cronbach's Alpha was high as well ($\alpha=.90$).

Scores are summed, with higher scores indicating greater perceived autonomy support. Each of the six items reflects the autonomous supportive teaching behaviours, such as avoiding directives (*"My instructor provides me choices and options"*), demonstrating empathy and interpersonal skills, enhancing confidence (*"My instructor conveyed confidence in my ability to do well in the course"*), avoiding criticism, enhancing internalization processes, nurture intrinsic motivation (Deci et al.,

1982).

Motivational factors. To measure motivational factors was used the Academic Motivation Scale (AMS), college version developed by (Vallerand et al., 1992) which consists of seven subscales. The original AMS contains 28 items (four for each subscale), but in the short version we used 14 items (2 for each subscale). Previous studies (Vansteenkiste et al., 2004) suggested that it is possible –for methodological reasons- to merge the three types of intrinsic motivation (to know, to accomplish, and to experience stimulation) into one, and do the same for the three types of extrinsic motivation as well (identified, introjected, and external regulation). We finally have three major subscales; one of Intrinsic motivation, a second one for Extrinsic motivation and the third one, to represent the Amotivation.

The reliability test indicated that AMS has satisfactory internal consistency across subscales, ranging from .77 to .96. The scale was translated and adjusted by the research team. In the current study, the three major subscales had the following rates at internal consistency test: Autonomous/Intrinsic motivation ($\alpha=.88$), Controlled/Extrinsic motivation ($\alpha=.81$), and Amotivation ($\alpha=.62$). Instead of “college” we used the word “HOU”, and we made some slight changes to fit in the research context. Participants had to answer using a 7-point Likert scale (1- *does not correspond at all to me, to 7- corresponds exactly*), in questions regarding the reasons to attend the course: “*I experience pleasure and satisfaction while learning new things*”, “*In order to obtain a more prestigious job later*”, “*I really feel that I am wasting my time in HOU*”.

Course satisfaction scale. Hao’s Course Satisfaction Scale (Hao, 2004) evaluates the general course satisfaction of the online students, using 11 items, which measure several aspects of course satisfaction, such as online teaching method, instructor’s attitude and help provided, educational material (video, web seminars, books etc.). The items have been modified to fit to the research context. The reliability test on the original CSS revealed a satisfactory internal consistency ($\alpha=.93$). In the translated version, the reliability test revealed a high value ($\alpha=.90$), as well. Using a 7-point Likert scale, participants had to underline the grade that the items (e.g. “*I am satisfied by the relationship I have with my instructor*”, “*I am satisfied by the course’s technical infrastructure provided*”) describe better their feeling (1- *does not correspond at all to me, to 7-corresponds exactly*).

Dropout intention Scale. Due to the lack of questionnaires available for dropout intention for online learning contexts, we created a 3-item dropout intention scale (“*During the last year I thought plenty of times dropping out my studies*” or “*I am sure that I will complete my studies*” -reversed item) using a 7-point Likert scale, ranging from “*I strongly disagree*” (1), to “*I strongly agree*” (7), in which participants declared their intention to discontinue their studies. The internal consistency test showed a quite high alpha ($\alpha=.83$). Complementary, the dropout part contained one multiple choice question, in which students were asked to choose the most important potential reason for quitting their studies. The available reasons were: financial, family, learning difficulties, and other reason, so that potential correlations with demographic data could be made.

Limitations

A number of factors could be considered as limitations of this study. A low response rate and small

sample size were attained for this study which may limit reliability of findings. The low response rate has affected the results not only in a quantitative way but also in a qualitative way, because those who filled in the questionnaire were probably those who are more emotional engaged with their studies in HOU. To further explain that rate, students that have decided to drop out their studies after the first year, or those who are considering it seriously, have probably neglect to fill in the questionnaire. This fact combined with the specificity of sample (individual characteristics of adult students of HOU) may limit the generalization to other students group, population, or context.

Results

Descriptive Statistics

One hundred and twenty four (N=124) students participated in this study (69 Female and 55 Male), all students of undergraduate courses. The majority of participants ranged between 25 - 44 years old (85.5 %), the rest (14.5 %) were older than 45 years old (45 -64). Slightly more singles (46,8%) than married (40,3%) have enrolled in last year's courses. Half of the participants' declared as a residence area, the wider capital region of Athens. The other half was distributed among thirteen other districts of Greece. As far as the "Course" major is concerned, the majority was from Humanities School (66,1%) [SEC, SGC, HLCS], the rest was from Natural Sciences and Technology School (27,4%) [SNS, CS], and from the Social Sciences School (6,5%) [BA] (Figure 2). More than 80% of the participants were employed, as in every distance learning program. As it is shown in the Figure 3, their occupational status included private employees (36,3%), civil servants (30,6%), unemployed (18,5%) and self-employed (14,5%). In respect of their working hours, the majority of the sample works more than forty hours per week (42,7%). In the question about the possible reasons of dropping out the rates were the following: Financial related difficulties (77,4%), Family related difficulties (12,1%), Learning related difficulties (3,2%).

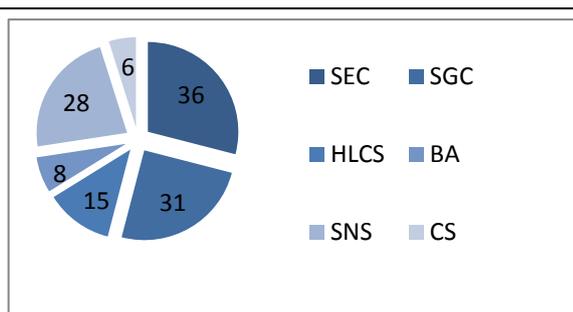


Figure 2. Courses

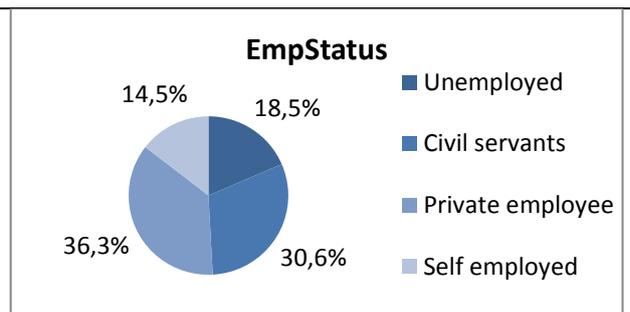


Figure 3. Employment status

Then, by elaborating the data, the following variables were exported: Learning Climate, Autonomous motivation (Autmot), Controlled Motivation (Conmot), Amotivation (Amotiv), Course Satisfaction (CourSat) and Dropout Intention (Dropout). Continuing with the descriptive statistics of our variables it was found that autonomous motivation had the higher median of other types of motivation; ($MAutmot= 5,87$, $SD= 1,12$), ($MConmot= 4,51$, $SD=1,53$), ($MAmotiv= 2,21$, $SD= 1,49$). The median of Course Satisfaction was 4,78 in a 7 point Likert scale ($SD= 1,18$), and finally the total Dropout Intention of the participants had a low average ($M= 2,7$, $SD= 1,75$).

The main objective of this study was to examine: (1) how all the above mentioned variables are correlated with each other and (2) if these variables are affected by the demographic data. First of all, we compared the effects of demographic data on the exported variables. To decide, whether to use parametric or non-parametric tests, we conducted a normality test of each variable. Due to the fact that the normality hypothesis was rejected, we moved on using the non-parametric Kruskal-Wallis and Mann-Whitney tests. Using Kruskal-Wallis test, we test if there is any difference between the medians of each variable.

The results, referring to the demographics effect on the testing variables are the following:

Grouping **Learning Climate** by the Age, there is statistically significant difference between medians of the three groups of age, at a 5% significant level ($\chi^2= 8.577$, $df= 3$, $p\text{-value}= 0.035$). By measuring all the other factors, no statistically significant difference was found among the medians and therefore, no effect of the factor is reported, except for Occupational Status, where there is statistically significant effect of the factor ($\chi^2= 8.624$, $df= 3$, $p\text{-value}= 0.041$). It seems that unemployed and younger participants (25-34) perceive the learning climate less autonomous supportive.

In regard to **Motivational Factors**, when Autonomous/Intrinsic motivation is grouped by Gender, there is statistically significant difference between medians at a 5% significant level ($U= 81425.000$, $p\text{-value}=0.035$, $g=-0.266$). We also observe statistically significant difference in Autonomous Motivation, when grouping the data by the Working hours per week ($\chi^2= 9.057$, $df= 2$, $p\text{-value}= 0.011$). Men and participants working more than 40 hours per week exhibit less intrinsic motivation at the time of enrolment. Finally, Autonomous motivation is influenced by the factor of possible reasons of dropout. At a 5% significant level, there is statistically significant difference between the medians of each possible reason of dropout ($\chi^2= 8.172$, $df= 3$, $p\text{-value}= 0.043$). These reasons are financial, family- related and learning- related. Highly autonomous motivated participants, intent to dropout mostly due to financial reasons. Amotivation is significantly influenced by the hours per week devoted in studying for the course ($\chi^2= 10.078$, $df= 2$, $p\text{-value}= 0.006$), as amotivated students are likely to devote less or none time per week for studying.

Similarly to this finding, students studying very few hours per week (0-4h) demonstrate higher **Dropout Intention**. The opposite conclusion was found when **Course Satisfaction** grouped by studying hours per week, the more the studying hours per week the more course satisfaction they expose. That is, the sense of “engagement” in a course, increases in persistent students the rate in Course Satisfaction whereas decreases the ratio of dropout intention.

Correlations

Thereafter, continuing the analysis process we run the non- parametric Spearman correlation coefficient test to identify the relations among the variables. The correlations presented in the Table 1 below provide an estimation of the associations of all the variables:

Table 1. Spearman Correlations among variables

	LearCli	AutMot	ConMot	Amotiv	CourSat	Dropout
AutMot	0.26**					
ConMot	0.11	0.33***				
Amotiv	-0.17	-0.14	0.01			
CourSat	0.59***	0.31***	0.22*	-0.25**		
Dropout	-0.16	-0.35***	-0.21*	0.60***	-0.28**	

(p < 0.001 ***, p < 0.01 **, p < 0.05 *)

First of all, Contextual factors – in terms of Learning Climate- have a strong positive correlation with Course Satisfaction ($r_s = 0.59$) at a 0.1% significant level. Course satisfaction is as expected positively related to Autonomous motivation student's attitude ($r_s = 0.31$, $p = 0.05$), but on the other hand, negatively correlated with Amotivation ($r_s = -0.25$, $p = 0.05$).

The most important factor to analyze is Dropout Intention. Dropout Intention is negatively correlated with all the other variables, apart from Amotivation. The two variables are strongly correlated ($r_s = 0.60$) at a 0.1% significance level. Moreover, four out of five correlation coefficients are statistically significant.

Regression Analysis

Our purpose is to examine how Dropout Intention can be explained by all the other variables. In order to see which variables can serve as a predictor for Dropout, we use the technique of Stepwise Regression. By doing this process, we find out that only motivational factors could sufficiently explain dropout ratio.

The results of the estimation are presented in the Table 2 below:

Table 2. Stepwise Regression with Dropout Intention as dependent variable

Model	Explanatory Variables	Standardized Coefficients (beta)	P-value	R square
Model 1	Amotivation	0.606***	0.000	0.367
Model 2	Amotivation	0.626***	0.000	0.459
	Controlled Motiv	-0.303***	0.000	
Model 3	Amotivation	0.607***	0.000	0.489
	Controlled Motiv	-0.243***	0.001	
	Autonomous Motiv	-0.184**	0.009	
Model 4	Amotivation	0.566***	0.000	0.478
	Controlled Motiv	-0.229**	0.002	
	Autonomous Motiv	-0.177*	0.017	
	Learning Climate	-0.062	0.389	

(p < 0.001 ***, p < 0.01 **, p < 0.05 *)

The results of the estimation regression indicate that the use of one variable (Amotivation) explains a small percentage of the variability of Dropout Intention. However, the introduction of the other two motivational factors improves the variability of Dropout Intention, which is explained by this model. As we can see in Table 2, the 48.9% of the dependent variable is explained by the regression model ANOVA test indicates that our estimation model is statistically significant ($F = 37.611$, $df_1 = 3$, $df_3 = 118$, $p\text{-value} < 0.001$). Controlled Motivation ($\beta = -0.243$) and Autonomous Motivation ($\beta = -0.184$) have a negative effect on the dependent variable. Instead of this, we observe that if Amotivation increases by one unit, Dropout Intention will be increased by 0.699 units ($\beta = 0.699$). It is thus noted that Amotivation is the most economically significant motivation factor for explaining the Dropout Intention among students. This result is in line with the outcome from correlation test before. In the model 4 we added Learning Climate, as an independent variable to dropout intention, but surprisingly, in the present study contextual factor did not show up as a significant factor in terms of predictability.

With respect to factors explaining Course Satisfaction, we identify that Learning Climate is by far the most statistically and economically significant driver. To explain this, the more supportive the learning climate is the higher the course satisfaction is. Table 3, below, shows that controlled motivation exhibits the strongest influence among motivational factors, in forecasting Course Satisfaction. ANOVA tests indicates that our estimation model is statistically significant ($F = 30.371$, $df_1 = 4$, $p\text{-value} < 0.001$).

Table 3. Linear regression with Course Satisfaction as dependent variable

Explanatory Variables	Standardized Coefficients (beta)	P-value	R square
Amotivation	-0.084	0.212	0.497
Controlled Motiv	-0.155*	0.027	
Autonomous Motiv	-0.109	0.125	
Learning Climate	0.614***	0.000	
$(p < 0.001^{***}, p < 0.01^{**}, p < 0.05^*)$			

Discussion

Based on these results, we can state that the type of motivation of enrolling in undergraduate courses in Hellenic Open University constitutes a significant predictor of the adult learner's intention to drop out. It is important to know that most studies have focused on types of motivation for studying or devoting time to study, neglecting the fact that the reason of applying for enrolment in a distance learning course may sometimes play as crucial a role as the reason one devotes time and commitment to a course.

To summarizing our findings, as the regression analysis results revealed, Dropout Intention could be predictable by measuring the students' motivation type, especially Amotivation. It is important to underline the finding that contrary to our expectations, that controlled motivation constitutes a

significant negative predictor of drop out, more than autonomous motivation does. This fact should be considered seriously by distance learning institutions as both external forces as well as intrinsic values can hold a strong effect on drop out. Therefore, factors of drop out are unique for the online population of students, making it difficult to apply existing attrition models, designed for traditional classrooms, to the online population. Another clue that traditional dropout models does not apply as such in adult online learning population is that contextual factors could not explain the dropout intention, as expected. As it is revealed in a previous study in the same population (students of HOU) tutors and educational material it was not cited as a reason for dropping out (Pierrakeas et al., 2004). Maybe there is something more to investigate in the “context” terminology for the specific population.

Furthermore, in relation with factors explaining course satisfaction, we observe the opposite result to the previous finding. Context factors revealed to be more significant than motivational factors. Autonomous supportive learning climate significantly increases level of course satisfaction that also indicates the direct emotions –motivations relation that we presented in the Introduction. On the other hand, motivational factors play a less significant role on the dependent variable.

Despite the fact that several studies have provided evidence for the positive correlation between students’ intrinsic motivation and perceived autonomy support (Assor et al., 2002; Roth et al., 2007), the present study expands these results by providing evidence for the correlation between the kind of motivation people perceive they had during applying to enrol in the university and the perceived learning climate. This is also in line with the assumption of SDT that the promotion of autonomy and social relatedness is important for intrinsic motivation (Deci & Ryan, 2002).

This study provides several implications; one can be the role of an early counselling intervention to less motivated students during pre-enrolment procedure, in order to investigate their goals before studying. Other example, motivational factors could be taken into account on designing learning procedure and educational material, whereas during the learning procedure, should be an attempt from instructors enhancing contextual factors that improve the course satisfaction. Finally, institutions may change their policy and pay attention on sensitive dropout groups (amotivated and financially constrained students).

Our study aimed at examining some potential motivational and contextual factors affecting drop out intention and course satisfaction. The main findings of the study indicated that all kind of motivations of applying for a distance learning course can provide useful information about drop out intention while learning climate remains a very significant predictor of course satisfaction. Of course, qualitative data can add valuable information about the exact and personalized reasons of quitting studies. Future studies, should focus on how the factor of time influences the motivation type and the persistence in studying through years, or address the relationship of individual differences and autonomous supporting context, as it seems that a lot discussion should be made in that field. We hope that this study will encourage further research on the need of building a new model for explaining dropout intention applicable in online learning contexts. This new model meets the need of creating and standardizing tools adjusted in adult learners’ population.

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Tikhomirova, N.: Management of a modern university integrated in the information environment: perspectives, methods and approaches

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Introductions

If we look at the theory of managing educational institution as a socio-economic system we will see that the researchers of educational technology's evolution do not pay enough attention to the problem of their effective use in terms of information technology. Meanwhile, these processes are related and interdependent. Moreover, these are the educational technologies that are based on the use of e-learning technologies and being the component of innovation require appropriate changes in the organization of educational process and in all university management.

Long-range development of the global and Russian educational systems directly depends on the widespread implementation of e-learning technologies, new approaches to the organization of educational process. Further, they depend on its basis the use of relevant up-to-date teaching technologies, methods of management decision making, implementation of new approaches to the educational institution management. The primary driver of university transformation is the use of electronic technologies in learning process and in management as a whole.

It's important to note that the role of electronic technologies is extending. Unlike conventional interpretations the use of electronic technologies should be considered on one side as the basis of the university management system and on the other – as means of the creation of the most relevant conditions for the development of students' creativity, teacher's competence, individualization of the learning process, improvement of the quality of educational process by using personalized updated electronic content and communicative-integrated system for organization of educational process. At the same time electronic technologies serve as the basis for transformation of administrative relations, arising during the transformation of the university management system, and as a resource for successful functioning of educational process in electronic distributed university. It in general leads to the changes in education system.

To sum up, we can quote Minister of higher education and research, Valerie Pecresse who said at the meeting dedicated to the university entry in electronic age in Paris at Dauphine University: «Our goal today is to carry out education reform in France in the following way:

- 100% study materials in electronic form for 100% students;
- ...we should more actively support e-universities which we defined as basic education centers of innovation in France that give different users an opportunity to use «electronic bricks» for all-round and lifelong education...;
- ...the purpose of e-learning is in the access to knowledge for everyone: for young people who cannot attend all classes as they have to work as well and for the disabled, who are not provided with appropriate conditions in all universities...;
- ...e-learning also allows to link universities from the whole world in a joint educational process...».

We can imagine the basis for the creation and operation of electronic distributed university as a single information environment (Fig. 1).

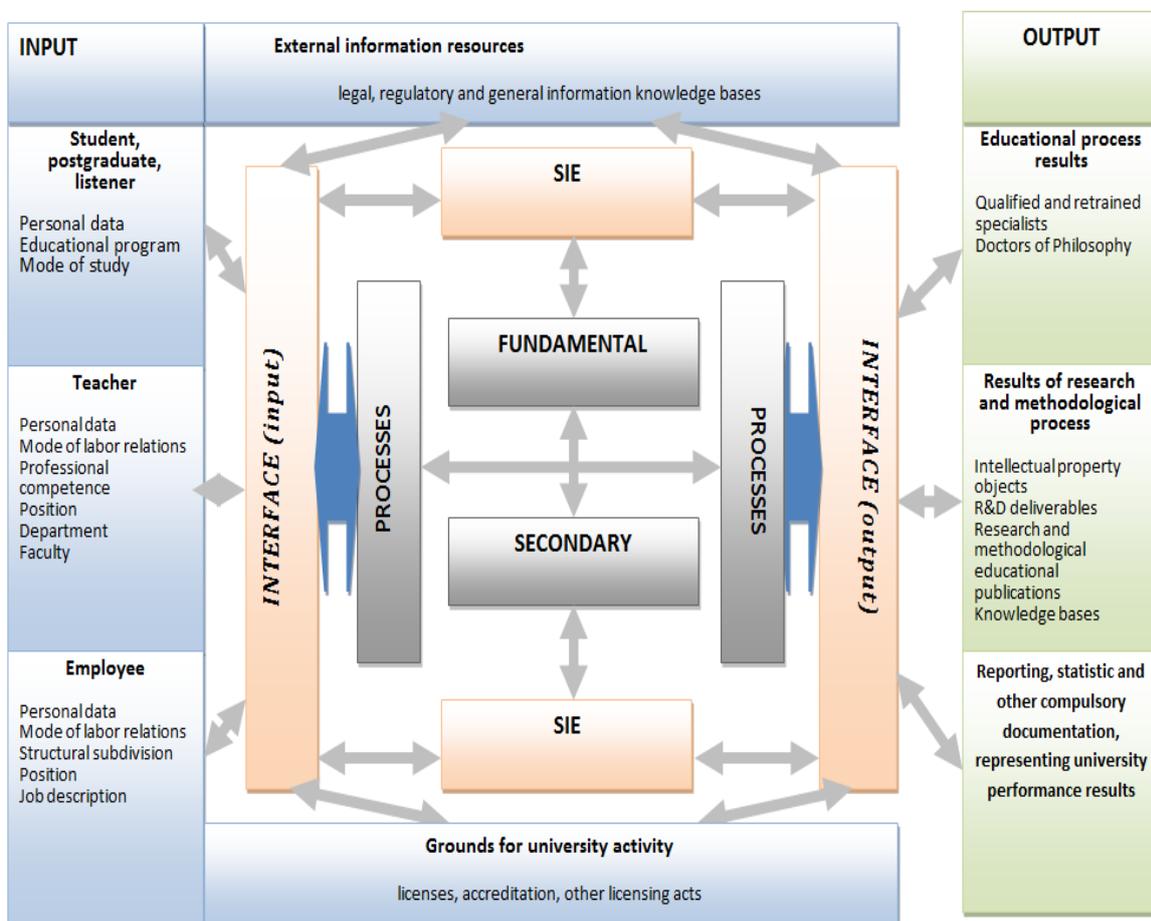


Fig. 1. Single information environment of modern university

Among the principles of a single information environment in electronic distributed university there are: complexity, integrity, integratedness, simultaneousness, dominance of users, continuous updating. It's important to pay attention to the synergistic effects that are provided by the managing organization on the basis of the single information environment. They are as follows:

- the development of communicative culture and a group of likeminded people;
- single information environment gives the staff an essential opportunity to make an administrative decision on the basis of information or allows the specialists, who more deeply understand the information, to take the initiative;
- single information environment encourages education and staff adaptation, includes the mechanisms of self-organization, initiated by the familiarity of the problem.

Formed in accordance with these principles, the integrated communication system based on electronic technologies allows organizing fully and qualitatively the educational process without any space and time limits.

It's necessary to pay special attention to the creation of integrated communication system of education process organization, which implements individual-oriented model of its organization (Fig. 2). It requires fundamental changes of teacher's activity and generally leads to changing of his/her role, provides a convenient access to education, which gives an opportunity to fully implement the principles of citizens' advanced vocational training.

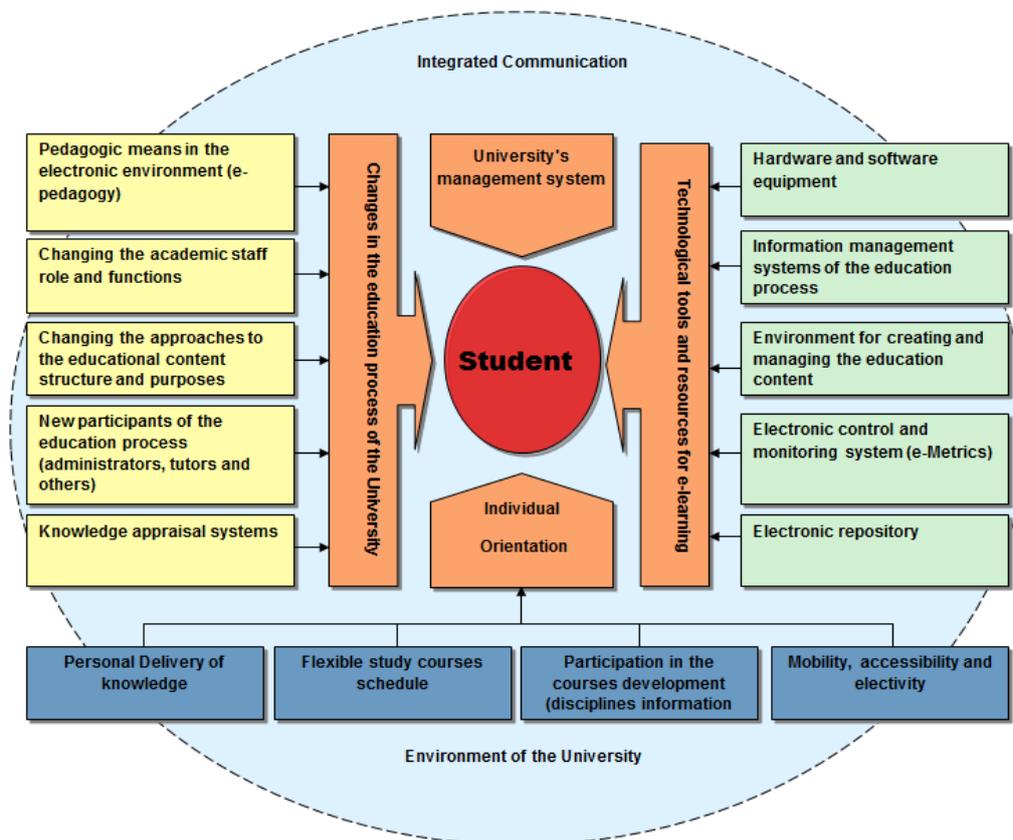


Fig. 2. Integrated communication system of management and organization of educational process

This integrated communication system of educational process's organization is characterized by such core features as personal delivery of knowledge; flexible study courses schedule; student's participation in the courses development; just-in-time knowledge; providing a student with the materials in the form that is familiar to him/her; mobility; accessibility; choice.

Fig.3 shows the goals of the creation of integrated communication management system of interaction of the faculty, staff and students that forms the basis of a new type of university. The

goals are as follows:

- support of the high innovation and research potential of the university and its competitiveness at national and international levels;
- implementation of the demands placed by the modern economy and employers on the institutions;
- meeting the growing needs of education;
- ambition to correspond with the level of the development of the world's leading universities;
- development of a single information space;
- the creation of a storage system for educational materials;
- the development of the knowledge management system, ensuring the continuity of experience within the university;
- improvement of the university's process model and creation of the indicator system for effective management and accountability;
- creation of electronic paper flow at the university, possibility of system scaling.

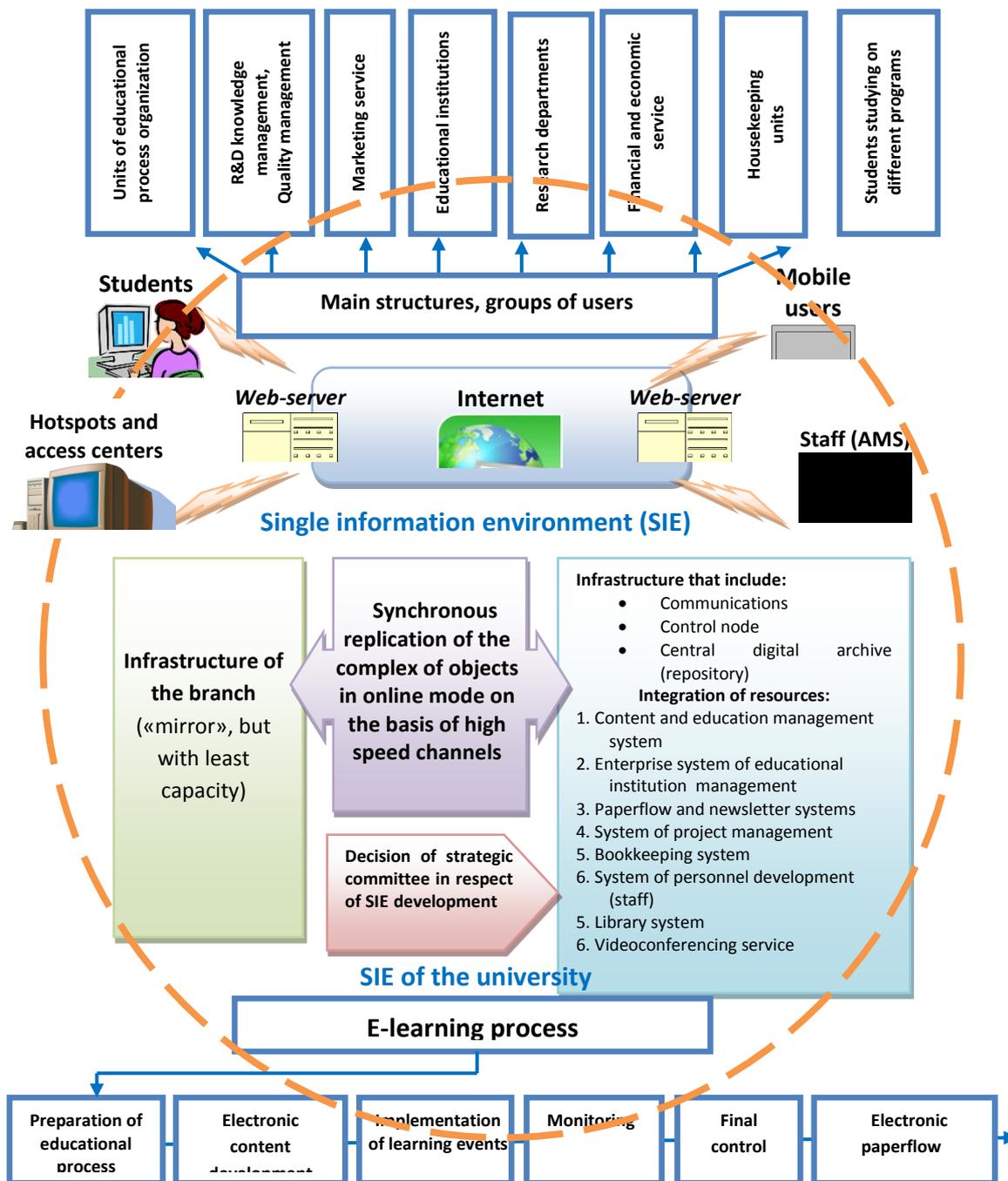


Fig.3. Electronic integrated communication system of management and interaction of the faculty, staff and students

The analysis of the development practice and use of constantly updated electronic content in the university's educational process has shown that this is the key factors that guarantee high quality of the educational process at electronic distributed university and provide students with educational service of high quality (Fig 4.). Main features of the electronic content are as follows: topicality, updatability, visualization, electronic visualization, flexibility, curriculum orientation, problematic social customer orientation.

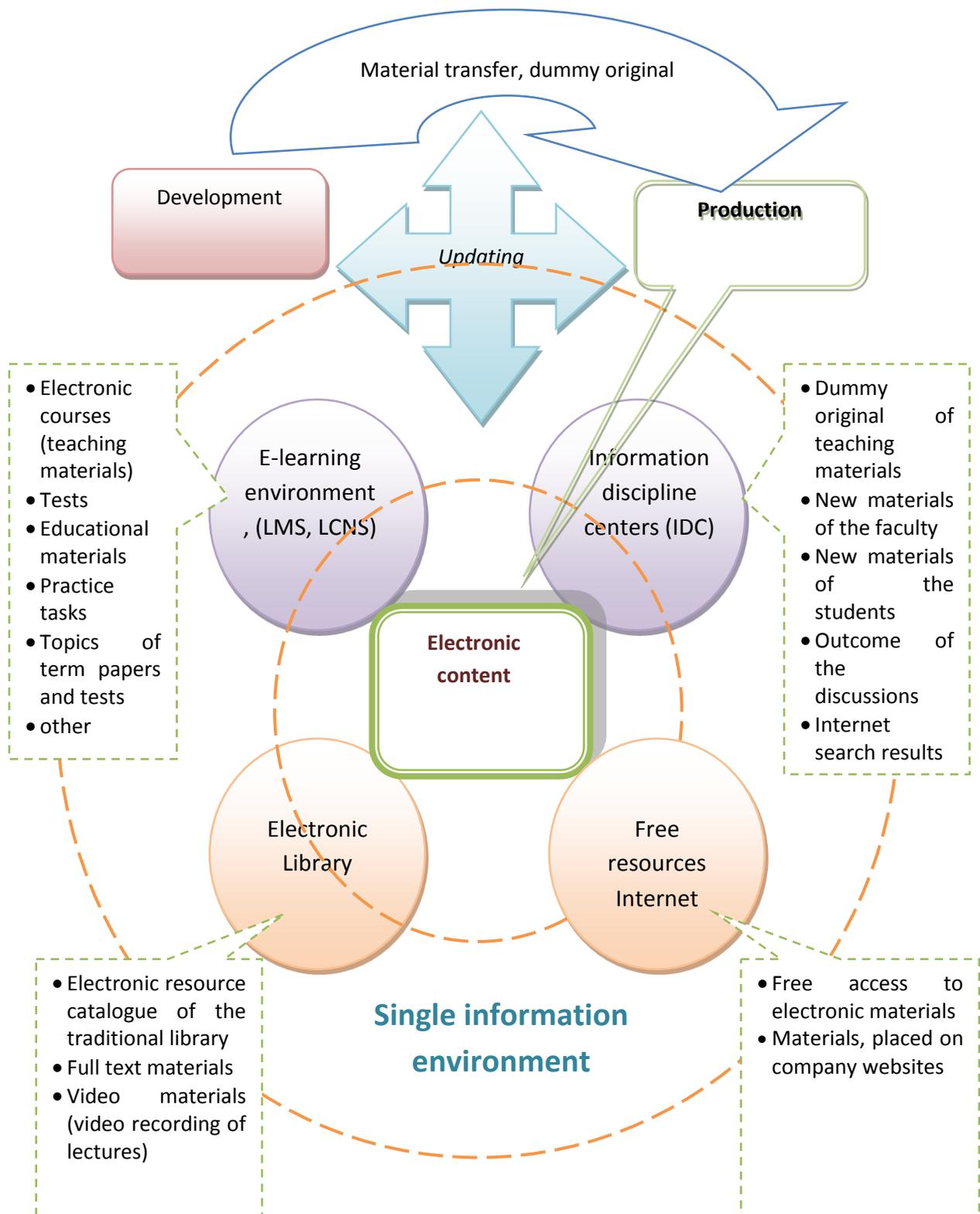


Fig. 4. Personalized and constantly updated electronic content

Content preparation and updating is effected through the tools of the information discipline center. Innovative methods of the staff development and faculty training should comply with the expansion of methods and tools in electronic distributed university management. Technical and technological facilities change the division of labour at university. It's important to note that electronic technologies enhance the role of the research professor whose main functional goal is to develop the topical area and to constantly update the curriculum.

The following organizational features have an impact on the efficiency of personnel management: a change of the department's role as a structural unit of the university (Fig. 5 describes the structure of a distributed department); a change of the goal orientation in educational process, in adaptation and in the development of the staff; the analysis of the specific features of the personnel management in the institutions since taking them into consideration provides the development of the university as a self-learning organization.

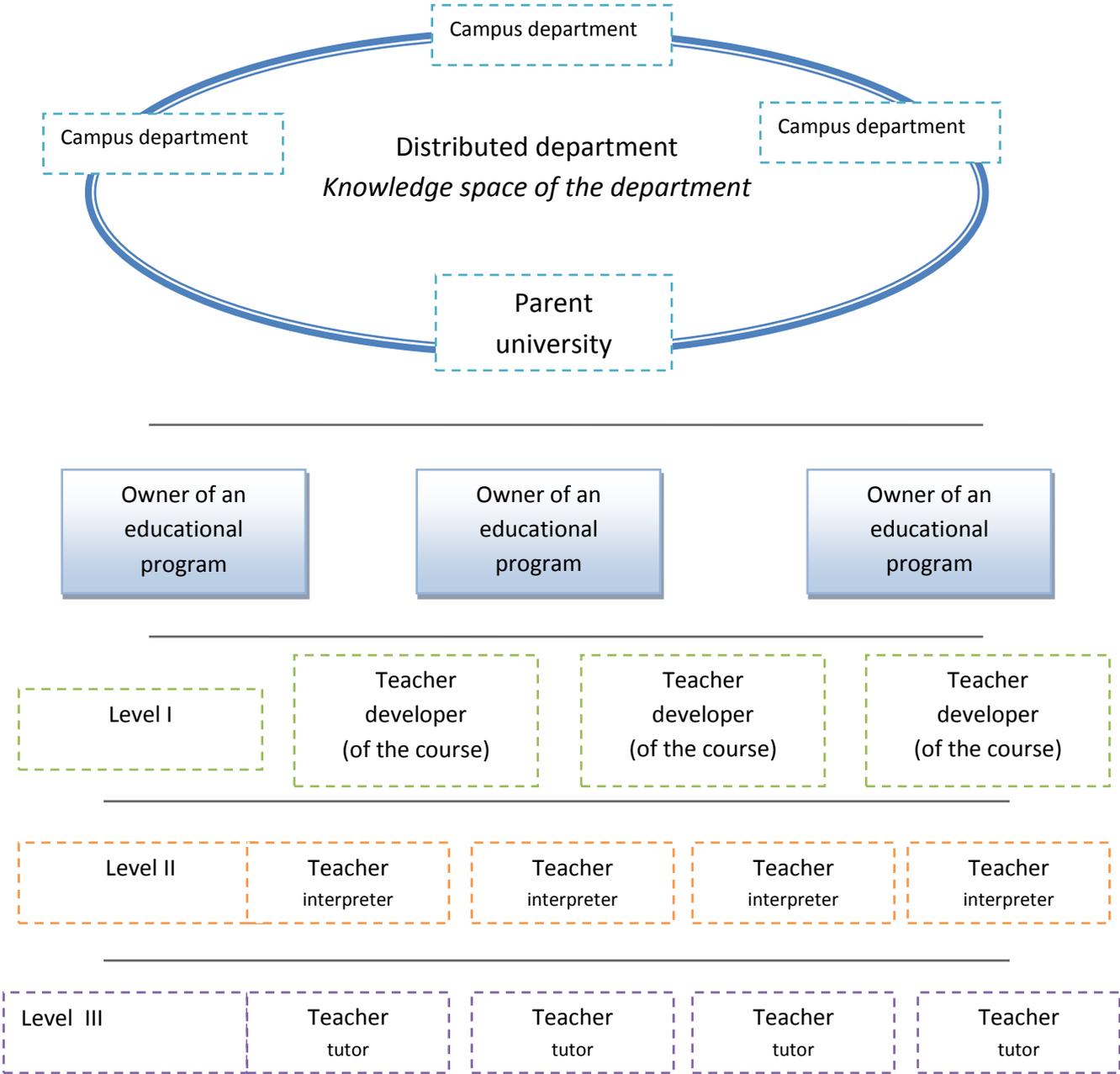


Fig. 5. The structure of a distributed department

The university has a set of practices for the implementation of the university management entrepreneurial style. There are such characteristics as a comprehensive system of ensuring high-quality university, that include the subsystems of quality management on the basis of the strategic planning and business processes, quality of e-learning with the use of E-metrics, assessment of the

quality of academic materials and content, quality of the educational process. We also shouldn't forget about the existence of such interconnected and interdependent tools of electronic distributed university management as project approaches, medium term strategic plan (MTSP), re-engineering and budgeting. E-integrative system of electronic distributed university management implies special approaches to financial management. All aspects of financial management are effected in a single information environment (Fig. 6). The principal elements of the financial management system are project financial management; the exposure and use of economic potential, full and objective data collection about financial condition of the university that is essential for making sensible management decisions. There are also the implementation of a comprehensive program of new technologies in financial, accounting, tax, operational and managerial accounting; the creation of a single financial space at the university with the use of the software.

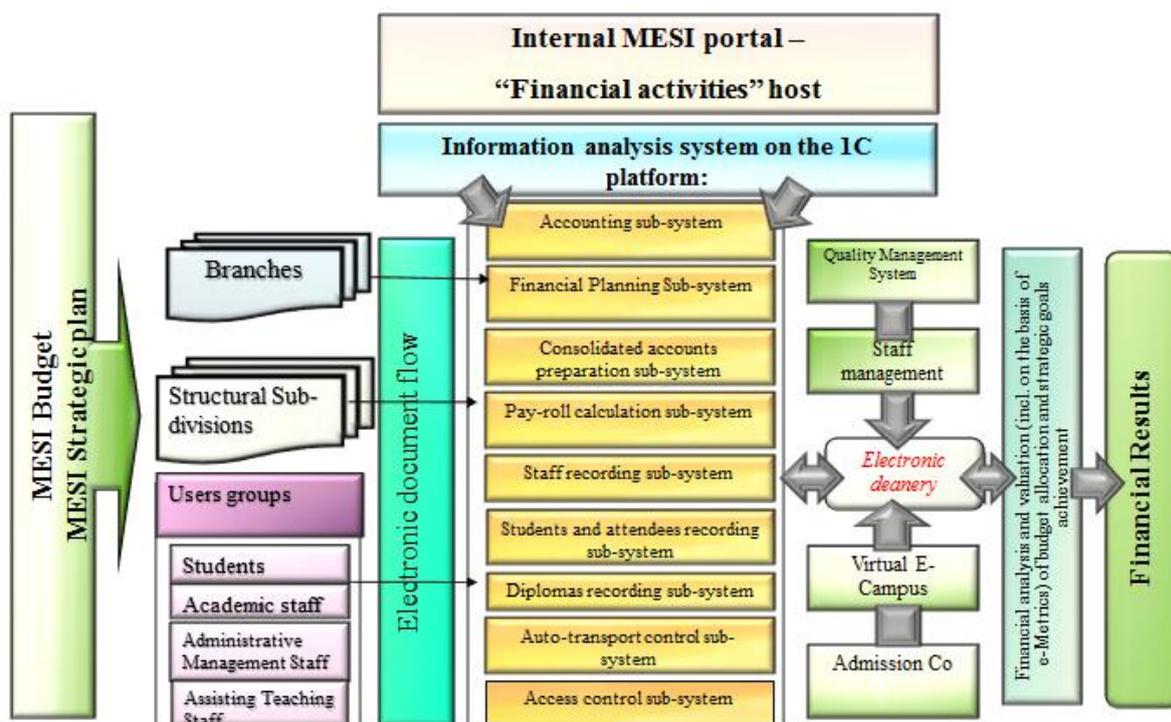


Fig. 6. The financial management system in the electronic distributed university

The aforementioned allows noting the quality parameters of electronic distributed university as shown in the Fig.7:

- ensuring of an open access to educational resources;
- new forms of interaction of the students, the faculty and the staff;
- new forms of the development and delivery of the learning material;
- flexibility, individualization of education;
- existence of the best content;
- compliance of the curriculums and programs with the plans and programs of the leading European universities;
- demand for the graduates on the labour market, their average wages, availability of the graduates among the administrators of different levels;

- availability of the educational services after getting basic education, i.e. the lifelong education;
- accessibility to educational services regardless the workplace and time;
- opportunity to apply obtained knowledge practically during the studies.

These parameters allow developing an integrated system of the quality parameters of electronic distributed university.

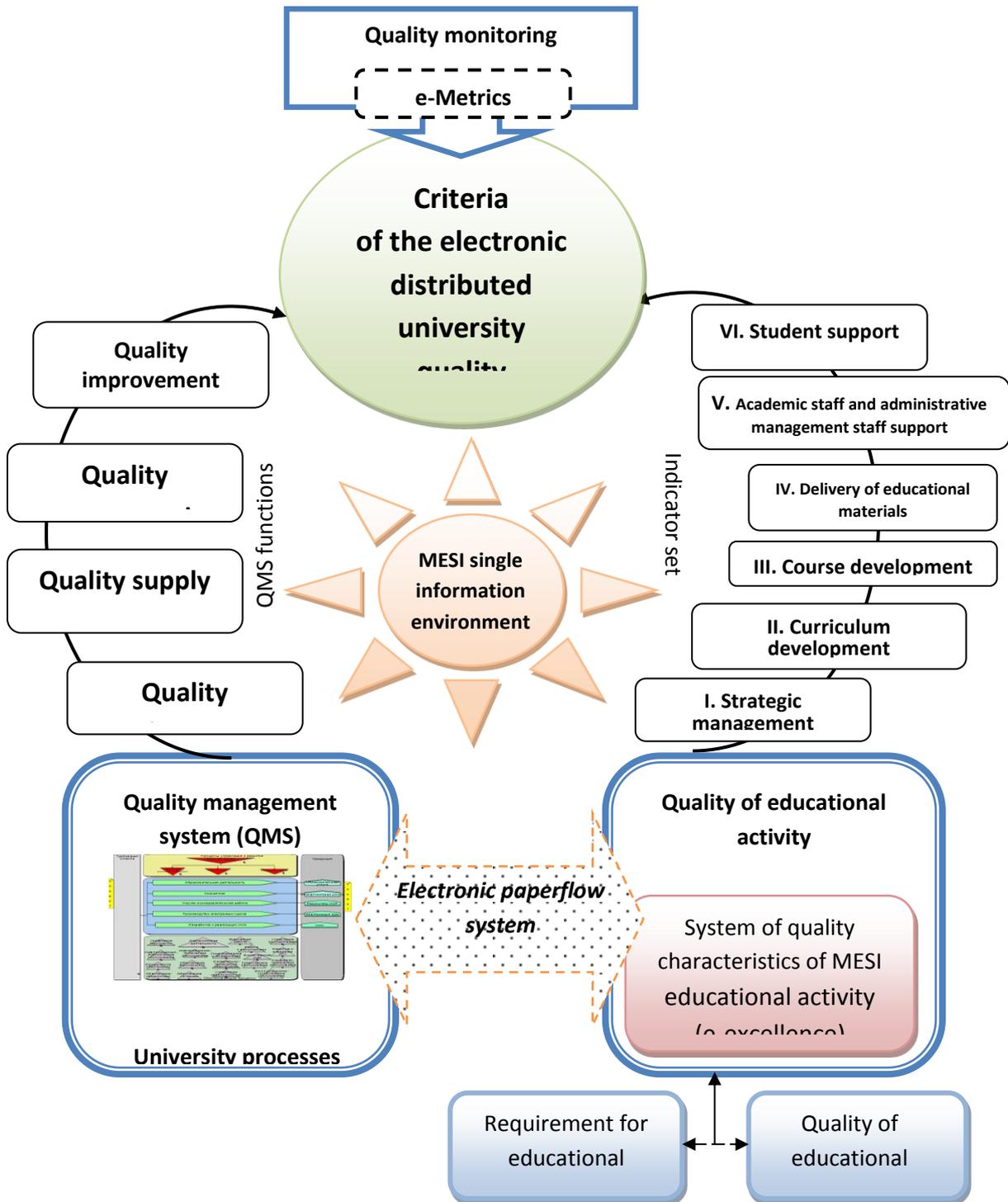


Fig. 7. An integrated system of quality indicators of distributed electronic university.

The earlier mentioned theoretical and conceptual principles allows us to define a modern university integrated into the information space as a single scientific and educational complex that includes university ensuring educational programs with the application of electronic technologies as well as its branches, offices, centers of access to educational resources that are connected under a single corporate network and that implement educational programs on the basis of a single information environment with the application of a single content, library resources, single faculty, single administration, and having an extra-territorial structure (including real and virtual space).

The features that characterize an electronic distributed university:

- A network of access center in Russia and (or) abroad.
- Information and communications network that covers all domestic and (or) cross-border centers/access stations.
- Single e-learning environment; rendering educational services according to the formula: 24x7x365 (24 hours a day, 7 days a week, 356 days a year).
- Educational content for each educational program in the form of academic complex on electronic media, fully ensuring the disciplines (subjects) provided by the curriculum of each educational program and allowing mastering educational programs on an individual basis.
- Single information and library resources allowing conducting educational processes of general and vocational education with the application of electronic technologies in accordance with the demands of Russian federal state education standards.
- Information system of administration, including electronic paper flow systems, systems of student accounting, accounting of their individual learning performance, accounting of their current, interim and final certification.
- System of electronic monitoring of education quality.
- System of monitoring and test materials in all basic educational programs.
- Distributed (regardless of the location) faculty, specially trained to work with students using electronic technologies.
- Communicative and integrated system of education process organization and personnel management.
- Management system ensuring centralized management of an educational institution, its branches, offices, centers/ multi and individual access stations on the basis of the single information networks.
- The structural units (branches, offices, multi-access centers) that support an operation of the single information environment of the university, assist the faculty in the development of academic materials, including those in electronic form; organizing an educational process, including current and final certification of students and listeners with the application of the e-learning environment of the university.

The model of the modern university transformation in the electronic distributed, integrated information space is developed (table 1).

Table.1. Types of universities

	A. Conventional	B. Intermediate	C. Electronic Distributed
Comparison criteria	A. Conventional	B. Intermediate	C. Electronic distributed
Funding source	Public finances	Public finances and extra-budgetary funds	Extra-budgetary funds along with public finances (accomplishment of public contracts)
Management system	Linearly functional	Functional and process, process	Matrix and project
Educational technology	Face to face	Groups with elements of individual orientation	Individual orientation
Chief data storage item	Paper medium	Paper and electronic medium	Electronic online
Territorial structure	Single campus, located in one territorial unit (territorially isolated)	Parent organization, network of branches and offices (territorially distributed)	Parent organization, network of branches, offices, centers and access stations, united under one information network (territorially distributed, combined by a single information environment)

Practical implementation of methods and procedures of university management, integrated in information space, is effectuated using a single information environment. It ensures the coordination of functional management services and fosters the effective management activity Fig.8.

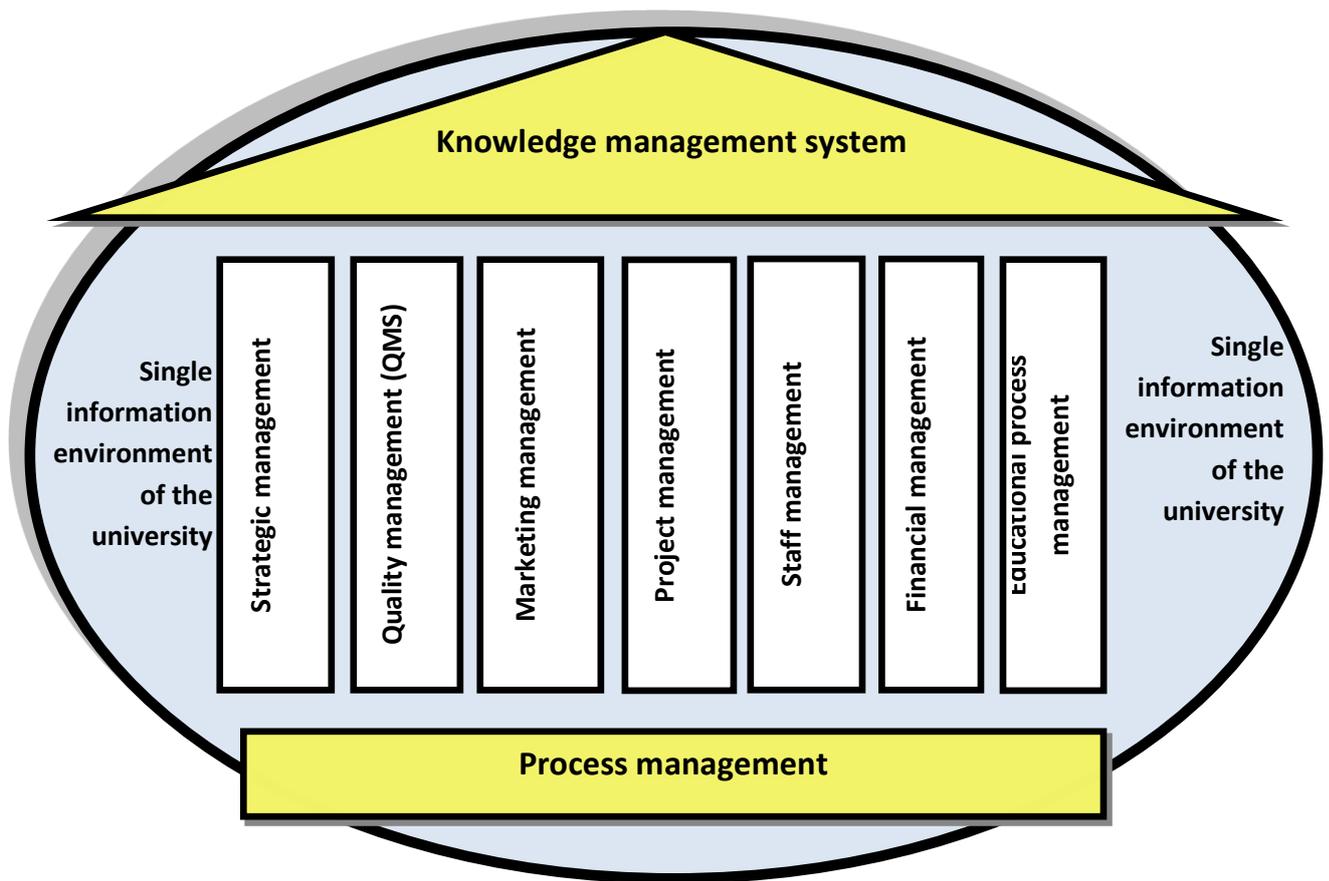


Fig. 8. Unity and interconnection of innovation management methods in single information environment of the university

The proposed management model allows providing the transformation of a conventional university into the electronic distributed university that has an extraterritorial structure, covers real and virtual space and ensures the unity of faculty, academic and research resources on the basis of a single information and educational environment.

Varabei T. – Volkmann C.: University-based Entrepreneurial Ecosystems: Drafting a Virtual Incubator as an Improvement Tool for Comprehensive Entrepreneurship Support

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Entrepreneurial Ecosystem: Relevance of the topic

The entrepreneurial ecosystem is one research field within the academic discipline of entrepreneurship which is relatively young in comparison to other areas of economics such as organization, production, marketing or distribution. The central idea of entrepreneurship is based on entrepreneurial thinking and acting which is of great relevance for the economic development of a society. An entrepreneur is permanently searching for and implementing improvements or innovations with regard to products and services or the processes of production, purchasing, distribution and other operational sequences. The permanent increase of product and service quality and of process efficiency and the introduction of new (better) products and services can result in greater economic prosperity (Schumpeter 1912). Therefore entrepreneurship is also politically relevant and is part of the strategic development objectives of many nations.

According to Isenberg (2011) entrepreneurship is even the fastest way towards economic growth and thus to social prosperity. Other development strategies such as promotion of national competition, the installation of a knowledge-based economy, the creation of economic clusters and the support of foreign direct investments are important, too, but:

- entrepreneurship is the prerequisite for these strategies to be successful;
- they complement entrepreneurship;
- if such development strategies are implemented without the comprehensive (ecosystem) perspective, they cannot yield the desired effects.

According to Isenberg (2011), the shortest way to economic growth is through the installation and

development of an entrepreneurial ecosystem, i.e. an environment which promotes entrepreneurship and creates a sustainable basis for it in a region. The holistic nature of the entrepreneurial ecosystem is essential here. For example, from the point of view of entrepreneurship support it will be inefficient to invest many resources into entrepreneurship education and training without providing sufficient space (for offices, storage and production sites) and an adequate infrastructure at the same time. The result of such a one-sided support, entrepreneurs would leave for other regions which provide the necessary resources after a cost-intensive qualification and education. In addition, a holistic consideration of the interaction of the parts of an entrepreneurial ecosystem and the local circumstances may help to avoid the following classic mistakes:

- Failure to create a sufficient public awareness of entrepreneurship,
- Involuntary impairment of desired entrepreneurship effects,
- Unsystematic programs with fatal consequences such as emigration of highly qualified workers or drain of venture capital (cf. Isenberg 2011).

The ecosystem perspective contributes considerably to the efficiency of entrepreneurship support, for example by following the principles of cost-effectiveness more efficiently. Taking the results of ecosystem research into account for the design of business development programs will facilitate the identification of support measures whose combination will bring about a maximum positive effect for the region.

Entrepreneurial Ecosystems and University-based Entrepreneurial Ecosystems

In spite of the fact that the topic of Entrepreneurial Ecosystems has gained increasing academic attention lately, there are only few contributions which deal with entrepreneurial ecosystems explicitly. The increasing use of the term coincides with the observation that there is no clear definition yet and that the term is used in many different contexts. However, one common feature is that the entrepreneurial ecosystems approach deals with factors which influence entrepreneurship in one way or another (cf. Isenberg 2010 and 2011, Cohen 2006, Neck et. al. 2004, Valdez 1988). The following definitions of entrepreneurial ecosystems can currently be found in the literature:

- environments that nurture and sustain entrepreneurship (Isenberg 2010, S. 42);
- the complexity and diversity of actors, roles, and environmental factors, that interact to determine the entrepreneurial performance of a region or locality (Spilling 1996, S. 91);
- an interconnected group of actors in a local geographic community committed to sustainable development through the support and facilitation of new sustainable ventures (Cohen 2006, S. 3)

In addition, it is noteworthy that many contributions with regard to entrepreneurial ecosystems are designed as single case studies. This is particularly true for the so-called university based entrepreneurial ecosystems where universities are regarded as main driving forces of entrepreneurship activities (O'Shea et al. 2005, Fayolle, Byrne 2010, Allen, Liebermann 2010, Butler

2010, Guillén et al. 2010, Ho et al. 2010). Due to the newness of the topic, most studies on Entrepreneurial ecosystems are of a rather descriptive nature. However, in combination with other contributions some common characteristics can be found. According to Daniel Isenberg (2010, 2011), whose research as leader of an entrepreneurship ecosystem project at Babson College is to be mentioned here in particular, spatial proximity of resources, uniqueness, sustainability and comprehensiveness are the main characteristics which distinguish the young ecosystem approach from its academic predecessors such as entrepreneurship infrastructure or entrepreneurship environment.

Isenberg (2010) defines an entrepreneurial ecosystem (he uses the term „entrepreneurship ecosystem“) as a set of individual elements such as leadership, culture, financial and human capital, which are intertwined in a complex manner. Each of these elements is relevant for a region’s entrepreneurial activity, but without the other elements it is not sufficient for a sustainable entrepreneurial ecosystem. Resources that are required for entrepreneurial activities (customers, workers, funding, suitable buildings etc.) are concentrated locally and attract each other. A sustainable entrepreneurship requires an ecosystem and an ecosystem in turn requires the spatial proximity of resources which then can take effect together (Isenberg 2010).

The holistic perspective is the decisive feature of the entrepreneurial ecosystem because its elements cannot unfold their maximum impact until they can act as a well-balanced entity. Mutual effects and interdependences of the elements must therefore not be neglected, because otherwise any measures in support of entrepreneurship might yield quite contradictory results. For example, in spite of high investments into entrepreneurship education, qualified potential entrepreneurs may emigrate to other regions if venture capital is lacking (Isenberg 2011).

According to Isenberg (2010 and 2011), the key to sustainable entrepreneurship lies in the specific combinations of the elements in an entrepreneurial ecosystem. These combinations differ in the respective individual regions since they have grown organically for decades and centuries depending on the social, economic, political and geographic conditions and (accidental) events (Isenberg 2010 sowie Neck et al. 2004, Spilling 1996). No sustainable entrepreneurial ecosystem can be designed without taking into account the local situation and the holistic perspective. It will develop organically according to its ecosystematic nature by adjusting to the conditions of its environment and to the characteristics of its elements.

Figure 1 on the next page shows the composition of an entrepreneurial ecosystem according to Isenberg (2011). It consists of six domains which in turn comprise further elements: (1) **politics**, including leadership and government, (2) **finances**, (3) **culture**, including entrepreneurial success stories and social norms, (4) **infrastructural, professional and non-public support**, (5) **human capital**, including education and personnel, and (6) **markets**, consisting of networks and early customers. For a healthy entrepreneurial ecosystem each of the six domains should be available in the region and be entrepreneurship-friendly.

However, there is no easy path towards a sustainable, fully functional entrepreneurial ecosystem that is at the same time innovative. The creation of an entrepreneurship-friendly environment will be extremely difficult in particular if there is no explicit political support of and no high social and/or

political priority on entrepreneurship. In Germany, the path was paved as early as 1998 through the introduction of the so-called EXIST initiative. EXIST is a sustainable entrepreneurship support program initiated by the Federal Ministry of Economics and Technology. The goal of the program is to increase the number of technology-oriented and knowledge-based start-ups through targeted support. Financial resources and relevant know-how are provided for students, graduates and scientists who are interested in starting their own company in order to allow for pre-commercial development of research results and to prepare the business formation and the market entry. In addition, EXIST promotes a vivid and sustainable entrepreneurship culture at public and private universities.

In 2011, the EXIST program entered its fourth round, which focuses on the development and implementation of university-wide entrepreneurship-focused strategies. Participating universities are challenged to improve their start-up management and to position themselves as entrepreneurship-friendly institutions. Wuppertal university is one of the few selected universities which have been continuously supported through all three previous EXIST rounds. This enabled the university to become one of the most entrepreneurship-friendly universities in Germany. In an independent biennial ranking of universities which offered the best chances to future entrepreneurs, Wuppertal university managed to rank first three times, second once and third twice over the past 10 years. The decision on future support during the fourth EXIST round is expected soon. Wuppertal University has of course applied again.

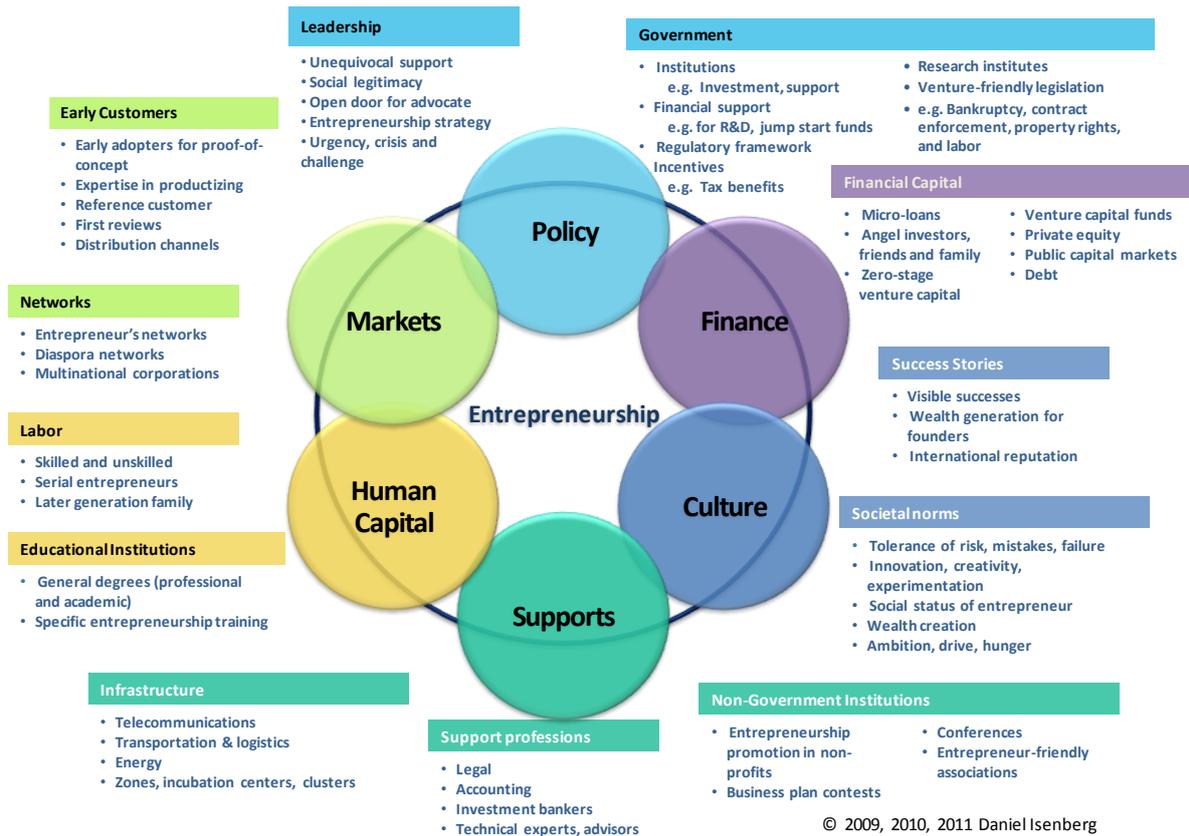


Figure 1: Domains of an Entrepreneurial Ecosystem

Source: Isenberg 2011

Wuppertal University's range of disciplinary and interdisciplinary teaching and other entrepreneurship-relevant events (workshops, conferences), its research output and public relations with regard to entrepreneurship, direct start-up support, a large entrepreneurship-relevant network, and close connections with local incubators and technology centers as well as investors prove that this university has successfully built its own (university-based) entrepreneurial ecosystem over the years. Now the focus must be to consolidate this supportive infrastructure.

The nucleus of a university-based entrepreneurial ecosystem is a university or college where entrepreneurship is emphasized in a special way, for example through:

- consideration in the profile / mission statement of the university,
- the acknowledgement of entrepreneurship as an academic discipline of its own,
- the establishment of an Entrepreneurship chair,
- a comprehensive range of entrepreneurship classes and
- the creation and development of a network with the regional business community and other relevant stakeholders.

In addition, the university is expected to promote entrepreneurial thinking and acting through various activities and initiatives which go beyond the university itself and to support networking with relevant internal and external stakeholders (cf. Volkmann 2009). According to Greene et al. (2010, p. 2), a university-based entrepreneurial ecosystem is defined as „multidimensional enterprises that support entrepreneurship development through a variety of initiatives related to teaching, research and outreach.“

The anthology „The Development of University-Based Entrepreneurship Ecosystems – Global Practices“ by Fetters et al. (2010) offers a comprehensive picture of university-based entrepreneurial ecosystems which takes practical as well as theoretical aspects into account. Six university-based entrepreneurial ecosystems and their history are described in detail, for example Babson College, Singapore University and Texas University. The description is followed by a qualitative analysis which aims at the identification of common “success factors”. According to this analysis, universities which succeed in spreading and promoting the entrepreneurship spirit in their region and have created fully functional university-based entrepreneurial ecosystems distinguish themselves through the following features:

- Senior leadership sponsorship for Entrepreneurship,
- Entrepreneurship strategic vision,
- Entrepreneurship academic division,
- Entrepreneurship course,
- Entrepreneurship practicum,
- Entrepreneurship concentration or minor,
- Entrepreneurship courses for non-business majors,
- Ongoing curriculum innovation,
- Entrepreneurship research program or center,
- Entrepreneurship center,
- Networking events,
- Entrepreneurship students club(s),
- Business plan competition(s),
- Student venture investment fund,
- Links to angel and venture funds,
- Incubator,
- Entrepreneurship endowed chair(s),
- Center or program endowment (Rice et al. 2010).

In addition, seven common indicators of successful university-based entrepreneurial ecosystems are identified. These are:

- The university management acknowledges the importance of entrepreneurship, embraces it as a part of the university's corporate vision and acts accordingly to promote its establishment and promotion.
- There are strong, visionary leading figures within the administration of entrepreneurial programs, centers, projects and initiatives as well as in the respective university departments who support the establishment of entrepreneurship in a determined way.
- The commitment of the university management and other leading personalities to entrepreneurship is sustained and permanent.
- There is sufficient funding for the establishment and promotion of entrepreneurship-friendly structures.
- Curricula, teaching programs and teaching methods are regularly adjusted to the latest findings.
- An appropriate organizational structure is provided.
- The networking with other entrepreneurship-relevant agents within and outside the university is pursued with great commitment in order to reach the critical mass which is necessary for sustainability (cf. Rice et al. 2010).

The establishment of fully functional structures for the promotion of entrepreneurship is time-consuming: According to studies conducted by Rice et al. (2010) it takes at least 20 years to develop a sustainable university-based entrepreneurial ecosystem. The first impulse may come from within the university management (market push), driven either by university leaders who promote the entrepreneurship vision through targeted activities or by leading personnel from a department or the administration who put a special emphasis on this topic. Ideally, all supporters of entrepreneurship from the university management, the departments and/or the administration join forces and start for example a common pilot program, i.e. a course, a research initiative or an outreach program in order to gain visibility and to attract further supporters and resources. If the first initiative is a success, it will lead to further projects. The ecosystem will grow organically until a critical mass is reached. At that point in time, it will become an official part of the university's strategic and financial planning (Rice et al. 2010).

It is, however, also possible that the establishment of a university-based entrepreneurial ecosystem is triggered by the demand side (market pull). For example, students may wish for an entrepreneurship course or a platform where they can network with successful entrepreneurs. Alumni who have become entrepreneurs themselves may motivate the university to establish entrepreneurship initiatives and offer their practical support for the introduction of entrepreneurship programs. A third possibility is that the development impetus for an entrepreneurial ecosystem comes from a government agency which aims for an entrepreneurship-relevant development program and asks universities and other institutions for their support in the establishment of such programs (Rice et al. 2010).

No matter how the creation of a university-based entrepreneurial ecosystem is started, it will usually

mobilize internal and external forces which support its development. If the process is successful, it will result in a robust curricular and co-curricular program, numerous, dynamic research initiatives and a large number of outreach programs which foster entrepreneurial talents and create an entrepreneurship-friendly environment (Rice et al. 2010).

Entrepreneurship support at universities: The term „Incubation“

Entrepreneurship-friendly universities and institutions usually supplement their entrepreneurship-related teaching programs with additional offers for direct start-up support. These offers are intended for students and employees of the university who seriously think about starting their own business. Ideally, the support activities are not confined to counseling and coaching of determined future entrepreneurs and the provision or procurement of resources but start much earlier through sensitizing potential entrepreneurs and other relevant agents to the chances and possibilities, but also the problems and challenges of business formation. Start-up support should also include the qualification of future entrepreneurs. An ideal start-up support process is depicted in figure 2.



Figure 2: Ideal start-up support process

Source: Stahlecker, Lo (2004, p. 4)

All measures and offers with regard to support and promotion which are provided to future entrepreneurs during the start-up support process are subsumed under the term “incubation” in the literature. It is, however, not essential that all incubation services are offered by the universities or institutions themselves. Often there are close connections to institutions outside the university, such as start-up or technology centers, which result in many synergy effects through cooperation in the field of start-up support, so some of the incubation services can be delegated to these partners for efficiency reasons. For example, very often such centers offer physical office space to young entrepreneurs in their buildings.

With few exceptions, the basic incubator model according to Stahlecker and Lo (2004) functions quite similarly: In addition to infrastructure (offices, telecommunication and office equipment), incubators provide a wide range of counseling and support services to new companies. Usually incubators are – at least partially – publicly funded. Regardless of different focuses, their general objectives are:

- Increase of the survival chances of start-ups,
- Acceleration of growth,
- Identification of opportunities for investors,

- Improvement of the commercial exploitation of academic research results,
- Job creation and revaluation of the region (cf. Stahlecker, Lo 2004).

Incubator activities can be distinguished into four categories. First, a learning environment for future entrepreneurs is provided where necessary know-how and skills for business formation and management are transferred. Second, access to counselors and coaches is provided who offer practical and theoretical support to the young companies and put their knowledge and experience at the entrepreneurs' disposal. Then, investors and venture capital are procured which are essential for a technology or knowledge based business formation. Last but not least a large number of measures enhance the visibility of young companies in the market. This includes the procurement of many helpful contacts from the incubator's large network (cf. Stahlecker, Lo 2004).

It is not necessary to have already founded a company in order to be accommodated in an incubator or to use the services of the university's start-up support. Often an incubator supports future entrepreneurs in the realization and marketability check of "just" ideas. Financial and conceptual validation prior to business formation is a top priority to knowledge and technology intensive business ideas because of the high research expenditures and the complexity of the venture. Usually universities allow entrepreneurs to use laboratories and research institutions for free in order to be able to develop new products and / or procedures to marketability. Simultaneously, further pre-commercial work is done in co-operation with the entrepreneurs: market analyses are conducted, business plans are drawn up, financial strategies are secured, and first contacts with relevant business partners are made. Future entrepreneurs who are not students of economics typically have only insufficient economic know-how and also lack management skills. Therefore interdisciplinary access to entrepreneurship classes and / or additional entrepreneurship courses and trainings are essential measures of an entrepreneurship-friendly university or college.

In a healthy entrepreneurial ecosystem the university will also take over other tasks in addition to entrepreneurship education and research and the operational start-up support and incubation. These tasks include a permanent public relations work which sensitizes the society for entrepreneurship issues and motivates potential entrepreneurs from all age-groups. A regular transfer of new scientific findings to regional and cross-regional political decision-makers will help to adjust development and support programs to the state of the art. While it is obvious that no university or college can shape every single domain of an entrepreneurial ecosystem through targeted action in an entrepreneurship-friendly way (cf. figure 1), they can actually trigger the emergence of internal entrepreneurial ecosystems through a carefully designed package of activities (cf. our earlier remarks on university based ecosystems). In a second step, the ecosystem can be gradually opened through the involvement of additional agents and its organic growth can be fostered. The development process of an entrepreneurial ecosystem will gain the more momentum the closer the system gets to its critical mass.

Regions which are in the process of creating an entrepreneurial ecosystem can support and perhaps even accelerate the development through virtual technologies. The use of modern networked software solutions facilitates the exchange between differently developed regions with regard to practical experiences and research findings. Such software will also help to cross-link entrepreneurship relevant agents according to their special interests in order to promote knowledge

exchange and to increase the entrepreneurial success of start-ups. However, for a maximum benefit a thorough conceptual preparation is essential. The holistic perspective of the entrepreneurial ecosystem must never be neglected if entrepreneurship is to be sustainably established in a region.

Conceptual draft of a virtual incubator

Modern life is unimaginable without the internet. Millions of people around the globe use it every day as a means of information and communication. Permanent progress in the field of the internet technologies and far-reaching developments of the telecommunications networks have contributed to the fact that the amount of data available on the internet has dramatically increased over the past 15 years. Virtual technologies facilitate many everyday tasks such as advice, travel planning, shopping and banking. In the field of education e-learning has become an integral part. Virtual social networks link people all over the world and enable them to make new contacts, to exchange information in their field of interest or to simply keep in touch.

In Germany, the use of software solutions for comprehensive start-up support is not prevalent yet and has a huge development potential. The existing virtual solutions have individual objectives according to the respective focus. For example, e-learning technologies are used for teaching and the transfer of knowledge, various business planning tools are used for planning, experimenting and testing purposes while virtual entrepreneurship platforms facilitate networking and the exchange of information. But in most cases there are no links to virtual tools used in other phases of the incubation process. By way of example, in the EXIST survey in 2011, only 11 of the 47 EXIST initiatives which were part of the first three rounds declared to have used or to use software solutions or internet platforms. When the survey took place, the initiatives mainly relied on conventional software solutions (Word, Excel), data bases (Access) and sometimes on additional CRM systems (such as Cobra). All initiatives had their own website which they used to present themselves in public, especially to provide information. In addition to more general information on contact persons, services etc. some websites offer administrative functions (for example online contact forms or the possibility to register for certain events) or allow for networking via online platforms in order to facilitate the exchange within the entrepreneurship community. Sometimes e-learning approaches have been developed which provide information and learning materials for entrepreneurship education and counseling in a centralized and easily accessible way (Kulicke et al. 2011).

A virtual incubator should follow a comprehensive approach and should refer to all services of physical incubation and optimize and reevaluate them through the use of virtual technologies. Any concept of a virtual incubator should be based on the system approach in order to analyze interdependencies, links and reciprocal effects between its parts and to find common features. If all components are carefully coordinated, the effect will be bigger than the sum of all their individual effects. The components can be departments or functional units of the university's start-up support which combine their efforts towards a common goal. A virtual incubator should have links to the appropriate physical entrepreneurship support infrastructure, just for the simple reason that new entrepreneurs often prefer a face-to-face meeting with counselors and hesitate to discuss their business models and other related matters indirectly via the internet. Especially in the late phases of the new venture creation process such physical resources as office space, transport connections, labor, proximity of suppliers and customers could never be compensated by virtual technologies.

That is the main reason for the importance of blended solutions which means that a well-functioning virtual incubator can only exist with strong connections to the physical infrastructure of entrepreneurship support.

Taking the ideal start-up support process (figure 2) as a basis, confining oneself to existing open source software solutions for financial reasons and taking into account our earlier assumptions, the concept of a virtual incubator may be designed as shown in figure 3 on the next page. All parts of the virtual incubator have the common objective of increasing the number of start-up companies via motivation and targeted support. In addition, specialization may take place, for example a focus on certain industries and / or on rapidly growing start-ups. Linking entrepreneurship research with the incubation process is essential in any case in order to allow for exchange of the latest findings from research and practical experience.

The Fraunhofer survey on software use of EXIST initiatives offers some further points for the conceptual design of a virtual incubator. The survey analyzed experiences gained from the application of virtual technologies in the start-up support process. Some deficits were discovered which had at least partially obstructed the intended added value (active exchange among young entrepreneurs, creation of entrepreneurship-relevant contents, faster contacts, improved visibility etc.). For example, the necessary administrative efforts and technical support were often underestimated in comprehensive approaches with a large functional scope. Similar effects were discovered with regard to a Wiki for potential entrepreneurs: Since contributions from external users are usually rare, great efforts must be made to safeguard the topicality and an appealing appearance. With regard to networking solutions the strong competition from established social networks must be taken into account and the challenge of reaching a critical mass must not be underestimated. Since active participation is essential for networks, it might be helpful to offer some added value to potential users (for example the possibility of advertising; cf. Kulicke et al. 2011).

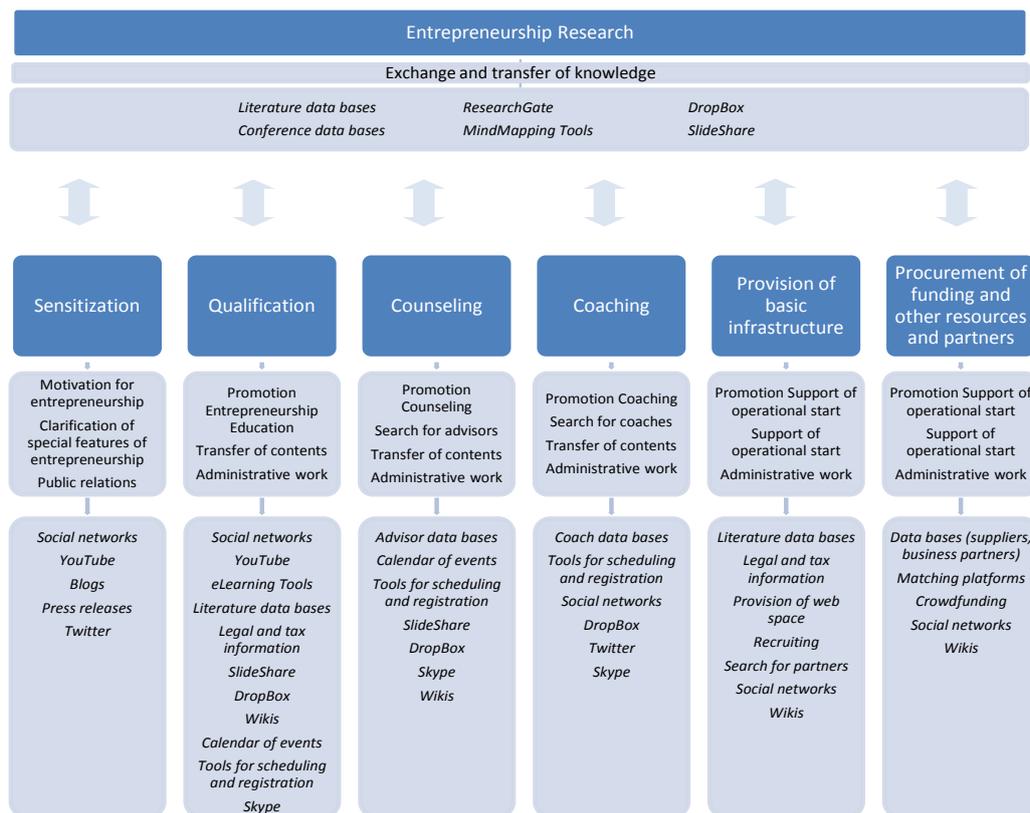


Figure 3: Draft concept of a virtual incubator / Source: Own representation

To summarize the conceptualization of a virtual incubator from the application-oriented view we have to consider that good contents, strong partners, technical support by competent partners and an appealing graphic design are essential for a wide use of virtual technologies during the incubation process. In addition, the following recommendations should be taken into account even in the early conceptual phases of a virtual incubator (cf. Kulicke et al. 2011):

- Follow the “less is more” principle – clarity and transparency of the information are decisive;
- Avoid unnecessary technical features – in most cases standard solutions are sufficient which in addition reduce dependency on external providers;
- Create transparent structures through specific contents;
- Draw up a time and money budget for the creation and administration of the platform (do not count on voluntary commitment which may not be sustained);
- Clarify and define areas of responsibility;
- Budget resources in order to be able to react to improvement suggestions;
- Draw up a realistic and differentiated list of duties if an external provider is needed for the technical realization – it may be very helpful to involve the internal IT department;
- Offer incentives for active use – the added value of using the platform should be immediately recognizable for the target group;
- Cooperate with other similar platforms and exploit synergies.

The holistic perspective of the entrepreneurial ecosystem must never be neglected if entrepreneurship is to be sustainably established. An efficient promotion of entrepreneurship in a region can only be implemented in a holistic approach which takes into account all elements of the entrepreneurial ecosystem, wins over relevant internal and external stakeholders for entrepreneurship and motivates them to a synergetic cooperation.

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Vyt A.: A three-step process in quality management

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Introduction

In quality management a stepwise approach can have several meanings. One of these is that a start is made with a general assessment approach, which is then deepened into a more fine-grained analysis and finally ending with placing the analysis in a wider perspective or framework. One can compare it with the difference between broad screening and differential diagnostics in psychological assessment. The analogy may seem appropriate, although not entirely correct.

Over the past 10 years the teacher education department of Artevelde University College Ghent has systematically developed a participatory management structure and a quality culture based on team-oriented self-assessment according to the PROSE framework. In 2010 a decision has been made to deploy e-learning in the department. A strategy focused on development of learning tools for use in blended learning.

In accordance with the principles of integrative quality management, we wanted to deploy e-learning not only based on specific quality criteria for this domain but also according to the integrative nature of our quality management system. A self-assessment was done with the E-xcellence tool, specifically developed for e-learning institutions, followed by an in-depth PROSE self-assessment of enabling key factors and core processes. A next step is to use a standardized set of questionnaires of the PROSE toolbox, developed for international benchmarking purposes. In this way we use three steps but also three different angles for systematic self-assessment: a specific one focused on e-learning, one focusing on in-depth quality management within the organization, and one focusing on accountability and benchmarking in an international perspective.

Step 1: The E-xcellence Quick scan tool

The E-xcellence tool has been developed (by a consortium led by EADTU) as a tool for assessing the quality of e-learning policy and practice in higher education institutions. Thus it has a very specific thematic scope and target group. It delivers a first orientation on the strengths of eLearning performance and fields of improvement. The E-xcellence instrument consists of a manual and assessors notes to assess the institution on its eLearning performance. The manual is based on 32 benchmarks directly related to eLearning specific quality criteria. These form the basis for the self-

assessment exercise.

The on-line questionnaire is filled out in consensus by a small team. Each statement is judged how this aspect of e-learning is realized in the course or programme of the institution or faculty. The instrument offers the opportunity to make comments on the specific issues by indicating: Not Adequate, Partially Adequate, Largely Adequate or Fully Adequate. The instrument also offers the opportunity to make comments on the specific issues or to refer to documents or other references which can be used as reference on that specific aspect of e-learning..

The output is used as input for internal discussions and for defining a roadmap of improvements. In table 1, an overview is given of the automatic feedback that was returned upon using the Quick Scan. This feedback is customized according to the specific profile of performance on the different items, and is based on items on which the self-assessment yielded scores of “inadequate” or “partially adequate”. Although the feedback remains on a general level and reiterates elements that were already present in the formulation of the items, it contains also some additional focused recommendations. For example in item 18 on the provision of technical infrastructure it is made clear that the institution has to take steps to ensure its academic and other staff are supported in the acquisition of new pedagogic skills addressing topics like assessment and self-study. Indeed, frequently an electronic or digital student portal or learning platform is merely used as a repository for course materials, while the opportunities for interactivity are rarely used by teachers. In the deployment strategy we therefore focus on continuous training of these skills in the staff of the teacher education department, alongside with developing similar skills in students as they progress in their study programme. A team defined the learning goals linked to the skills and the developing new technologies, and a plan for gradual competence development was generated.

The Quick Scan delivered us also a general aggregate quantitative index based on all items, which provides opportunities for additional benchmarking at a more general level or a follow-up of this baseline measurement at a later stage, to verify on indicator level whether we made progress.

Table 1. Automatic feedback provided by the online E-xcellence Quick Scan instrument on some items scored as “inadequate” or “partially adequate” by the self-assessment (2010).

Item 4. The resourcing of developments in e-learning activities should take into account special requirements over and above the normal requirements for curricula. These will include items such as equipment purchase, software implementation, recruitment of staff, training and research needs, and technology developments.

Feedback: Your strategic plan should address the provision of the human, technical and financial resources necessary for implementation. There has to be an effective infrastructure for delivery of teaching materials and student support services. The policies should address issues of financial, physical and technical resources, staffing and staff development, management, responsibility and accountability. It is possible that your institution has to review and revise the policies on the deployment of resources to ensure that it has in place an adequate technical and physical infrastructure.

Item 6. When e-learning involves collaborative provision, the roles and responsibilities of each partner (internal and external) should be clearly defined through operational agreements and these responsibilities should be communicated to all participants.

Feedback: The infrastructure and developmental costs of e-learning may create circumstances in which collaboration with other institutions provides an attractive route for the development and delivery of e-learning. The development of collaborative ventures, whether initiated through top-down or bottom-up processes should be formally agreed and ratified prior to the course design stage. Contractual arrangements between the collaborating partners should define the scope of the collaboration, the responsibilities of partners, financial arrangements and the relationships with third parties particularly students and teachers. All collaborative ventures should be subject to stringent risk analysis and appropriate contingency planning should be in place in the event of the collaboration breaking down. Low performance against this benchmark may indicate that collaborative projects have been pursued outside a clear institutional framework. Institutional action may be required to strengthen existing collaborative arrangements and provide a policy framework for future development.

Item 7. E-learning components should conform to qualification frameworks, codes of practice, subject benchmarks and other institutional or national quality requirements

Feedback: A low score against this benchmark may indicate that the institution's e-learning programme has been developed on an ad hoc basis and not as part of its mainstream curriculum. If it does not conform to accepted academic frameworks then it will not secure recognition by regulatory bodies or peer review processes.

Item 18. The technical infrastructure maintaining the e-learning system should be fit for purpose and support both academic and administrative functions. Its technical specification should be based on a survey of stakeholder requirements and involve realistic estimates of system usage and development.

Feedback: Evidence of an effectively designed and implemented strategy is essential to secure a good performance against this indicator. It is recommended that there is evidence of a structured survey and analysis of stakeholder expectations of the performance of the e-learning system. Major stakeholder groups are academics, administrators, students, and those providing on-line tutorial support. Projections on usage must be based on institutional projections on student enrolments, the patterns of system usage envisaged by academics and students and realistic projections of technical developments in the equipment used by students to access the system. The technical design must take account of anticipated usage, numbers of students, administrative transactions, download requirements. Realistic assumptions of student usage patterns (eg prediction of peak periods such as assignment submission or downloads of essential material) should be used in estimation of server and connectivity requirements. Arrangements for backup, archiving and recovery should be specified as an integral element of the technical specification. Courses that exploit electronic systems to distribute course content but do not facilitate active learning will not score well against this benchmark. Poor performance indicates that the institution should take steps to ensure its academic and other staff are

supported in the acquisition of new pedagogic skills addressing the following issues. E-learning offers many opportunities for multiple embedded formative assessment and learning reinforcement loops. Course designers should exploit the interactivity of e-learning delivery to embed opportunities for self-assessment. When delivered by e-learning the materials should be designed to maximize the use of interactive techniques to provide opportunity for student self-assessment of progress towards learning outcomes. The predicted expansion of the availability of readily accessible repositories of learning objects may enable institutions to augment their own inventory of self-study materials and provide their students with a wider range of self-study materials than current practice allows. Assessment design should address group outputs, individual contributions to the group outputs, individual use of group working tools and individual group working skills. Group peer assessment may be an appropriate input to the assessment process.

Item 20. Appropriate provision needs to be made for system maintenance, monitoring and review of performance against the standards set and against improvements as these become available.

Feedback: This benchmark applies the principle of effective professional management to the delivery of services. Attention to the following factors is necessary to ensure good performance. Technical requirements of the system are monitored on a regular basis. IT professionals operate the system to the standards commonly encountered in the commercial customer service sector. Comprehensive documentation of operational procedures are evident, logbooks and other routine record keeping should demonstrate whether the standards set are being achieved. The system must allow for data collection on many aspects of its operation and the use that users make of the system. Monitoring the patterns of use by students and staff directly supporting their study is a source of information for improvement in pedagogical as well as technical aspects.

Item 22. The information and services should be provided to all users in a logical, consistent and reliable way.

Feedback: Achievement of good performance in this area will be indicated by user satisfaction. Satisfaction should be based on ease of access, completeness, relevance, up-to-date information, coherence, consistence, etc. The e-learning system and resources must demonstrate ease of use for the full range of target users, including people with disabilities.

Item 24. Institutional materials and information accessible through the VLE should be regularly monitored, reviewed and updated. The responsibility for this should be clearly defined and those responsible provided with appropriate and secure access to the system to enable revision and updating to occur.

Feedback: An institution that performs well against this benchmark demonstrate effective processes for monitoring and updating services. Monitoring student user views may make an important contribution to successful performance in this area. The e-learning provision must be monitored and managed on a continuous basis to ensure its effectiveness. It should be evaluated and updated on a planned and appropriate basis. Monitoring should cover both the detailed operational aspects of the system (performance, availability, capacity utilisation, user error reports etc) and also the performance of the human support systems. Student surveys administered on-line, routinely as part of courses and by random selection should be augmented by consultation with the student body regarding the effectiveness of the system. This information should be used to inform future development.

[Step 2: the PROSE tool for integrative quality management](#)

PROSE is a model, a toolbox and a network for quality management now used by more than 200 institutions in Europe. PROSE started in 2000 as a spin-off of University Colleges and is now one of the leading networks for quality management in higher education. The PROSE System integrates elements of classic quality management models (e.g., EFQM), and provides a methodology for self-assessment as well as for deployment and monitoring of improvement plans. A system of quality

labels for the recognition of good practices has been developed in 2004. The PROSE Online Diagnostics & Documenting System (PODS) exists in Dutch, French, English and Spanish versions. The PROSE Online Diagnostics & Documenting System (PODS) has several advantages. It is a user-friendly and transparent system to activate self-assessments, evaluations and online consultations. Administrators can use standardized questionnaires but also develop anonymous surveys. An ingenious system allows to monitor the responses without breaching respondents' privacy. Response rates usually lie between 80 and 90%, ensuring a high validity and at the same time avoiding an overload of paperwork. The model helps in selecting groups of respondents according to the selected questionnaires. All questionnaires have been developed and validated by experienced quality managers and by persons working in the sector.

Questionnaires include a Quickscan on institutional level, a scan for basic quality in study programmes, more than 50 specific questionnaires for processes and conditions in departments, satisfaction questionnaires for staff and students, and performance indicators. The toolbox also contains creative mindmaps for quality improvement, and templates for project management.

Respondents are invited to answer questionnaires and can also be asked to indicate priorities for improvement and/or provide evidence for positive answers. They can write additional comments to items and respond to additional open questions formulated by the diagnostics manager. Data are analyzed automatically by the software and displayed in table format as well as in graphics. Detailed results can be downloaded in Excel. The output provides indicators that can be used for benchmarking purposes. An agreement exists which will allow members to do a self-assessment on the E-xcellence Quick Scan within the platform of PODS, providing the full advantage of the diagnostics system. It is an ideal combination of a quantitative and a qualitative approach.

We applied the PROSE self-assessment in 2011 for the 5 input factors (leadership, staff, strategy, means, and communication) and the 3 human factors (vision & responsibilities, agreements & communication, competences & wellbeing). In 2012 the self-assessment was focused on the 7 core processes of the department (development and internationalization of the study programme, coaching and guidance of students, execution of teaching and learning, practice learning and coaching towards graduation, assessment of students' progress, research and service provision, and values orientation).

In 2013 we foresee a self-assessment on output factors (results and satisfaction of staff, students, and graduates) and on a set of indicators that are specifically relevant in an international benchmarking perspective.



Figure 1. Screenshots from the PROSE Online Diagnostics & Documenting System (PODS). The first screen displays the interface for the diagnostics manager, the second one for the respondent.

Step 3: international benchmarking

In 2013 we foresee a self-assessment on a set of indicators that are specifically relevant in an international benchmarking perspective. These will include the following domains: Policy and management of quality, staff and services, programme, teaching & learning practice, study load, practice learning, integrative project(s), assessment of students, and performance.

For this we collaborate with universities in Europe, the United States, and Latin America. As a framework we use the PROSE-lists on basic programme quality, which have been validated against the accreditation framework of NVAO (Belgium and the Netherlands) and the European Standards and Guidelines on Quality Assurance (ENQA). They are revised in an international perspective in accordance with other frameworks such as of NOKUT (Norway), ANECA (Spain), and Aeqes (French Community in Belgium). Results of the self-assessment of our department are reviewed and discussed with transatlantic partners who function as a critical friend, i.e. detecting good practices and eventual risks, in a broad perspective.

Walsh E. - O’Keeffe N. - Delaney L.- Fox S.- Brunton J. - Costello E. - Morrissey A.:Enhancing the teaching and learning experience of distance education through the use of synchronous online tutorials

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Background

Established in 1982, Oscail has provided thousands of adults with an opportunity to achieve their educational goals through the study of undergraduate or postgraduate programmes. In keeping with the principles of distance education, Oscail aims to provide students with the means in which to attain their educational goals without having to attend campus-based classes.

In addition to a small number of full-time campus-based staff, students are supported through a network of part-time writers, editors, senior academics, subject monitors, internal examiners, external examiners and programme board members.

Until recently, the main mode of academic support has been through non-compulsory face-to-face tutorials and asynchronous online support in the virtual learning environment. While the benefits of attending tutorials are significant, the numbers of students attending tutorials has declined. One of the key challenges we have faced has been ensuring the provision of quality academic support with declining student attendance.

Furthermore, the proliferation of technology within society has led to an increasing expectation and demand from students for the integration of new technologies into academia. Following the demand, from our students for the provision of online teaching sessions, online tutorials were piloted on the Bachelor of Science in Information Technology (BSc in IT) programme offered by Oscail, during the 2010/2011 academic year. The findings of this pilot were reported at the 2011 European Association of Distance Teaching Universities conference held in the Anadolu University in Eskisehir, Turkey. Following its successful implementation, the pilot was then adapted for the

Bachelor of Arts in Humanities programme; online tutorials were fully integrated within all of the modules of the BSc in IT and a number of the postgraduate programmes.

The focus of this paper is the integration of online tutorials; the effectiveness of this method of teaching and learning; the experience of the teaching staff and students; and the key changes required to teach in a different mode of delivery.

Theoretical framework

Technology Changes

Changes in technology and globalisation have had a huge impact on culture and “are dissolving frontiers in education” (Harry and Perraton, 1999:1). The technological and communication revolution and advancements have reshaped the world in which we live and inevitably the nature of education. Rajasingham (2011) argues that higher education cannot be excluded from this revolution. Even the method used to find information and the way in which we communicate with other people has been reshaped by technology (Conole 2012). Information has become increasingly accessible with vast amounts of information, now being stored on the Cloud (Naughton 2012), becoming instantly available through such mobile devices as smartphones. With the assimilation of technology into the very fabric of our lives, we cannot ignore the impact this will have on education.

“Perhaps the first significant disruption caused by e-learning capabilities and approaches is in the field of distance education” (Garrison, 2003: 66). Over the past eighteen years, distance education has assimilated and been transformed by technological advances. Keegan (1996) identified technology as one of five key distinguishing features of distance education. Some forecast that traditional distance education will not feature in the education of the future (Evans & Pauling, 2010 cited in Garrison, 2011: 66) however, others challenge this viewpoint with the opinion that the future of education will rely on a modified embodiment of distance education, transformed by e-learning (Miller, 2010 cited in Garrison, 2011: 66). While the introduction of Virtual Learning Environments such as WebCT and Moodle facilitated asynchronous communication among students and tutors, the void still existed for synchronous communication. New technologies such as virtual classrooms provide distance education with the tools to deliver high quality, interactive academic support to off-campus students in an innovative and dynamic way (Cakir, 2004).

Theory

While the modes of delivery may differ, regardless of whether a course is offered online, on-campus or blended, students will use technological tools to communicate with their peers (Brooks, 2012). Social interaction is not only a powerful tool in counteracting feelings of isolation and supporting retention (Salmon 2000, Simpson 2003), it is key to facilitating knowledge construction (Vygotsky 1978, Habermas 1979).

Vygotsky claims that there is a level of attainment that we can achieve on our own but to achieve a level of deeper learning and understanding we must interact with a more knowledgeable other. This area between what we can achieve on our own and what we can achieve through our interactions with a more knowledgeable other is referred to as the Zone of Proximal Development. Vygotsky believed that it is within this zone where learning occurs. One of the challenges of distance education has been providing the opportunities for students to interact with a more knowledgeable other, such as a tutor.

Collaboration, afforded through synchronous communication tools, amongst students is also important in building a community (Ingram & Hathorn 2004). For traditional distance education students that community is constructed within face-to-face tutorials but learning communities can also be constructed online. Institutions concerned with the online delivery of courses must scaffold interactions in such a manner as to encourage the creation of effective learning communities. Once these communities form and thrive, knowledge-building should increase (Palloff and Pratt, 2005). Tutors within an online learning environment must develop specific skills to promote, moderate and support communication and collaboration. The design and development of the course and the assignments along with skilled moderators are crucial in directing students and facilitating effective online communication and collaboration.

In an effort to promote social interaction and knowledge construction, Oscail actively encouraged tutors to make use of interactivity in their online tutorials. During the opening tutorials, tutors used the 'break-out' rooms feature in Wimba as a method to focus on community building activities (Ingram & Hathorn, 2004). These activities promote interdependence (Johnson et al, 1998) as group discussions promote the learning of all members of the group and enhance the overall knowledge base of the group.

Methodology

The student and tutor experience of using Wimba was evaluated through the use of online surveys consisting of both qualitative and quantitative questions. A mix of closed and open questions (consisting of no more than ten questions) were selected to gather information and assess students' perceptions on various aspects of the Wimba tutorials. During the 2011/2012 academic year, the survey was made available to students across all Oscail programmes, both postgraduate and undergraduate.

At the end of the 2011/2012 academic year, a separate survey consisting of seventeen questions was designed and disseminated to all tutors who were assigned online tutorial groups. The tutor survey consisted of a combination of closed and open questions.

The surveys were designed so that it would require on average no more than five minutes to complete.

The quantitative questions utilised a five point Likert scale, with responses ranging from 'strongly agree' or 'excellent' (1) to 'strongly disagree' or 'poor' (5). Results are summarised in Table format. A

value of three represent the middle position, a figure of less than 3 represents varying degrees of agreement; whereas a figure of greater than 3 represents disagreement.

Results

The MSc survey had a response rate of 39%, the BSc survey had a 34% response rate and the Humanities programme had a response rate of 33%. (The humanities survey was made available to all humanities students with over one hundred and forty responses. Only 33 of these respondents had signed up for live online tutorials and so the response rate given is for those students who were registered for online tutorials only). The average response rate to the tutor survey across the three programmes was 63%.

Student survey

Question 1: Do you have broadband access at home?

The majority of students in all programmes had broadband access at home. The most common form of broadband access for BSc student was fixed line (27%), with wireless for both MSc students (52%) and BA students (49%).

Question 2: If you have broadband, what is the (nominal) download speed?

The majority of students on all programmes had a download speed of between 1-5Mb.

Question 3: Please indicate you travel distance from DCU?

Across all programmes, the majority of respondents reside within 30 kilometres of a university (In the case of MSc and BSc respondents this is DCU). Distance may not be an issue to this cohort of students, but due to the flexibility of distance education, it is still the preferred mode of study. The flexibility provides access to the students who not only live in a remote location and do not have access to part-time/evening course provision but also the students with work and family commitments who cannot attend existing part-time/evening courses.

Question 4: How many Wimba live classroom tutorials have you attended this academic year?

Table 1: Number of Wimba tutorials attended

Tutorials	0	1	2	3	4	5	6	>6
MSc	6(14%)	6(14%)	5(12%)	21(50%)	2(5%)	1(2%)	0	1(2%)
BSc	11(12%)	10(11%)	9(9%)	9(9%)	15(16%)	11(12%)	6(6%)	24 (25%)
BA	7 (21%)	2 (6%)	3 (9%)	5(16%)	6 (18%)	3 (9%)	1(3%)	6 (18%)

The rate of attendance at online live tutorials varied across programmes with 50% of MSC and 25% of BSc respondents indicating that they attended the maximum number of live online tutorials, at the time of the survey. However, on the humanities programme only 3% of respondents indicated that they had attended the maximum numbers of tutorials available. It should be noted that from the responses it was clear that there was confusion in relation to the distinction between 'live tutorials' and 'archived sessions' as some respondents indicating they had attended more tutorials than the

maximum provided.

Question 5: Did you experience any problems connecting to or using Wimba?

The majority of students did not experience any issues in connecting to or using Wimba. 23% of MSc students and 33% of Humanities students reported that they had some problems in either connecting to or using Wimba. However, 63% of BSc students indicated that they experienced problems.

The main issues related to using Wimba rather than connection issues with the most common issues relating to the use of laptop speakers and in-built microphones in laptops.

40% of tutors indicated some issues connecting to Wimba with only 25% experiencing problems when using the online tutorials.

Question 6: Have you accessed the Wimba archive?

80% of respondents from the postgraduate and BSc programmes together with 64% of Humanities students had accessed the Wimba archive.

Question 7: Have you any comments you would like to make on your experience of Wimba-based tutorials?

The majority of students reported a positive experience of using Wimba but stated that they had been made aware of the possibility of potential issues with the introduction of a new system. The types of issues reported by students can be grouped within five main themes: technical, timetabling, archive, content and collaboration.

Sound quality was the main technical issue with students reporting that slides occasionally did not synchronise with the voiceover and there were some instances where students experienced time delays. In conjunction with low bandwidth issues, the web camera intermittently caused problems. However, a number of students stated that they would still prefer to retain the use of the camera as they felt they wanted to be able to see the tutor and their fellow students. They also felt the camera encouraged a more interactive environment.

'I think seeing someone on screen during the tutorial can keep you interested and makes the tutorial feel much more interactive. (Humanities, Student)

The BSc students reported an issue with the timetabling of the online tutorials, with many students expressing concern with the 18.30 start. Many students felt this start time did not allow students to travel from work and interfered with a crucial part of family time, mainly dinnertime and bedtime for children. Across all programmes, students stated that they would prefer more frequent tutorials.

The most popular feature of the online tutoring system was the archive. Students felt that the archive was a valuable learning resource which allowed them to review tutorials that they missed which enabled students to manage the pace of their learning and their own schedule.

'Downloading the archives is very useful, as it gives me the ability to structure my own time' (BSc Student)

The main issue in relation to the delivery of the content of a tutorial, across all programmes, was students did not find it effective if tutors read their notes online rather than engage the students in a discussion.

'I think it is a fantastic idea but I think the tutors who use this need to try and make it as interactive as possible in addition they need to input their own thoughts and ideas..'(MSc Student)

The collaborative aspect of Wimba was an important element for the students even when students reported some issues in relation to sound quality.

'I've used the Wimba classroom several times for collaborative work and it worked well, however, when 2 are [sic] more people are speaking at the same time the echo and feedback are quite off-putting.' (BSc Student)

New students on the postgraduate programmes were urged to organise student study groups and to arrange study sessions through Wimba. Students reported that they found this very useful for their studies. Second year students did not actively engage with Wimba unless specifically directed to a tutorial session.

Question 8: How would you rate your overall experience of participating in a tutorial via Wimba?

The majority of students across all programmes reported either an 'excellent' or 'good' experience of using Wimba with 44% of MSc, 54% of BSc and 46% of BA students indicating a positive experience of using Wimba.

Overall breakdown as follows:

Table 2: Overall experience in the participation of Wimba tutorials

	Excellent (1)	Good (2)	Neutral (3)	Not Good (4)	Poor (5)	Value
MSc	3	14	13	7	2	2.7
BSc	16	32	22	14	5	2.5
BA	8	10	13	2	6	2.7

Question 9: Which of the following options would you choose for tutorial support in the future?

Table 3: Preference for the future provision of tutorials

	BSc	BA	PG
All tutorials face to face	13%	48%	N/A
Half tutorials face to face (in DCU) and half online	60%	29%	N/A
All tutorials online	27%	24%	N/A

While 48% of humanities students indicated that they would prefer future tutorial provision to consist of face-to-face tutorials only, the majority of humanities students indicated that they would like some form of online classroom to be integrated into future tutorial provision. The majority of BSc students (60%) indicated that they would prefer a blended form of tutorial provision in the future. As the postgraduate programmes are delivered entirely online, the above question was irrelevant to this group of students.

It is important to note that the results of this survey indicate that the majority of students on the BSc and BA programmes would prefer to retain some element of face-to-face tutorial provision.

Question 10: Have you any suggestions on how Oscal could make better use of Wimba?

The main area that students suggested would enhance the experience of online tutorials was enriched collaboration amongst student.

'Find ways to ensure students participate in the live sessions'

'Develop and encourage methods for collaboration between students'

Tutor online survey

Once the tutors resolved some initial technical problems with the connection they did not report any issues in using Wimba. The feature which was of most benefit to the tutors was the eBoard. Tutors reported using this feature for the delivery of presentations. The feature of least advantage to the tutors was the Apps Sharing function. One possible reason for the unpopularity of this feature was that tutors reported problems in connection when using Apps Share. This disruption in the connection impacted on the sound quality.

One of the main differences tutors reported was the level of preparation required for the online tutorial compared to the traditional face-to-face tutorial. Tutors reported that there was an increased level of preparation required for the online tutorials with some tutors indicating that they felt they needed to 'script' their tutorials for online delivery.

Tutors also reported that the type of interaction with students was different within the online tutorials than within a classroom-based face-to-face tutorial. Compared to the face-to-face tutorials, tutors felt that Wimba enhanced the learning experience of the students and that their own tutoring was enriched.

Tutors indicated that they preferred the shorter timeframe of the online live tutorials compared to the longer duration of the face-to-face tutorials. Online live tutorials were schedule for ninety-minute slots while face-to-face tutorials have a three-hour time slot.

One tutor reported that some students in his group reported that they found it easier to ask a question within the online tutorial rather than at the face-to-face session.

The majority of tutors reported a positive experience of using Wimba (Likert value – 2).

Some useful suggestions for future use of Wimba were as follows:

- Invite guest speakers to talk on topics for the course
- Bigger groups might ensure more attendance at live sessions
- Remember to use student names to help make it a more personal experience
- Practice with the eboard tools (advice for new tutors)

Discussion

Distance education students tend to have numerous demands on their time (Simpson 2003, Salmon 2000). The fundamental reason for these students in choosing distance education revolves around their inability to attend traditional university based or part-time/evening lectures. However, these reasons can also impact on a student's availability to attend a live online tutorial. A major motivation for the introduction of online tutorials was due to the low attendance at face-to-face tutorials (Walsh et al, 2011). The archival of online tutorial sessions was a key deciding factor for a number of students who were unable to attend face-to-face tutorials and indeed for those students who could not attend either the face-to-face or online live tutorials. While the attendance rates in some of the online live sessions was low, maximising participation in the live online tutorials could result in a more dynamic and engaging learning environment.

It is evident that the most valuable feature of the online tutorials was the archived sessions of live tutorials. This feature was not only a prized resource for those who could not attend the tutorial but also served as an indispensable revision resource for all students. For the student who could not attend the live online tutorial, the archive can be accessed at a time and location that fits their schedule. The benefits of this feature are hugely important to the distance education student.

Similarly, the archive feature was hugely beneficial for tutors, however, this tool was utilised by tutors in a different manner. Comparable to microteaching, the main advantage of the archived sessions for the tutors was the ability to review their own teaching style, which they felt provided them with an insight into how to improve the quality of their future tutorials. Some of the tutors felt that one of the disadvantages of the archiving feature was that it discouraged some students from participating in the live tutorial. The lack of participation impacted on the richness of tutorial discussions. Tutors felt that some additional benefit needed to be emphasised to encourage students to 'attend' the live tutorial and to participate in the online discussions.

Improved access to and cheaper broadband has been an important deciding factor for the introduction of online live tutorials by Oscaleil. The majority of students and tutors have access to broadband and therefore the current environment has enabled the smooth delivery of online tutorials.

While the user experience was mostly positive, amongst students and tutors, it was apparent that the majority of students still felt that they would like some face-to-face contact with their tutors and peers during their studies. Whereas some tutors felt that tutorial discussion and engagement was better facilitated in a face-to-face setting, a number of tutors felt the opposite and indeed felt that

the level of engagement and interaction was enhanced within the online tutorial. One of the key challenges faced by Oscail has been decreasing attendance rates at tutorials, especially in the non-Dublin based tutorial centres (Walsh et al, 2010). While on some programmes the attendance rate was on par with the level of attendance at the face-to-face tutorials, there was a particular issue with attendance rates on the humanities programme. This may have been as a result the students' perception of the purpose of the online tutorials. While there are no face-to-face tutorials for the postgraduate programmes and tutorials in Dublin only for the Information technology students, tutorials had traditionally been provided in a number of non-Dublin based centres for the humanities programmes. Also, the online tutorials for the postgraduate and undergraduate information technology students was built into the main delivery of tutorials, the provision of online tutorials on the humanities programme was supplementary to the face-to-face delivery. Therefore the motivation for humanities students compared to the other Oscail students may have been different. Humanities students may have opted for online tutorials in preference to not being able to attend face-to-face tutorials in Dublin, solely for the benefit of access to the archived tutorials.

In general, accessing and using Wimba was relatively easy. However, the information technology students indicated a higher level of concern in using Wimba. The main reported concern focused on the sound quality especially when using laptop speakers and built-in microphones. While students were in general content to deal with technical issues on their devices, they were less lenient if a tutor experienced a connection issue and indeed regarded their own experience as problematic when in fact the problem was with the tutor connection and not their own.

Online live tutoring altered the teaching style required by our tutors. The duration of tutorials needed to be shortened as tutors felt that it was a more concentrated environment which required a more encompassing delivery from the tutors. These tutorials were more demanding of the tutors in that they constantly had to engage with the students as the tutors could not 'read' facial and body expressions.

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Williams K. – Swithenby S.J.: Virtual science and engineering; can ICT overcome the challenges of teaching STEM subjects in distance teaching universities?

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Introduction and context

The world faces global challenges that demand an understanding of science and engineering to underpin the development of sustainable policies. The UNESCO report *Engineering: issues, challenges and opportunities for development* (UNESCO 2010) provides an overview of current issues affecting the engineering profession worldwide. It explains that, more than ever, the world needs creative engineering solutions to face its biggest challenges, from poverty to climate change. Yet many countries are seeing a decline in the enrolment of young people, especially women, in engineering studies. The slump endangers future engineering capacity, particularly in developing countries where brain drain is an additional problem.

The UNESCO report illustrates the supply problem as follows.

It is estimated, for instance, that some 2.5 million new engineers and technicians will be needed in sub-Saharan Africa alone if the region is to achieve the UN Millennium Development Goal of improved access to clean water and sanitation..... The risk is great that cuts in education funding will reduce training opportunities for potential engineering students.

In its analysis of educational provision it identifies issues associated with the capacity of education systems but also the need to renew curricula to emphasise professional skills development and prepare graduates for lifelong professional learning. The report recommends;

New approaches must be developed in education and training, notably hands-on, problem-based learning that reflects engineering's problem-solving nature.

Can Open and Distance Learning methodologies contribute to addressing the challenges outlined in the report? Can they provide the flexible, practically-oriented higher education capacity that the UNESCO Report advocates?

Since 1971, the UK Open University OU has presented successfully programmes in science and technology to its audience of part time adult learners, the majority of whom combine study with full time work, often in scientific and technical roles. The Open University's core operational precept is that of creating a student centred learning environment using communications technologies that are

accessible in a domestic environment. Residential schools have been used when essential, for example to provide laboratory experiences. The existence of study routes that allow students to gain professional recognition by professional bodies such as the Institute of Physics and the Institute of Mechanical Engineers testify to the university's strong position in the mainstream of higher education in the UK. The OU has established effective systems for teaching STEM subjects at scale. However, at times of rapid change in both higher education funding and technological opportunities, there is a constant need to review and adapt the OU's modes of operation to respond to changing socio technological contexts.

There has been a rapid expansion in the exploitation of electronic communications in the domestic, entertainment and business sectors that has transformed the tools available to educators in both distance education and conventional sectors. Innovative use of these technologies can transform the nature of teaching and supports the development of scholarship associated with the teaching and learning of STEM subjects.

Sustainable innovation in teaching requires knowledge, inspiration and organisation. The innovation in STEM practice described below has been led and coordinated within a recently established Open University unit, eSTeEM that supports scholarship in STEM teaching and learning. The eSTeEM locus provides a knowledge base and the credibility required for effective change.

eSTeEM's history shows its potential in supporting educational innovation. From 2005 to 2010 the Open University was funded by the Higher Education Funding Council for England to host four Centres of Excellence in Teaching and Learning (CETLs), two of which were concerned with the scholarship associated with STEM subjects. These centres enabled academic staff to undertake action research projects involving innovative teaching methods. Information on their work and the extensive resources generated is available via <http://www.open.ac.uk/opencetl> . Given the CETL success the Open University's STEM faculties elected to support continued development of scholarship, innovation and engagement through formation of a new unit eSTeEM which was launched in early 2011.

Since its formation eSTeEM has initiated over 30 projects involving scholarship in the teaching and learning of STEM in an open and distance learning environment. Exploitation of ICT in support of STEM teaching is an element in the majority of projects. Information on these projects is available from <http://www.open.ac.uk/esteem> .

Teaching STEM practice by open and distance learning.

The teaching of STEM practice by open and distance learning presents particular challenges as national academic and professional standards may specify significant laboratory or fieldwork as essential components of accredited courses. From its launch, the Open University has, circumvented these practical difficulties in a range of ways:

- Residential schools with required student attendance to undertake physical laboratory or fieldwork activities using the facilities of a conventional university or field-centre.
- Home Experiment Kits (HEK) specifically designed for use in students' homes.
- Use of simulation and other computer based tools to substitute for physical experimental activity.

The extent and balance of use of these mechanisms varied between subject areas. In electronics, provision of HEK equipment to standards close to that encountered in teaching laboratories was feasible but expensive. In other subjects such as chemistry, issues of safety and toxicity have limited the activity that could be carried out at home, requiring greater emphasis on use of conventional laboratories.

Appropriate use of these three mechanisms has enabled the Open University to present programmes in science and engineering that are routes to professionally recognised qualifications. However, patterns of use are evolving in response to; changing professional, educational and technological contexts, changes in the financial environment in which the university operates, and changes in the enrolment demographics.

A major driver for change has been the transformation brought about through the impact of digital technologies on professional practice in STEM fields. Increasingly the practice of science and engineering is transacted through digital technologies. Laboratory equipment operates through digital interfaces. Professional scientists acquire data from remote facilities and instruments. The processes of engineering design, calculation and simulation are similarly conducted electronically.

The hands-on student laboratory is becoming somewhat anachronistic in those fields where digital technologies are being used to acquire and manipulate data and to synthesise solutions. The very notion of authenticity is changing as professionals spend more and more time working to screens. The challenge for educators in ODL environments is to transform the teaching approach to acknowledge, embrace and exploit changing professional practice in our pedagogies. Distance from a physical laboratory facility need no longer present a major barrier to effective teaching of STEM practice.

There are many technological approaches to the teaching of STEM practice. The most familiar approach is to create **on screen simulations**. These mimic the behaviour of natural phenomena and systems through algorithms based on theoretical models. Such simulations can be very rich and they have a central role in professional practice but they may not provide insight into the complexities of real data. **Interactive screen experiments** may be used to mitigate this objection. They are based on photo-realistic recordings of real experiments with the data replayed under interactive student control. **Virtual instruments** abandon the photorealism but retain the interaction and the reliance on real data.

Robotically controlled **remote experiments** bring the student closer to reality. They involve real physical equipment that is controlled remotely by students in real time. Perhaps the longest established use of such techniques can be found in astronomical observatories which are frequently accessed and controlled remotely within the research community.

The perception of reality in the above may be enhanced through the use of **3D immersive environments**. Such gaming technologies enable students to explore and interact with equipment and gather, arrange and assess real data with a sense of space and place,.

Roving field technologies can be used to link students in a home base into a field experience. Cameras, microphones and portable sensors are carried on a field trip so that a group of online students can communicate and collaborate with a field-scientist. An alternative field learning technology is to capture a real site at all levels of details, from landscape to specimen, and allow the student to move through the site reliving the 3D experience under their own interactive control. This screen field experience is the direct equivalent of the interactive screen experiment.

Finally there are the so-called **citizen inquiry experiments**, sometimes known as Megalabs. These involve large numbers of remote distributed students contributing independent data into a common

experimental or observational study. Such approaches are particularly suited to environmental and biodiversity investigations, for example, the distribution of animal or plant species, and have generated significant research outputs.

Using these techniques, we believe it is possible to create learning experiences in which students gain a deeper understanding of the processes of contemporary STEM practice than is achieved in many traditional laboratory based settings where the emphasis lies in execution of set laboratory routines rather than experimental design or interpretation. Moreover, the digital interface can support the rich conversations and social interactions found in STEM communities.

Overview of current developments

There is a growing literature on online laboratories but, in common with earlier developments in the use of ICT in teaching, the critical mass of users essential for extensive institutional application is yet to be reached. There are many parallels with the development of e-learning and the current growth of interest in OERs with extended periods of *cottage industry* development at individual and departmental level taking place prior to widespread adoption. Promoting developments beyond departmental level is a challenge requiring innovators and resources. Notable developments within consortia include the MIT initiated *ilab* network <http://ilab.mit.edu> and its European wing i-lab Europe <http://ilab-europe.net> , the European based Global Online Laboratory Consortium, <http://online-lab.org/>, and the Australian Labshare initiative <http://www.labshare.edu.au/> .

These initiatives focus largely on remote access to physical laboratory equipment. Consortium members work to common interfacing and administrative protocols enabling students and staff to book experimental sessions on equipment hosted in another institution, thus offering a wider range of experimental activity than a single institution might offer on-line. They demonstrate that the technical challenges of interfacing with and controlling remote equipment from an online student's desktop have been overcome. The Proceedings of the *IEEE Educon 2012* conference which are accessible via the *IEEE xplore* digital library (<http://ieeexplore.ieee.org/Xplore/guesthome.jsp>) provide evidence of the extent of international activity.

The Indian government's National Mission for Education through ICT (NMEICT) is an impressive example of a national project to support expansion of application of ICT in higher education. The project, financed by the Ministry of Human Resource Development, is multi-institutional, and multi-subject in coverage. It is designed to support an expansion of the higher education system by capitalising on the academic expertise of leading institutions and making resources available nationwide through institutions and newly established teaching centres. The Virtual Laboratory elements of this initiative are accessible via <http://www.vlab.co.in> . The materials available through this portal include experimental simulations and remote experimental activities. The project displays a diversity of approaches in the use of a common infrastructure. Materials are still in development but when complete will represent a very significant open educational resource.

Hence, with a growing range of technical solutions to the operation of remote laboratory equipment and of experimental simulations accessible via OER repositories, the future challenges lie in development of effective pedagogic approaches and sustainable cost effective provision.

In campus based institutions the development of virtual and remote laboratory activity may be driven by a desire to improve student flexibility through offering anytime access to lab equipment or to significantly improve laboratory capacity and throughput by minimising the time that students

spend in a physical laboratory setting.

There are interesting examples of use of immersive environments for enculturation in laboratory processes such as the SWIFT project at University of Leicester <http://www2.le.ac.uk/projects/swift/the-swift-team> and <http://vimeo.com/44026851> which is used to introduce first year biosciences students to laboratory practice in DNA manipulation. Having taken part in virtual laboratory activity students are better briefed on the processes and even the geography of the real laboratory. A similar approach to online simulation being used as a precursor to physical attendance by students is described by Dalgarno, Bishop and Bedgood (2003).

The Wolfson OpenScience Laboratory at the Open University

As we reconceptualise open and distance learning to serve physically distributed but digitally well connected student populations we need to reconceive how to engage these students in the practice of science and engineering so that practical work can be distributed throughout study and not compartmentalised in residential schools or Home Experiment Kit activity.

The Open University's STEM faculties have experience of teaching online STEM practice using all the technologies presented earlier but, in common with other institutions, much of this has emerged from initiatives driven by single module teams. It was recognised that there was a need for integrated development and an institutional approach. This would involve multidisciplinary inputs and a strong formative research component that would shape future development. A successful matched funding submission to the Wolfson Foundation has enabled the Open University to initiate the development of a Laboratory for STEM practice that is fully integrated within the University's Moodle Virtual Learning Environment.

The 'OpenScience Laboratory' will comprise more than a collection of applications. It will support peer and teacher/student interactions, mentoring, and assessment, and will include support resources and a full suite of learner management functions and learner analytics. The project is based in the eSTeEM unit and its outcomes will influence future directions of the Science and Maths, Computing & Technology faculties. Details can be found at <http://www.open.ac.uk/openscience>.

In the first stage of the project, the platform will be constructed. It will provide the capability for use by formally enrolled students from any institution, as well as registered and casual users. It will also provide students with the opportunity for engagement with the research activity of Open University departments and professional body networks as well as with their fellow students. The platform will support the 'applications', each of which is an experimental or observational activity with accompanying learning script.

We will migrate existing exemplars of each of the types of practice based teaching to the new environment, adapting them as necessary to increase student flexibility. New approaches will be piloted. The package will be as platform independent as is achievable with existing technologies. Our aspiration is that the OpenScience Lab will be usable in countries with limited technological infrastructure.

Some illustrative areas of application are described below.

Virtual microscopes will be incorporated. Each will provide a screen interface with the usual microscope functions, e.g. focusing, traversing, altering lighting etc., and sets of digital slides generated by real specimens. These will include rare specimens. The slide 'data base' will increase year on year. Students will be able to access the highest quality real data from professionally

acquired and digitised specimens.

Remote synchronous observations will be possible using robotically controlled optical and radio telescopes. Students will be able to plan observations, and access the resulting data online. Students will have the opportunity to interact with professional research scientists using the instruments. Extension to allow control from mobile devices is being investigated.

Robotically controlled chemical analyses of water samples involving traditional volumetric analysis by titration and colorimetry are planned for both chemistry and environmental science courses. Such studies might be extended by constructing databases on water samples from real sites spread globally. These real data may be accessed via virtual instruments, adding a broader relevance and reality to the students' online study.

Detailed 3D modelling of a mountainside of significant scientific interest in Northern England will be used as a vehicle for virtual field trips in environmental sciences. The data captured can be used to enable a wide range of on line experimental observations to be undertaken either under the close direction of academics or as student designed activity. The data architecture will allow others to create models of other environments.

Linking laboratory and fieldwork in earth sciences and life sciences was the theme of the *Out there - in here* project which explored the possibilities for new technologies to support distributed, synchronous collaborations between students in the field, and others based in a stationary location (<http://www.open.ac.uk/blogs/otih/>). In the first set of trials, geology fieldwork in a higher education context provided the test domain for design and evaluation of a prototype system, from which wider issues with developing interdependent learning experiences across mobile and static contexts can be identified and analysed. In the OpenScience Lab environment roving technologies could be deployed integrated with the 3D immersive environment.

The Open University's iSpot project provides an example of a large scale citizen science activity. Individuals share in the observation and identification of wildlife by posting their observations on the project website (<http://www.ispot.org>). Large scale observations conducted by distributed populations of ODL students enable projects to be conducted at national scale. Earlier exercises of this type conducted by OU students were restricted by delays in data processing etc. Collection of data online allows for instantaneous recording and interpretation of data extending scope for student participation in experimental design. The iSpot approach will be taken further through *Trezilla*, a potentially global map of trees

The above exemplars, which are not exhaustive, illustrate possible directions in the development of on-line experimentation and analysis. Our aim is to create an infrastructure that is attractive to others in order that the crucial critical mass of users and developers can be created. Using an open source approach and integration with Moodle and collaboration with others underpin this strategy.

Professional skills development

In the remainder of this paper we tackle a separate but related topic. The majority of practising scientists and engineers work collaboratively in teams and, increasingly, employers regard team working as an essential skill for effective employment. The UNESCO report emphasises the importance of problem based learning and the majority of real life problems demand collaborative solutions. Bourne Harris and Mayadas (2005) discuss how the professional skills elements demanded by the US ABET organisation (formerly Accreditation Board for Engineering and Technology), can be

met in online engineering programmes. Similarly, in the UK, the Engineering Council defines the skills required of professional engineers in the UK Standard for Professional Engineering Competence SPEC document. All HE programmes accredited by the Engineering Council's member institutions must demonstrate that students have taken part successfully in an engineering team project.

The Open University. Engineering Programme achieves this through its course T885 Team Engineering. The course commences with students attending a weekend residential school at which they join a team, select a problem whose investigation will cover technical, environmental and business aspects possibly including a computing/software dimension and establish the aspect of the project that each will develop. After the first weekend, and working at a distance from the other team members, they individually and jointly pursue agreed lines of enquiry on the engineering project. Their progress through the project is charted in the team wiki, in online video conference records of team meetings and in team and individual reports, submitted as tutor-marked assignments. A second residential weekend some 20 weeks later allows for final discussion, integration and presentation of project outcomes prior to preparation of each individual's final report. Students predominantly use the online tools provided by the University that operate through the MOODLE VLE and Elluminate, the current online conferencing system. Working in this way students develop skills in online collaboration that are often directly applicable to their workplace as most organisations conduct an increasing amount of their business through online meetings and information exchange.

Conclusion

Developments in ICT have influenced the way in which scientists and engineers work and also facilitated a transformation in how the practice elements of STEM subjects can be taught in an Open and Distance Learning environment. Though there has been extensive work on development of remote laboratory activity it has not yet reached the critical mass of developers and users to realise its full potential. The Open University's OpenScience Lab project aims to provide an open source environment in which a range of styles of STEM practice can be presented and evaluated. When combined with existing methodologies for supporting the development of professional skills amongst communities of distance learning students, online practice based teaching can make significant contributions in meeting the challenge of expanding the supply of trained scientists and engineers.

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Xenos M.¹ - Mavroudi A.² - Karaiskakis D.¹ - Birbilis G.³ – Glezos D.⁴ – Zafeiropoulos D.³: The development of an institutional repository service for a large distance education university

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Introduction

Hellenic Open University (HOU) is an open and distance learning university that currently has about 28,000 enrolled students, across about 30 undergraduate and post-graduate programs (Hadzilacos et al., 2008). Being an open and distance learning university, the quality of the online services that HOU has to offer to its student is vital. Thus, the need for the adoption of a methodological approach which would tackle effectively complex, interwoven and sometimes contradicting factors (described in the following sections of the paper) in the design and the development of the online institutional repository service, was imperative.

In the following section, an overview of the services offered through the use of technology to the students of HOU and the impact of the organizational structures on these services are discussed. Also, the methodology and the techniques used in the use case of HOU are briefly presented.

Overview and background

HOU services in conjunction with its organizational structures

Hellenic Open University (HOU) provides distance education to its students and this is reflected to

the structure and the design of the courses, as presented herein after:

- universal access to educational resources (in both printed and digital/electronic form) is vital,
- students are encouraged to personal communication with their tutors,
- a small number of consulting sessions between the students and their tutor is organized (about 5 per year).

With respect to the use of Learning Management Systems (LMSs), HOU supports the integrated use of: Moodle⁷⁹ LMS and Learning Activity Management System (LAMS)⁸⁰. Except LMSs, various other systems (like: the HOU portal, a webconference system etc) are also used. All the technological tools and services that are being used in HOU are considered as alternative means to communicate and to streamline several aspects of the educational process (Hadzilacos et al., 2008).

Concerning the studies in HOU, the only entry requirement is the successful completion of high school studies. Consequently, students reflect the mean level of experience and competence in the use of electronic services in Greece, which is not high. Thus, “planning for the development of electronic services should address the need for universal access in services of stratified complexity (suitable for each team level in order for all to accept their use) and the organizational aspects of scaling up in numbers and in complexity” (Hadzilacos et al., 2008).

The need of an institutional repository

Many academic institutions worldwide are sharing a common problematic situation: they maintain a large volume of material in various formats (printed, audiovisual and other types), and they face the problem of long-term digital storage and preservation of their data. HOU, which provides open and distance education through a great variety of support services combined with the use of a set of particularly extensive and heterogeneous collections of digital educational material, was also faced with this challenge.

Institutional repositories aim at the enhancement of the organization process of the rapidly developing volume of digital information that circulates in the ecosystem of an academic institution. An institutional repository has the possibility of storing, providing access to, preserving and indexing a wide spectrum of digital material, which can be reused in various ways, and be embedded in educational and socio-technical activities of university.

Particularly useful in the description of informational objects or learning objects are metadata which are an inherit part of institutional repositories and (physical or digital) libraries. The library of HOU has tens of thousands of books. For its proper and easy organization and retrieval, several metadata are attached to each book. The role and the importance of metadata, their semantics and the metadata application profile used in the case of the HOU repository are being further explained in this paper.

Design of an information system in its social and organizational context

Software development practice has increasingly revealed the need for Information Technology (IT) professionals to seriously consider human and organizational issues, but it seems that they have

⁷⁹ Moodle, <http://www.moodle.org>

⁸⁰ LAMS, <http://www.lamsinternational.com/CD/index.html>

failed to incorporate these issues into the systems' development lifecycle in a way that these issues would have a significant bearing upon the specification and development of the technical solutions (Blackler & Brown, 1986; Hemingway,1999;Hemingay & Gough, 1998).

In the design of the UI, end-users may be more or less actively involved. In classical user-centered design methodologies, the opinion of the user may inform (i.e. elicit needs) and evaluate (i.e. evaluate a prototype) the design. In participatory design methodologies, the user actually becomes a co-designer though their participation in the process of solution elaboration and even, in the process of design decisions (Détienne, 2006).

In collaborative design, several socio-technical solutions are possible. The paper will focus in particular on these (Détienne, 2006):

- At the task and organizational level: matching organization structure with task decomposition.
- At the team level: coordination mechanisms through awareness and informal or semi-formal communication.

The design method of a knowledge management system should be able to integrate in the design changes about the system requirements that may occur as the project development cycle evolves. In addition the method should address changes concerning the hosted organization (Plass & Salisbury, 2002). Consequently, the team work had to incline with both the aforementioned solutions, while making available a rapid prototype of the system to a small proportion of users (who are called 'early adopters' in the remainder of the paper). Additionally, discussions with the administrators of other instances of Dspace in Greece (such as the instance of the University of Patras and the instance of the University of Athens) were held related to their experience and anticipated problems or weaknesses concerning the use of an institutional repository. From these synergies, the team concluded that cooperation at informal or semi-formal level can grow awareness in a small country and encourage the formation of a community.

Methodology & Techniques

The institutional repository platform was selected with respect to organizational needs and possible future integration possibilities with the rest of the technological artifacts already in use (tools, platforms etc), while also taking into account future thoughts, plans and needs. That was a highly complex, collaborative procedure, which involved: technological, organizational and economic factors, described below.

Requirement analysis

The requirement analysis involved the following factors:

- Interoperability. According to IEEE, interoperability is defined as “the ability of two or more systems or components to exchange information and to use the in-formation that has been exchanged”(IEEE,1990). It was obvious to the team that the usage of arbitrary metadata accompanying the resources would be a problem concerning the cooperation of the e-services. The attachment of semantically proper metadata is needed in order to foster interoperability between heterogeneous resources. Interoperability with the e-services already in use was an important factor.
- Metadata standards. The aim of the use of a metadata standard (for the scope of their use in this use case) was to enable a selection of a predefined set of metadata that would be appropriate

for the description of the resources and the integration of the repository with pre-existing, proprietary library services. Consequently, the use of metadata standards in order to describe the digital resources is one of the critical factors concerning the functionality of an institutional repository. The study of the metadata standards conducted by the team was focused on Dublin Core and LOM, the two most prominent metadata standards in the educational technology field.

- Standards related to the usage of metadata and the exploitation of the existing services.

The functionality of the following standards was examined:

(a) SCORM (Shareable Content Object Reference Model) is a set of standard web-based technologies and protocols that allow sharing content and data between different learning management systems (ADL, 2002). Practically, SCORM is mainly used in order to track the progress of the learners while they interact with the SCORM-compliant e-courses, inform the tutor about their performance in a test/quiz etc.

(b) OAI-PMH (Open Archives Initiative- Protocol for Metadata Harvesting) is a significant part of the architecture of distributed services and networking information databases. It is a mechanism through which the data providers (i.e. a digital library) can publish their metadata in other systems. Several external services that also support this protocol can interact with the repository and harvest metadata (OAI TC,2008). So, if a service at the HOU (for example, the cataloging system of the digital library of the HOU) supports OAI-PMH, then it can search and retrieve documents publicly available without any further customization. In the case of HOU, the support of the OAI-PMH was considered a desirable parameter, especially since future plans about storage and harvesting of the metadata of the students' theses (which would be freely accessible by the students and the faculty of the HOU) existed.

(c) Z39.50 (ANSI/NISO Z39.50-1995) is a standard for information retrieval. It enables access to digital resources regardless of their location in the WWW and the way they are stored in the databases, by allowing a 'client' to perform searches in these databases and retrieve the results of a search query. This standard is popular amongst digital library systems, since it allows their integration (NISO,2003). The support of Z39.50 was considered desirable for the same reasons as OAI-PMH: it can foster the integration with other sophisticated systems, like the OPAC (Online Public Access Catalog) system used by the HOU digital library.

- Long-term preservation of information. One of the main aims of a digital repository is the long-term preservation of the digital resources. Except the kilobits that comprise the informational material per se (for example, a text document), attention should also be placed to the fact that it should be accessible in various formats or stored with its source code etc., since a format may become obsolete or extinct in the future.

- Types and formats of the existing educational and informational digital content. A great volume of heterogeneous educational material was created by the HOU tutors in collaboration with the Educational Content, Methodology and Technology laboratory (E-CoMeT)⁸¹, which was used supplementary to the printed educational material (i.e. printed books). Qualitative analysis conducted by the team revealed a high heterogeneity level, especially in terms of the available formats (mainly: Webcasts, DVDs, software, multiple choice questions and hypertext) and types

⁸¹ E-CoMeT laboratory, <http://eeyem.eap.gr/en/about>

(bachelor, master and doctoral theses of students, research publications, material already existing in the HOU digital library, proceeding, reports etc.)

– Discussions with the technical staff working at the HOU digital library and other staff from the E-CoMeT laboratory (that have organized, supervised and supported the production of the existing digital educational material), revealed additional requirements, which led to the following conclusion: the storage of the existing digital material in the repository has become a complex matter. For example, a video lecture could be separated to many parts, contain subtitles, presentations etc. Thus, the granularity of the learning objects that may be stored in different locations of the repository as self-contained, re-usable material was a decisive choice.

Additional requirements that the repository should satisfy, were the followings:

- (a) Support batch import of a large variety of data types, like compressed files, video, images etc.
- (b) Support the efficient organization of the material into collections. Without collections and sub-collections, the retrieval of the useful material will be of limited efficiency.
- (c) Support large files (some of the existing lectures were near the size of a GB) in a single record.

– Existing technological artifacts. One of the main goals of the requirements analysis was to provide insights concerning the integration of the repository with the rest of the technological tools, services and platforms already in use by the university, in order to achieve interoperability between them. These are:

- (a) Portal. A related requirement was to host the educational material and inform the HOU portal by providing back to it a unique identifier (URI) for each item.
- (b) Moodle. The requirement concerning the integration of Moodle with the online repository service was also the use of unique identifiers that would be referenced by the Moodle environment. Single-Sign-On (SSO) was another additional requirement.
- (c) Other services: LDAP (directory service) and OPAC. A great proportion of the available educational material is not available to the public. That poses the requirement of having private collections, accessible only from certain group of users (i.e. having specific authorization rules). The adopted solution would also support LDAP authentication.
- (d) OPAC is the system used by the librarians for indexing and search purposes. Through an online form the user can perform search queries using various criteria and check the status (available or not, in a physical or digital form) of the resource(s). The system uses MARC records. The integration with the repository can be summarized as follows: once a resource is stored in the repository, it obtains a unique URL. This link could be added to the MARC record so that the users will use the OPAC user interface -with which they are already familiarized - to search within the repository. After discussions with the librarians (especially with the library technician that liaise between the software engineer and the librarian) this solution was considered as satisfactory.

Finally, the integration with other platforms used (for example, the web conferencing system) was considered as unimportant and for that reason is not mentioned in this paper. Many discussions with all the stakeholders were held, so as to get a clear understanding of their needs concerning the online repository service, at least in the near future. Other important factors that affected the procedure reaching conclusions were: informal communication and awareness (Détienne, 2006).

Informal communication was used in order to ensure coordination and reduce the amount of information lost or mis-directed. Informal communication and awareness i.e. common understanding of shared plans, assignments, roles and their modifications and other similar issues were important,

since discussions between people with background from different disciplines had to reach a mutual understanding so as not to jump into vague conclusions. One example: reaching a common consensus of the university's current and future needs.

Comparative analysis

The comparative analysis involved the study of the functionality of the following institutional repositories:

1. Dspace⁸² is an open source institutional repository software, highly customizable to fit the needs of the hosting organization as follows:

- customization of the UI
- customization of metadata
- configure the "browse and search" functionality
- configurable database
- ability to choose the default language

It preserves all types of digital content including text, still images, moving images, and data sets. It is being developed by the MIT University in collaboration with the Hewlett-Packard labs, and it is fully OAI-PMH compatible. The recent versions of the platform are launched along with two types of UI: one written in Java and the other one in XML code (called Manakin), for easier customization and integration. In terms of metadata, a metadata application profile of the DC (Dublin Core) metadata schema is launched along with the Dspace source distribution, but other arbitrary/local schemas can also be used. On the other hand, the usage of arbitrary metadata schemas and/or metadata application profiles is not advisable, because it doesn't promote interoperability and other desired qualities that each digital item should ideally possess (reusability, modularity etc).

One of the key features of the Dspace institutional repository software is the CNRI Handle System, a system used to provide a unique and persistent identifier (i.e. a URI- Uniform Resource Identifier) for each item stored in the repository. Finally, the Information model of Dspace is comprised of: Communities, Sub-Communities, Collections, Items, Bundles and Bitstreams. Different policies may apply in each of these levels.

2. Greenstone⁸³ is a software suite for building and distributing digital library collections, produced by the New Zealand Digital Library Project at the University of Waikato in cooperation with UNESCO and the Human Info NGO, and distributed as an open source, multilingual software. It supports the latest version of OAI-PMH protocol and the METS (Metadata and Encoding Transmission Standard). The key points of its core business functionality include:

- Distribution on the web as well as on CD-ROM
- Highly customizable metadata and UI
- Multilingual UI
- Platform independence

Greenstone is designed to allow non-specialist users to produce single, individualized, digital library collections (Wittten, 2005).

⁸² Dspace institutional repository software, <http://www.Dspace.org/>

⁸³ Greenstone digital library software, <http://www.greenstone.org/>

3. Eprints⁸⁴ is a popular open source platform for repositories mostly populated with: research outputs of literature, scientific data, theses and reports or multi-media artifacts from collections, exhibitions and performances. A key point of its functionality is that it supports OAI-PMH for the exchange of metadata between several Eprints services. To ensure the long-term preservation of the digital items, Eprints is using the LOCKSS (Lots of Copies Keep Stuff Safe) system which is actually a combination of technical elements and business-aware elements that can be deployed to ensure the long-term accessibility to electronic journals even if the publisher ceases to exist, or a subscription is terminated, or the acquired content is damaged (Rusbridge & Ross, 2008). The functionality of the LOCKSS system attributes to the fact that it creates copies of the digital material in various locations, in order to prevent unwanted deletions.

4. Fedora⁸⁵ is (an acronym of Flexible Extensible Digital Object and Repository Architecture) is a general-purpose, open-source repository. It provides:

- a core repository service, exposed as a set of web-based services with well-defined APIs (REST/SOAP)
- an array of supporting services and applications including full text search service, OAI-PMH Provider Service, JMS messaging, administrative clients, and more
- RDF support, for example RDF search (SPARQL)
- sophisticated features that support digital preservation.

In conjunction to HOU needs, the advantages of Fedora compared to the other three repositories were: the wide usage of web services internally in the system and its rich information model, through which many different types of digital items can be supported (documents, images, e-books, multimedia, datasets, metadata etc). The content can be of any format and can be stored locally or it can be distributed and be referenced by the repository. Moreover, Fedora can be highly scalable (it can handle more than 1million objects). Batch import of objects is also supported. On the other hand, Fedora has high maintenance cost and its community is less active than those repositories already mentioned (4 times less active that the one of Dspace).

A comparison of Dspace with the other systems already mentioned, such as Eprints and Fedora is available at JISC website (2009). The comparative analysis conducted by the HOU re-search team revealed that all the aforementioned repositories are -at a great extend - capable to support the needs of the university. This analysis compared the repositories based on various parameters and characteristics, such as: support of various formats, degree and type of customization, workflow processes, Greek UI etc. Dspace was finally selected, taking into account not only the functionality parameters already mentioned above, but also other two important criteria, related to the organization's 'ecosystem': existing know-how and interoperability with the existing technological infrastructure used in the university (tools, platforms etc).

The next section presents the work conducted by the team focusing on the significance (in the process of setting up the repository service) of parameters such as: the complexity of the interdependencies between various categories of the stakeholders and their diverse needs, the policies related with different groups of users and the existing technological and organizational infrastructure.

⁸⁴ Open Access and Institutional Repositories with EPrints, <http://www.eprints.org/>

⁸⁵ Fedora Commons Repository Software, <http://www.fedora.info/>

The customization of the open source institutional repository (Dspace)

First phase

The first phase included the integration of the repository with the LDAP-based authentication scheme. For this purpose, additional code was written in Java which resulted to the customisation of the DSPACE LDAP authentication manager and the LDAP servlet module in order to enable mappings with the specific design of the HOU LDAP directory. In this way, the user authentication policy was inclined with the one described in paragraph 2.1.

Following, the design and development of Communities, Sub-Communities and Collections was a two-step process:

1. the configuration of the GUI
2. the development of authorisation policies and the attribution of access rights.

In the process of creating the hierarchical structure which consisted of Communities, Sub-communities and Collections etc, the educational, technological and organizational status described in paragraph 2.1 was a determinant factor. As a result:

- the first level of organization of the digital content (i.e. the Communities) corresponded to the undergraduate and postgraduate programs
- the second level (i.e. the Sub-Communities) corresponded to the thematic units and
- the third level of organization of the digital content (i.e. the Collections) corresponded to specific categories of the digital content. For example: complementary educational material or backup files of the teleconferencing meetings or article re-views etc. For usability reasons, having four levels of hierarchy was considered a bad design choice.

As written in Hemmingway & Gough (1998), “the functionality of a system cannot be considered distinct from the representation of information to its users”. Processed data only take on their full meanings when communicated to users as messages in their own language (Witten et al., 2005) and program and interface are fundamentally connected. In alignment with this opinion, the configuration of the UI included processes varying from the localisation of the UI and the introductory texts in the homepages, to logo icons and the selection of colours in the webpages. Most of the design decisions were driven by the aim to achieve consistency with the other existing platforms of the HOU. An additional challenge concerning the representation of the information was related to the semantics of the metadata. The problem was that the available digital content already had metadata attached to it. Their semantics were often contradictory and their translation to the Greek language (as a part of the localisation process of the system) added complexity to the matter. In the process of the design of the UI, a liaison person (helpdesk) between the students and the team provided useful insights about users interactions with the existing KBS (Knowledge Based Systems) and CMS (Content Management Systems) and how the informational needs, the functionality of the existing services and the students’ expectations would affect the social acceptance of the online repository service.

Second phase

The second phase involved the preparation needed in order to store and index the digital items. The heterogeneity of the existing digital (mostly, educational) material was a challenge due to the following reasons:

- the granularity of the learning objects and the digital items, in general
- the authorization policies. This was a complex issue, since it involved the levels of the organizational hierarchy (Communities, Sub-Communities, and Collections) and the groups of users, in conjunction with the various access rights. For example, one user (that belongs to group A) may see the title of the item stored in a specific collection but cannot access the items' webpage; another user (that belongs to group B) has access to the items' webpage and she can see the metadata, but still cannot download the informational material; finally another user (that belongs to group C) can download the informational material. This flexibility concerning authorization policies is one of the key features in the functionality of the Dspace software
- the accompanying metadata, used so as to cover as sufficiently as possible the informational needs of the stakeholders. As already mentioned, Dspace is using the Dublin Core metadata schema. DC metadata schema is comprised of 22 main elements (simple DC schema) and 65 qualifiers (Qualified DC Metadata Schema). Dspace is launched along with a Metadata Application Profile (MAP) which wasn't suitable for the HOU case. In order to develop a new MAP, the metadata semantics and the indented usage of each of the DC metadata elements needed to be clarified. A technique used to support this purpose was the creation of a 75 to 7 matrix, with the DC metadata elements (including: the Dspace MAP, the simple DC schema and all the qualifiers) in its rows and in its columns check lists (for "yes/no" answers) and text boxes (for open-ended answers) that corresponded to answers regarding the indented and proper usage of the metadata elements. In order to fill in this table interviews were conducted with policymakers and developers of the HOU. The production process of the educational digital material and its evaluation process were also discussed, in order to clarify the usefulness of the elements dc.contributor.*, dc.creator, dc.publisher etc. As a result, a HOU Dspace MAP was built, containing only 15 mandatory metadata elements. A meeting with all the stakeholders was held in order to confirm their acceptance regarding: the basic functionality of the institutional repository, the selection of the Dspace open source software, the semantics and the best practices of the metadata elements comprising the HOU Dspace MAP.

Third phase

The third phase involved the collaborative work on the pilot/test server. During this stage (which lasted several months), the functionality of the Dspace pilot instance of HOU was tested and further optimised by taking valuable feedback (suggestions, but mostly complaints) by the 'early adopters'. Finally, in the production server a private company replicated the previous work done in an upgraded version of the Dspace software. This version was launched with two types of GUIs: the "Manakin" UI (written in XML) and the "traditional" UI of the previous version (written in Java). Since Dspace is open source software, it is being continuously evolving and supported by a worldwide community of developers. For example, the localisation file (in Greek) of the Manakin UI was contributed to the Dspace open source community from one of the team member in collaboration with the Technological University of Cyprus. This collaborative translation was based on the localisation file of

the previous version, in order to achieve consistency with the existed terminology, as the types and versions of the UI are involving.

Future plans include working with the Manakin/XML UI, instead of the UI launched via JSPs as well as, the creation of additional Communities and Collections in order to cover all the administrative and informational needs in the HOU.

Conclusions

The paper presented the description of work (focusing on the difficulties) concerning the customization of an institutional repository, viewed as an example of the usage of technology in its social and organizational context. In a university that offers distance education, the technological artifacts should be designed in relation to many interwoven (and sometimes contradicting) parameters that can be largely anticipated within the context of a socio-cognitive engineering approach. For example, concerning the universal adoption of the specific MAP in HOU, it has opened a passage from a chaotic flexibility in describing and annotating the digital educational resources to a benevolent inflexibility that was finally respected from all. Since this constitutes partly a change of attitude (discipline, respect other people needs, compromising, reaching consensus etc), it was not an easy process.

On behalf of the students, they frequently discuss about this institutional repository service in an online forum. Since this forum was created by the (geographically dispersed) HOU students themselves, they communicate in a spontaneous and informal way through it. Thus, their comments may provide valuable insights on the way they actually perceive the notion of the institutional repository in the context of HOU. Their complaints involve mostly: the volume of the informational items, problems with the authorization process and the process of indexing, which should be more straightforward. Another example on learning preferences: one student wrote in the forum that although this service might be helpful in downloading the available digital educational material, he prefers the printed form. Also, he has written that he would read from his books solely and wait until the books arrive in his house via ordinary mail. It is also worth noted that the students prefer to solve their problems through the forum than to give a notice to the helpdesk. This is being partially explained by the fact that through this forum (which was created years ago) the students have built an online community of interest and have established a sense of trust, a sense of belonging and also a sense of 24/7 'presence'. The ultimate goal of the technical support service would be to establish this kind of relationship with the end users through continuous and reliable communication. With regards to quantitative feedback, the 'Statistics service' has been activated. It provides monthly reports as well as daily reports on user logins, words searched, number of views (Communities views, Collections views, Item views) etc. Finally, after the use of dspace was streamlined, a unit of the HOU called "Unit of Internal Evaluation and Training" incorporated the use of the institutional repository service in the informational/training material disseminated to HOU staff and students.

The added value of the papers is that it may help similar universities and institutions to foresee challenges related to: current and future organizational policies, diverse informational needs of various groups of users, and technological infrastructure and transform all that into useful input that informs the process of building an institutional repository service, which can some-times be an ill-structured problem, due to its implicit complexity.

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Yamagata N.: Classics as Pan-European Curriculum in the Digital Age

Strand: **Networked Curricula: University Curricula and Academic Networks**

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My paper derives from my own experience as a classicist born and raised in Japan and now living in London. Despite my non-Western origin, I feel that I belong to the country of my residence, the United Kingdom, and Europe in which it is situated, not only because of my growing familiarity with English and other modern European languages, but also because of my classical education. In my numerous encounters with European citizens (and Westerners from outside Europe) I have often found common cultural currency that allows me to relate to them thanks to my knowledge of the classical past of Europe. I believe such cultural foundation will be of value to all new citizens of Europe, whether they are born in Europe or first-generation immigrants from outside Europe.

It may be said that with ever greater influx of population from other parts of the world and with global exchange of ideas, cultural identity of Europe is being somewhat diluted and its social cohesion weakened. The globalisation of Europe is most conspicuously epitomised in London, where, according to the latest survey, 233 languages are reported to be spoken by school children.⁸⁶, and some even estimate that over 300 languages are spoken in London, making it the most linguistically diverse city in the world. The linguistic and cultural diversity especially in large cities across Europe must be *mutatis mutandis* similar to the case of London.

My proposal is this - as an alliance of universities across Europe, EADTU can play its part in promoting the social cohesion of Europe, by providing a pan-European curriculum which can empower and unite new generations of European citizens of all origins and backgrounds who can draw on and value the common heritage of Europe. Such programme of study can include many subjects, but I believe at the core of it should be the Classics, the study of Greek and Latin past, as it forms the very foundation of European culture and thought.

My reason for promoting the Classics is twofold. One is the intrinsic value in studying classical

⁸⁶ Eversley et al. (2011). According to Regional Languages Network London (2008), after English, the top ten languages spoken fluently by London residents are French, Spanish, Polish, Hindi, Italian, Urdu, German, Russian, Bengali and Portuguese.

languages and culture and the other is the unifying effect this could have for all citizens of Europe of different origins. In such a diverse cultural environment as we have seen in London, it is impossible for educational institutions to teach home languages to all students and choosing a few will be divisive. The national or official language or languages in each country will play a unifying factor to a certain extent, but this will seldom go beyond national boundaries. If, on the other hand, we have a pan-European curriculum of classical languages and texts, this will help introduce all sections of European population to the common values of European heritage. I have long advocated⁸⁷ that the study of the classical languages, i.e. ancient Greek and Latin, has a particular benefit, in that they will give the learners the skills to learn any languages radically different from their own and that because of the historical distance between now and antiquity and the absence of native speakers, the study of these languages puts everyone on an equal footing, avoiding the danger of alienating one group or another. Latin in particular also has its advantage in facilitating (or being facilitated by) the learning of Romance languages which many European residents already speak and study. I dare say that classical education is a ticket to European identity, whether you are descended from settled European residents or, like myself, a newcomer from outside the European or Western cultural sphere.

Once again I am speaking from my own experience. I had the pleasure of teaching Greek at London University's summer school this year and the linguistic diversity of my students was a microcosm of Europe itself. Along with four white English speakers, I had a Chinese-British, a half-Swiss-half-Tunisian, a half-French-half-Dutch student, not forgetting that I myself as their tutor was a Japanese. It was a Greek language class, but our discussion was often enriched by the cultural and linguistic diversity that each of us brought to the classroom. By studying the past European heritage and considering how it has influenced our present together, we can all forge a new European culture, in conversation with the rich heritage of Greek and Roman past.

The intrinsic value of the Classics must be obvious to many of those educated in Europe and in the rest of the Western World. I am thinking here not only of the study of classical languages, but also of classical studies more generally, conducted in translated texts or visual and material sources, including Greek and Roman literature, history, philosophy, religion, art and archaeology. The richness and variety of human activities captured in literature, artefacts and architecture, the joy of encountering many fine minds, and, as already mentioned, the educational advantage of learning languages radically different to one's own, are but a few of obvious advantages.

In addition, as I have observed elsewhere,⁸⁸ the Classics is the basis of Western ways of thinking in which we *all* take part today, whether we are born into a 'Western' culture, or into a 'non-Western' culture which has recently begun to assimilate Western science, technology and political systems (e.g. democracy and socialism both of which have their origins in ancient Greece). We are all 'Westerners' now in one way or another. For those who live or come from outside the traditional sphere of the 'West', it is even more urgent a task to learn about Western civilisation, which we have let into our lives without fully understanding its dangers and potentials. This rationale for studying

⁸⁷ Yamagata (1997).

⁸⁸ Yamagata (1995).

the Classics of course applies to Europeans and other 'Westerners', too. By adopting ancient Greece and Rome as its spiritual ancestors, as it were, the Western civilisation has inherited their limitations and problems as well as their blessings. In order for all of us to know what sort of tools we are borrowing from the Greeks and Romans, we all must study the Classics. Precisely because of the acuteness of global problems brought about by our modern civilisation based on Western thinking, which dominates the world today in the forms of science, technology, politics, philosophy, religion, art, literature and many other things, we should all be studying its classical roots more rigorously than ever before. To study the Classics, in other words, is to understand why we think the way we do.

So far I have emphasised the global importance of studying the Classics, but as the alliance of European universities EADTU can make significant contributions to the higher and public education in Europe as well as the world beyond. The Classics is a subject on which many member universities should be able to contribute distinct parts to form a common curriculum, which learners across Europe (and indeed beyond) can study. Those of us based in the areas where the remains of Greek or Roman artefacts or architecture can be found could provide courses based on such local resources. One institution could provide Beginners' Latin, another Intermediate and yet another providing advanced Latin, for example.⁸⁹ Some courses may be short on-line free access courses without accreditation, which could be linked to accredited courses in the host institutions. We can make the Classics, often seen as elitist and only available to those in higher economic groups, available and accessible to a wider spectrum of citizens of Europe, raising their awareness of the legacy of classical antiquity within the Western world and beyond. As I hinted at above, the additional benefit of on-line courses studied across Europe will be the contributions from the diverse population of Europe each with their different experiences of reception of classical antiquity within their own country and culture. If we connect those learners by on-line forums, for example, we can facilitate cross-border collaboration of students, thinking together about the legacy of Homer which influences our perception of war and heroism, or that of Socrates who compels us to ask such questions as 'What is justice?' or 'What is knowledge?' and so on.

There has never been a better time to study Classics, thanks to the technology available to assist learners. Those of us who spent our student years lifting a mighty lexicon weighing 3 kg each time we had to look up one word in Greek or Latin can only marvel at the on-line parsing facility provided at Perseus Project hosted by Tufts University or the instant access to any word entry of Liddell and Scott Greek Lexicon via iPhone or iPad. These facilities are widely used by classics students, and should EADTU wish to develop its own classical curriculum, they can be utilised or something similar or parallel could be developed. OUUK also provides open-access interactive exercises for Beginners' Greek and Latin on the web and has the capability of developing such facilities further.

Open access courses and short lectures in classics are also proving popular, judging by the recent success of OUUK's course 'The Ancient Olympics: Bridging Past and Present'. Developed by Aarón Alzola Romero at OUUK, this five-hour introductory level course was uploaded in November 2011

⁸⁹ OUUK currently offers Beginners' Greek (174 students registered for 11/12), Beginners' Latin (369 students) and Intermediate Latin (199 students) as accredited courses. In addition each course has an accompanying free-access taster course called 'OpenLearn'.

and had 28,135 visits in its first four months and by June, with 57,000 visits, it was the most downloaded page on OpenLearn at OUUK. This course has won an award for excellence from the OpenCourseWare consortium. This may well be a one-off success riding on the back of London 2012 Olympics Games, but during the period between Oct 2011 and February 2012, another OU classics lecture, A History of Latin, attracted 4,176 visits. Although this is a much more modest figure, this seems to prove a remarkable level of interest in Latin in the public domain.

Another set of 'in-house' evidence of public interest in Classics that I can provide is the popularity of the YouTube mini-lecture series entitled 'Classics Confidential', hosted by the Classical Studies Department of OUUK. It consists of short interviews with classics specialists from within and outside of the OUUK and was started in March 2010. It now has 64 items to the listing and in total attracted 30,111 views to the end of July 2012. The very first item posted (by Phil Perkins on Etruscan DNA) has so far had 5,603 hits and the number is still growing. What is of particular interest to this conference may be the breakdown of visitors by geographical areas. The top five areas with most visitors are UK (10,169), United States (7,749), Canada (1,440), Italy (1,348) and Germany (1,014), followed by, with figures fewer than 1000, Greece (788), Australia (686), France (532), Spain (509), Netherlands (485), Turkey (370), Ireland (366), Belgium (269), Denmark (254), Israel (248), Sweden (242), Switzerland (218) and Brazil, (209). So although UK and the English-speaking countries make up a large majority, there is sizable interest in European countries, too. If we develop a multi-lingual curriculum as an alliance of European distance-teaching universities, we can hope to tap into this market, first to attract interest by open access courses, and possibly onto fee-paying accredited courses. If we devise a set of courses fit for informing European citizens of 21st century, we may also be able to attract public funding to support the running of such courses.⁹⁰

Such a pan-European Curriculum may be but a dream of an over-optimistic classicist, biased as I am. However, I firmly believe that this is a dream worth pursuing, especially knowing as I do the enormous potential of classical education which can empower anyone with the cultural treasures of Europe, deepening his or her understanding of the human world, and bring together those who share them.⁹¹

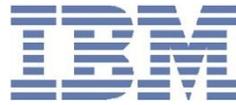
⁹⁰ It may also be relevant to add that OUUK's course in classical mythology (Myth in the Greek and Roman Worlds) attracted 1067 students in its first year (2010/11) and 750 in its second (2011/12), which has been an unprecedented success as a Classical Studies course at OUUK.

⁹¹ I would like to thank my colleagues at OUUK, Jessica Hughes, Laura Swift, Elton Barker, Derek Matravers and Liz Toone, for their help in putting this paper together.

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