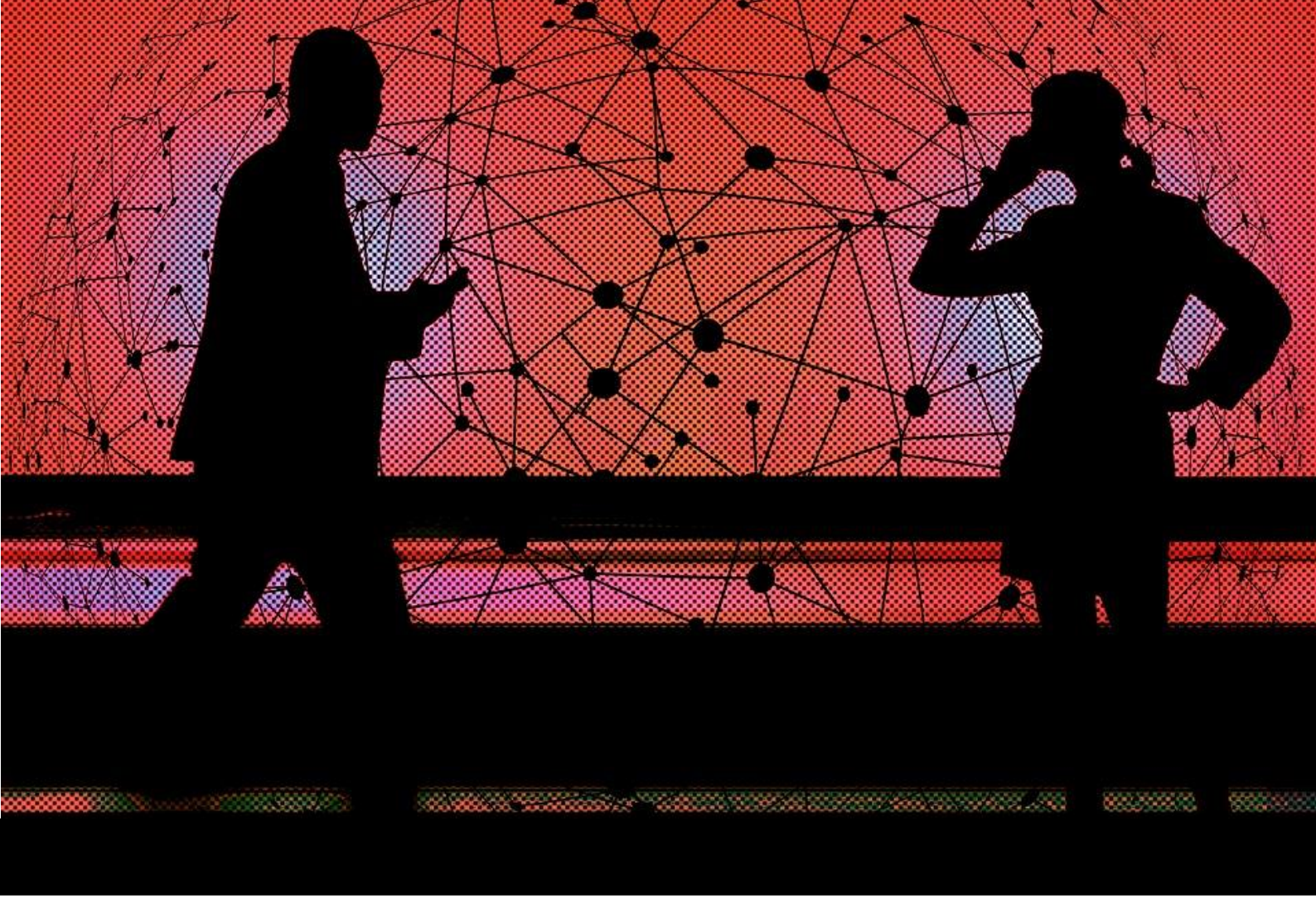


The Envisioning Report for Empowering Universities

3rd edition

April 2019

empower higher education

EADTU

Erasmus+

Editors
European Association of Distance Teaching Universities (EADTU) | George Ubachs

Logistics and lay-out
European Association of Distance Teaching Universities (EADTU) | Lizzie Konings
European Association of Distance Teaching Universities (EADTU) | Beau Nijsten

Authors
European Association of Distance Teaching Universities (EADTU) | George Ubachs
FernUniversität of Hagen (FernUni) | Cathrin Vogel; Noëlle Diegel
Ghent university (UGENT) | André Vyt
Hellenic Open University (HOU) | Rozita Tsoni; Elias C. Stavropoulos; Vassilios S. Verykios
The Open University of the Netherlands (OUNL) | Christian M. Stracke; Olga Firssova; Francis Brouns
The Open University of the United Kingdom (OUUK)| Andy Lane; Hilary Lindsay; Inma Alvarez; Jon Rosewell; Karen Kear
International Telematic University UNINETTUNO | Dario Assante
Universidade Aberta (UAB)| José Bidarra; Henrique Mamede
Universitat Oberta de Catalunya (UOC) | Gema Santos-Hermosa; Marcelo Maina; Lourdes Guàrdia; Sandrine Albert
Universiteit of Jyväskylä (JYU) | Päivi Kananen

Published by: European Association of Distance Teaching Universities, The Netherlands

Correspondence
European Association of Distance Teaching Universities (EADTU)
att George Ubachs, Managing Director
Parkweg 27, 6212 XN Maastricht, The Netherlands
Tel: +31 43 311 87 12 | E-mail: secretariat@eadtu.eu
www.eadtu.eu | empower.eadtu.eu

Suggested citation
Author(s) (2019) Title of paper. In G. Ubachs (Eds.) The Envisioning Report for Empowering Universities. (pp. Pages). Maastricht, NL: EADTU. Retrieved from https://tinyurl.com/envisioning-report-2019

Disclaimer
This research is conducted as part of the EMPOWER project. This project is supported by the European Commission, DG EAC, under the Erasmus+ Programme. The European Commission supports for the production of this publication and does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Co-funded by the Erasmus+ Programme of the European Union

Table of contents

The third envisioning report for Empowering Universities in the uptake of new modes of teaching and learning

Also this year, the expert pools of the EMPOWER programme by EADTU are delivering the Envisioning report to cover the latest trends and developments in new modes of teaching and learning. Innovations in education create new opportunities for enhancing the quality of the learning experience in on campus programmes, reaching out to new target groups off campus and offering freely accessible courses nationally or worldwide through the internet. This to enhance the quality of offerings as well as the visibility and reputation of the institution.

Certainly, innovation should be organised within the institutional framework and strategies to have sustainable impact. Next, it cannot be successful without a strong motivation of a professional teaching staff and without a continuous commitment from the top management of a higher education institution. New initiatives represented in the envisioning report reflect these efforts by EADTU member institutions in an easily accessible format with clear indication of the innovative impact.

The EMPOWER expert pools are working in all relevant areas for the development of new modes of teaching and learning. For this third edition the expert contributions mainly focus on learning analytics, continuous professional development, OER as outputs of research projects, Open learning activities by institutional repositories, challenges and good practices in European Short Learning Programmes, framework for the Development of Researching professionals, Blended Education Artificial Intelligence, Blockchain in Online Education and Student Support Studying in a Virtual Mobility Context.

The Envisioning report is part of a series of actions within the EMPOWER initiative of EADTU. EMPOWER is further supporting individual universities by on site expert seminars with free independent advice, onsite and online webinar weeks, guidance for university leaders, expert panels for targeted reviews and, support for whole of institution initiatives. Further, EMPOWER hosts the Empower Online Learning Leadership Academy (EOLLA) on new and emerging models of teaching and learning and staff training sessions that can all be found under https://empower.eadtu.eu/.

We certainly believe also this third edition of the EMPOWER Envisioning Report is an inspiration for many to further innovate education and start cooperation and sharing of expertise with fellow innovators.

George Ubachs
Managing Director EADTU

Continuous Education / CPD

Marcelo Maina, Lourdes Guàrdia & Sandrine Albert

Universitat Oberta de Catalunya, Spain

Good practices in European Short Learning Programmes (E-SLP)

Innovative impact

The E-SLP project fosters collaborative inter-institutional curriculum designs. The outcome of these collaborations can be SLPs built from scratch or as puzzles (collection of existing learning building blocks). One of the consequences of international collaborative design is that it introduces distinct working practices and therefore requires teams to set innovative processes. It also brings opportunities from each institution to exchange policies and triggers new consensus. Furthermore, it requires harmonisation of recognitions and accreditations, which in turns prompts innovatory agreements.

In the long term, these innovations could conclude in a normalisation and generalisation of international and interuniversity programmes.

Introduction

European educational institutions are developing short programmes to meet evolving needs in society. New target groups, learning approaches or market requirements are triggering a demand for innovative short learning programmes. As part of the "European Short Learning Programmes" (E-SLP) project lead by the EADTU, we undertook, in 2018, a qualitative analysis of existing SLPs amongst the project's partners' institutions. This study concluded in a "Compendium of good practices" which details patterns of good practices in the design of SLPs. The project addresses the implementation of short learning programmes as a main part of continuing education / continuous professional development and lifelong learning policies.

About SLP

Short Learning Programmes (thereafter SLPs) are short academic programmes with a sequenced set of courses (units, modules or other learning building blocks) representing a learner's total study requirement and usually leading to an award on successful completion. Their main characteristics can be detailed as followed: an EQF Level between 4 to 8 (foundation, bachelor, master and doctoral level); a study time from 5 to 60 ECTS; an inter-institutional or joint recognition, preferably accredited and bearing some relation to formal degrees or to HEIs. For example, they can be used as stackable elements of larger formal degrees; with a common subject focusing on specific needs in society - they can be market driven; targeting non-traditional and adult learners who combine work and study or learn for personal development; online or blended learning programmes. They must be flexible and scalable.

Aim of the compendium of good practices

The "Compendium of good practices" has the objectives of establishing a state of affairs of the characteristics of the SLPs on offer, of identifying patterns of good practices and of assessing the improvements necessary in their design. The aim was to produce an index of good practices, which can be used as examples to inspire and structure new SLP designs.

Procedure and participants

In order to gather the information necessary to determine these good practices the participating universities *(Università Telematica Internazionale UNINETTUNO, KU Leuven, Universidad Nacional de Educación a Distancia, Open University of University of Jyväskylä,*

Comparable examples

The recent EADTU report "The Changing Pedagogical Landscape" highlights the move of the European universities towards continuous education, Lifelong Learning and open education, enabled by new technologies and strategic positioning in a networked economy and society. It shows new modes at curriculum / programme level: "OERS supporting blended and online programmes; dual mode programmes; joint degrees with elements of online and distance education; regional mergers and curriculum collaboration/ integration; and fully online programmes". Our project provides comprehensive examples of existing practices in curriculum design targeting these issues.

Henderikx, P., & Jansen, D. (2018). *The Changing Pedagogical Landscape: In search of patterns in policies and practices of new modes of teaching and learning*. The Netherlands: EADTU.

References

Buus, L., & Georgsen, M. (2018). A Learning Design Methodology for Developing Short Learning Programmes in Further and Continuing Education. *Journal of Interactive Media in Education, 2018* (1), 8. DOI: http://doi.org/10.5334/jime.469

EADTU (2016). Memorandum of Understanding (MOU) - *Between the European open and distance teaching universities on Short Learning Programmes.*

O'Neill, G. (2015). *Curriculum design in higher education: theory to practice.* Dublin: University College Dublin. Teaching and Learning.

Kaunas University of Technology, Universitat Oberta de Catalunya, Hellenic Open University, Universidade Aberta (Portugal), Anadolu University, AGH University of Science and Technology in Cracow, Poland, Open University Netherland) were asked to answer a written survey about the design practices of two SLPs of their choice. Thus providing information on a total of 22 SLPs. These SLPs were selected as they corresponded best to the definition adopted within the project.

The survey was elaborated to cover a broad range of design issues, which were selected from the project description. Further items were gathered from the following references: "Quality Assessment for E-learning: a Benchmarking Approach (European Association of Distance Teaching Universities - EADTU - George Ubachs)", "Curriculum Design in Higher Education: Theory to Practice (O'Neill, 2015)" and the "JISC the Design Studio".

The survey covered two main areas of inquiry: Short Learning Programme design and Learning Building Block design (LBB), a concept developed within the project referring to a separate and coherent self-content block of learning, organised around consistent learning outcomes. The programme design section of the survey focused on educational philosophy, learning and teaching strategies, programme structure and sequencing, while its second section dealt with instructional engineering parameters, support and contributors, as well as technical parameters.

Results

The "compendium of good practices" dresses a picture of the current situation of SLPs in Europe amongst participating partner institutions. The information gathered from the survey has enabled gaining specific information on practices, which we contrasted with the project's aims to reveal the good practices.

The "Compendium of good practices" shows design trends (focusing on target groups, flexibility / scalability, accessibility and innovation) and unique features, in existing short learning programmes, which make possible the reach of this project's goals. Amongst the most relevant patterns of good practices, which have emerged from this study, is the availability of a set of SLP targeting lifelong learners, thus answering to one of the project's priorities. The possibility of scalability of SLPs, by increasing or decreasing the number of learners, generally achieved through the organization of learners into clusters, is also recurrent among the documented programs. One noteworthy feature, which has come up, is the relation of a good number of existing SLPs with societal and market requirements. Many pedagogical teams call upon benchmarking and industry / ministry reports to insure the adequacy of their offer or involve key market actors into the design and delivery process. Market players engage sometimes in curriculum auditing and play an encompassing role ensuring the SLP relevance across time, by means of regular feedbacks and reviews.

The study also revealed patterns of good practices which include real situations and experiences, learners' reflexion and elaboration of new solutions, collaborations and peers / experts / tutors interactions in the design process. There is also a tendency to include non-formal and suggest informal learning activities in the learning process. A certification is generally issued, whether accredited or not, and in some cases recognised by other institutions. Certificates range from professional certifications, short programme certificates (certification of attendance or completion) to credit allocations.

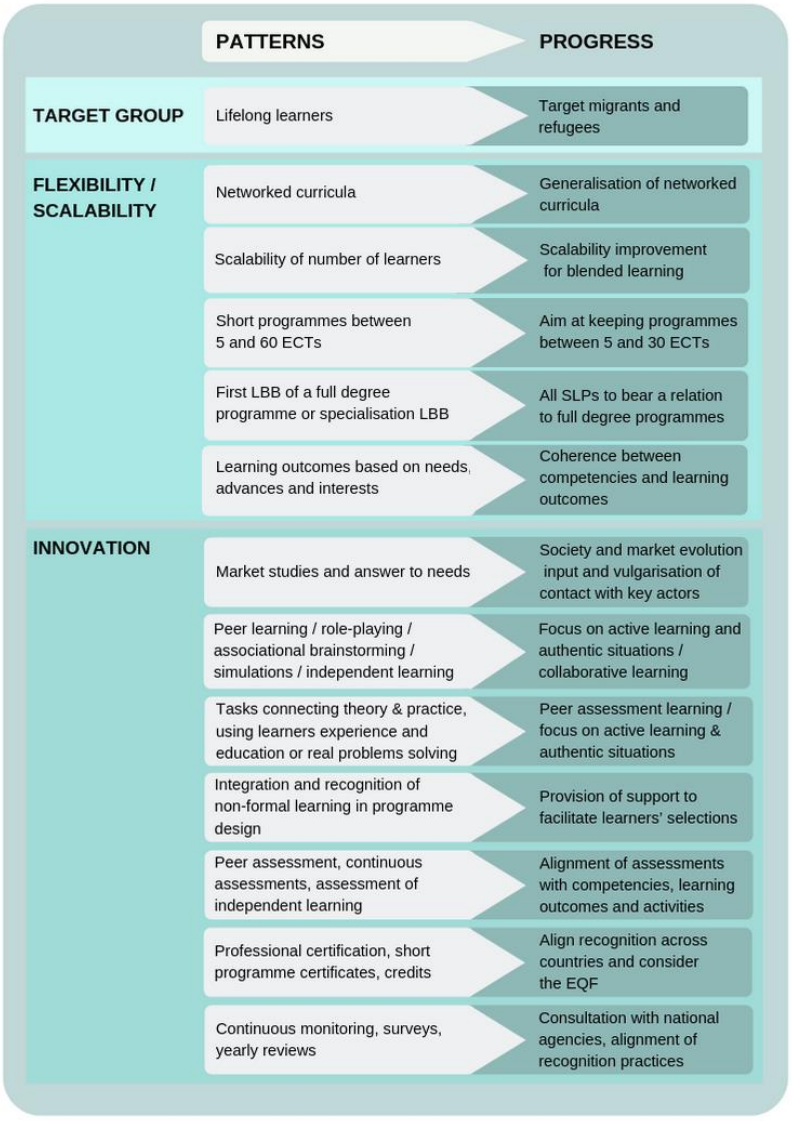
A prominent feature of the E-SLP project is the inter-institutional

Ubachs G. (coord.) (2016). *Quality Assessment for E-learning: a Benchmarking Approach (3rd ed.).* The Netherlands: EADTU.

Ubachs G. (coord.) (2012) *NetCu Handbook: Guidelines for organising networked curricula.* The Netherlands: EADTU.

creation of SLPs. A few examples of collaborative approaches have emerged in the forms of partnerships, of the recycling of LBBs from other programs or of contents being reused from existing programmes with or without adaptation; however, inter-institutional co-creation is not yet a well-known practice.

Overview of patterns of good practices



Conclusion

The study has provided an overview of the current situation amongst partners through a selection of SLPs good practices. It revealed a promising background for advancement and helped to identify key issues related to improvements required to reach the project's objectives of co-design and delivery of inter-institutional SLPs for continuous professional development across Europe and beyond.

Dario Assante

Università Telematica Internazionale UNINETTUNO

Smart online training experiences in the area of Industry 4.0

Innovative impact

Erasmus+ is actually the main European program supporting the realization of educational initiatives and the creation of networks for the sharing of knowledge.

Being innovation in education a pillar of Erasmus+ program, the project are also an opportunity to develop and experiment new teaching methodologies, new supporting tools and new didactic approaches.

This short document briefly describes the innovative aspects of some Erasmus+ projects in the area of Industry 4.0. Innovative aspects are:

- use of the PBL methodology in a distance learning context;
- adaptive learning methodologies;
- digital tools for the transnational recognition of qualifications and competences;
- virtual and remote labs in technologies related to Industry 4.0.
- last but not least, education of Industry 4.0, being the contents and context new and continuously evolving.

For more details, please refer to the project websites listed in the next pages.

Introduction

Industry has a key role in each country economy, providing qualified and stable jobs and having a big multiplier impact on commerce and service sectors. Nowadays, the Industry 4.0 model seems to an essential key for ensuring the companies' competitiveness. It provides gains in operational efficiency, cost reduction, quality improvement, optimisation of the manufacturers-consumers' communication, major competitiveness and profits. The Industry 4.0 paradigm implies the adoption of new technologies (such as Big Data, Internet of Thing, Artificial Intelligence, Cloud Computing, Machine Learning, Augmented Reality, etc.) and radical changes in the company organization, being the horizontal and vertical integration new pillars of the digital company. New business models and opportunities arises, but also new risks (mainly related to cybersecurity issues). New skills and competences are required for managers and employees, and new professional profiles are needed. According to a recent World Economic Forum analysis, the "Digital Transformation Specialists" and the "New Technology Specialist" will be two of the top 10 most requested jobs in 2022. This implies, in a European context, the need to train or retrain millions of employees, professionals and managers to the use and management of the 4.0 technologies.

A new education challenge has to be faced, and a transnational approach is essential, due to the transnational nature itself of the digital companies. Although the difficulty to provide training program on continuously evolving technologies and models, Universities and VET centres are upgrading their education offers to respond to the labour market needs.

Samples of European training initiatives in the context of Industry 4.0

The European Commission has supported through several initiatives the adoption of the Industry 4.0 model and the diffusion of the related technologies. In particular the Erasmus+ program, even if not specifically focused on such topics, has funded different initiatives sustaining the digital skills education in the context of Industry 4.0. The International Telematic University UNINETTUNO has been involved in several of them, here briefly introduced. All of them have adopted a MOOC based approach. Additionally, it is worth noting that each of them, apart from the specific topic, has tried to introduce innovative methodologies to enhance the students' involvement, the didactic impact or the efficiency of the training program.

Online resources

European catalogue of national initiatives on Industry 4.0: https://ec.europa.eu/futurium/en/content/digitising-european-industry-catalogue-initiatives

INNORESOLVE project website: http://innoresolve.ffeuskadi.net

IoT4SMEs project website: http://www.iot4smes.eu

MeMeVET project website: http://www.memevet.eu

IN-CLOUD project website: http://www.learn-in-cloud.eu

IoE-EQ project website: http://www.ioe-edu.eu

References

D. Assante, M. Castro, I. Hamburg, S. Martin, "The Use of Cloud Computing in SMEs", Procedia Computer Science vol. 83, pp. 1207-1212, 2015. DOI: 10.1016/j.procs.2016.04.250

S. Martin, D. Assante, I. Hamburg, A. Owens, R. Tavio Gallo, K. Konstantinou, A. Pascoal, M. Spatafora, M. Castro, "The role of VET certifications in MOOCs", EDULEARN Conference, Barcelona, 2017.

D. Assante, C. Fornaro, E. Weitschek, M. Castro, S. Martin, I. Hamburg, A. Owens, R. Tavio Gallo, K. Konstantinou, S. Stekoulis, A. Pascoal, C. Reis, M. Spatafora, A.M. Cotovanu,

INNORESOLVE Project

INNORESOLVE - PBL Training for managers to face the Foundry 4.0 challenges (pr. n. 2017-1-ES01-KA202-037932) has been funded in the framework of the Erasmus+ programme – Strategic Partnership. The project aims to transfer the benefits of the digital revolution within the Foundry industry. Thus, it focuses on Foundry industry top and intermediate managers to make them ready to face the Foundry 4.0 challenges. Secondary targets are also sectorial organizations that support management training, policy makers and stakeholders in the Foundry sector. The main project outcomes are:

- InnoResolve PBL collaborative e-learning training: a training program based on PBL methodology. Such training aims to provide required skills and promptly enable management in Foundry industry to cope with the increasingly demanding industrial environment.
- InnoResolve Support Guide: a guide about the new challenges of Foundry in partners countries and a collection of good practices and case studies of Foundries 4.0.

Innovative didactic aspect: the adoption of the Project Based Learning (PBL) methodology in a distance learning context is proposed to engage the Foundry managers in problems directly connected to their daily activity. Such experience is highly challenging since the PBL methodology is commonly adopted just in presence, due to the need to let learners interact to reach the didactic goal.

IoT4SMEs Project

IoT4SMEs – Internet of Things for European Small and Medium Enterprises (pr. n. 2016-1IT01-KA202-005561) has been funded in the framework of the Erasmus+ programme – Strategic Partnership. IoT4SMEs aims to facilitate the exploitation and diffusion of the Internet of Things (IoT) at European level. IoT not only has a huge social impact, but can also support the employability and boost the competitiveness of European companies. The European Commission has recognized the importance of the IoT technology for the competitiveness and modernization of the European enterprises, for the economic growth and employability in the European area. The IoT4SMEs proposal intends to operate pursuing the European policies on IoT and according to the Digital Single Market pillars, with the main objective of qualifying new professionals able to support the digital transformation of the European companies exploiting to the advantages offered by the IoT technology. This objective is reached by pursuing the specifically objectives of:

- raising awareness among European Small and Medium Enterprises of the IoT technologies and applications and of the potential benefits for their competitiveness and economical growth;
- creating VET qualifications for professionals inside European Companies, enhancing their digital competences and training them to introduce and manage IoT technologies and applications.

Innovative didactic aspect: the project offers a balanced mix of theoretical concepts (videolessons), real examples (interviews and showcases), guidelines (handbook) and practical activities (didactic demonstrators), fully online.

"Smart open online tool for adaptive education on Cloud Computing", IEEE EDUCON 2017, Athens, 2017. DOI: 10.1109/EDUCON.2017.7942998

D. Assante, E. Romano, M. Flamini, M. Castro, S. Martin, S. Lavirotte, G. Rey, M. Leisenberg, M.O. Migliori, I. Bagdoniene, R. Tavio Gallo, A. Pascoal, M. Spatafora, "Internet of Things education: Labor market training needs and national policies", IEEE Global Engineering Education Conference (EDUCON 2018), pp. 1846-1853, 2018. DOI: 10.1109/EDUCON.2018.8363459

S. Martin, M. Castro, D. Assante, "OERs for improving European SMEs competitiveness: From video-lectures to remote labs", IEEE Global Engineering Education Conference (EDUCON 2018), pp. 1846-1853, 2018. DOI: 10.1109/EDUCON.2018.8363405

D. Assante, A. Caforio, M. Flamini, E. Romano, "Smart Education in the context of Industry 4.0", IEEE Global Engineering Education Conference (EDUCON 2019), pp. 1846-1853, 2019.

MeMeVET Project

MeMeVET - Mechatronics and metallurgical VET for the sectors' industries (pr. n. 591854-EPP-1-2017-1-DE-EPPKA2-SSA) has been funded in the framework of the Erasmus+ programme – Sector Skills Alliances. The MeMeVET project addresses the mechatronic and metallurgy sectors, that are very relevant in the European market. The project aims to boost the employability, developing a transnational curriculum focused on mobility and providing an innovative digital tool that will make easier the movement of students and workers. Once concluded, the project would foster the activation and delivery of the common curricula.

Innovative didactic aspect: the design and development of the "e-card", a digital wallet for the easier transnational recognition of competences, qualifications and expertise.

IoE-EQ Project

IoE-EQ – Internet of Energy: Education and Qualification (pr. n. 2017-1-IT01-KA202-006251) has been funded in the framework of the Erasmus+ programme – Strategic Partnership. The project aims to train professionals able to bring the benefits of the digital transformation into the energy sector, ranging from smart devices and home automation to complex smart grids and smart devices. The main outcome is a set of online training courses, associated to professional qualifications defined according to the e-CF3.0 standard, complemented by a wide set of additional didactic materials.

Innovative didactic aspect: one of the first MOOC courses in the energy sector, integrating theoretical concepts (video lessons), real examples (webinars), practical activities (virtual and remote labs) and support tools (handbook), fully online.

IN-CLOUD Project

IN-CLOUD - Innovation in the Cloud bridging Universities and Businesses (pr. n. 2015-1-IT01-KA202-004733) has been funded in the framework of the Erasmus+ programme – Strategic Partnership. The IN-CLOUD project intended to operate pursuing the objectives of the European Cloud Computing Strategy, with the general objective of fostering a partnership between Higher Education and the corporate sector, qualifying new professionals able to boost the competitiveness and growth of European Companies and Universities, thanks to the advantages offered by the cloud technologies. The main outputs of the projects have been the definition of professional qualifications on Cloud technologies based on the ECVET model and an online training course on Cloud technologies addressing the business sector, the public administration and the educational sector. Due to the quality of the results, the project has awarded of the "Good Practice Example" and "Success Story" labels in the EU project result portal.

Innovative didactic aspect: the creation of an open online adaptive learning tool, able to assess the users' behaviours and suggest customized learning activities fitting the users' specific needs.

OER

Andy Lane

The Open University

OER as outputs of research projects

Innovative impact

There many ways in which research projects can have impact. One is to be incorporated into teaching programmes for higher education students which can be done quickly by researchers including their own research in their own teaching. For teachers using the research of others this takes longer as they have to await formal publication in journals and reports. Creating online courses are OER as part of the research project means that finding are disseminated more widely and also in a form which can be more readily studied. This can also open up interactions between researchers and learners.

Introduction

Open educational resources (OER) primarily arise from human activity systems with teaching about current knowledge and skills as their purpose. Research articles and other outputs (open access or otherwise) primarily arise from human activity systems with discovering new knowledge and skills as their purpose, including educational processes and practices (Corral and Pinfield, 2014). While some of those research outputs can be used within teaching 'as is', they are not specifically aimed at supporting learning. However it is becoming more common to devise research programmes where creating open educational resources are a defined output. This paper explores the advantages and disadvantages of creating OER in this way.

The interplay between teaching and research

Teaching and research are both academic pursuits carried out in higher education institutions, and related organisations. The fundamental purpose of these pursuits (sharing knowledge and skills and creating knowledge and skills respectively) are different and this difference is often supported by separate funding streams, contracts of employment, promotion criteria etc. However there are many ways in which teaching and research overlap to influence or reinforce each other.

Research-informed teaching

All teaching should be informed by the research in the discipline being taught. Most educational programmes are based on teaching a body of knowledge and skills derived from published research and scholarship although done so through the choices and perspectives of the teacher(s) involved. This is exemplified by referencing or quoting from the appropriate literature whether that be done so in a prescribed text book, reading lists on a VLE, references at the end of an open, online course, etc. As already noted the actual research and the way it is presented and discussed within an educational programmes is decided by the teacher(s) and at one end of a spectrum that teacher may also be the researcher whose research informs the teaching (Masterman, 2016). In this case the research informing the teaching may be very recent and very pertinent to the educational programme, thus giving students insights into how knowledge and skills are constantly evolving from a noted authority.

Research-led teaching

The teacher/researcher/student relationship can be further bridged by involving students within the researching process as a part of their studies (in effect becoming 'co-researchers'). This can be done in many ways, for example, through the teacher supervising students doing a mini research project as part of their degree; through students helping collect or analyse data for a grant funded research project where the

References

Caird, S., Lane, A., Swithenby, E., Roy, R. and Potter, S. (2015) Design of higher education teaching models and carbon impacts, International Journal of Sustainability in Higher Education, Vol. 16: 1, pp.96 – 111.

Corrall, S., & Pinfield, S. (2014). Coherence of" open" initiatives in higher education and research: Framing a policy agenda. IConference 2014 Proceedings.

Masterman, E. (2016). Bringing open educational practice to a research-intensive university: Prospects and challenges. Electronic Journal of E-Learning, 14(1).

teacher is an investigator; or through students being subjects within the research project.

Teaching practices as the research subject

Educational research can put students in the role of subjects of research projects investigating educational process and practices but they can also be the beneficiaries of latest findings into the most effective teaching practices arising from educational research. However it is more usually subsequent student cohorts, not those involved as research subjects that benefit from such research, unless they are 'co-researchers' as noted above.

Educational resources as outputs of research projects

The previous models usually operate in fairly 'closed' situations within formal taught programmes of study within place based environments. The advent of open licences, open access publishing and open educational resources (OER) has supported teaching and researching practices being enacted with, or reported more openly to, a wider set of learners or participants than previously. This has happened alongside a growing culture of making research contribute directly to real world problems (through participatory action and/or trans-disciplinary research), through engaging people with research (such as citizen science), and through finding new means to derive and measure impact from research findings. In the latter case OER, as open, online courses, can be direct or indirect outcomes from funded research projects.

Two case studies

In this section I briefly outline two research projects where open, online courses were/are unplanned and planned outputs.

SusTEACH

SusTEACH (Sustainable Tools for the Environmental Appraisal of the Carbon impacts of Higher Education Teaching Models using ICTs) involved a team of 3 researchers (including myself), which ran from 2010 to 2012 and was funded by the then Joint Information Systems committee (JISC) in the UK. The increasing use of information and communication technologies (ICTs) has led to innovative, online models of teaching across higher education but also raised questions about whether these models have better or worse environmental impacts than more traditional face-to-face and distance teaching models. The SusTEACH project involved a carbon-based environmental assessment and data analysis of 30 Higher Education courses and modules, across UK institutions that used a range of teaching models.

We found that the main sources of carbon impacts in HE teaching models were associated with travel, residential energy consumption and campus site operations. However, the use of online and ICT enhanced teaching delivery methods and traditional distance teaching methods reduced these sources of energy consumption and therefore achieved significant carbon reductions (Caird et al, 2015).

Building on these findings, an innovative SusTEACH toolkit was designed to support the planning of more sustainable courses and programmes as part of the formal project. However, we were also able to secure internal Open University funding to present these tools and other findings as a self-study open, online course on the OU's OpenLearn platform called The environmental impact of teaching and learning, thus providing a novel form of project output beyond the several journal articles and book chapters that were also published (to date there have been 246 enrolled learners and 67 statements of participation awarded with thousands more having visited the course).

AgriLink

AgriLink (Agricultural Knowledge: Linking farmers, advisors and researchers to boost innovation) is an EU Horizon 2020 research and innovation programme project running from 2017 to 2021 and involving 16 organisations from 14 countries. The goal of AgriLink is to stimulate transitions towards more sustainable European agricultures by i) furthering the understanding of the roles played by a wide range of advisory organisations in farmer decision-making and ii) enhancing their contribution to learning and innovation. This will be achieved through cutting edge research which develops a number of innovative approaches in 26 Focus Regions, analysis of the governance of farm advisory systems, sociotechnical scenario development, and six 'Living Laboratories' (Living Labs) where farmers, advisors and researchers develop and test together innovative advisory tools and methods.

The work on the Living Labs includes a web-based engagement strategy, that I have responsibility for, to realise interactions and share learned lessons with stakeholders beyond the project. The web-based strategy sets out how we intend to capture and present findings of the participatory action research process through blog posts, reflective journals, podcasts, diagrams and animations, as well as more traditional written reports and open days. These outputs will eventually be combined and synthesised into distance learning materials presented as an open online course on how to set up and run a Living Lab. Thus the creation of an OER has been a defined deliverable within the project from the outset.

Conclusion

It can be easy to think of OER as primarily the outputs of teaching and yet there is just as much scope for them to be the planned outputs of research. The two examples I give here show an earlier one where there were openly available resources as planned outputs which we were fortunately able to further use within an open online course. In the case of the more recent project, the development of an open, online course has been planned in as defined output. This has been made more possible by open licensing, open access publishing and open educational resources and is a trend that is likely to grow.

Gema Santos-Hermosa

Universitat Oberta de Catalunya (UOC)

Open learning activities in Spanish institutional repositories

Innovative impact

Currently, the most widespread OER are open textbooks, which are seen as a solution to the access and affordability (Hilton, 2016). However, other less prominent OER, such as learning activities and assignments, have been gaining popularity. These assessment resources (together with essays, quizzes, tests, exams, etc), have been identified in OER repositories (Santos-Hermosa, Ferran-Ferrer & Abadal, 2017).

While educational repositories, such as OER Commons, include specific categories for learning activities and large amounts of them, this kind of OER is a rare find in institutional repositories.

For instance, in the Spanish institutional repositories (REBIUN, 2019) the assessment activities only represent 26.4% of the total number of OER, a small percentage when compared with the more common type: classroom materials(over 60% of the total).

Of this small percentage of Spanish institutions with learning activities collections, the case of the Universitat Oberta de Catalunya (UOC) is the most recent. For the first time, the UOC's institutional repository, O2, includes four collections of continuous assessment activities. This is thanks to a pilot test run with the Faculty of Economics and Business with the support of the Library.

Learning activities as an essential part of OER

According to UNESCO (2002), open educational resources (OER) are any type of educational materials that are in the public domain or introduced with an open license; they range from textbooks to curricula, syllabi, lecture notes, assignments, activities, tests, projects, audio, video and animation.

Currently, the most widespread OER are open textbooks, which are seen as a solution to the challenges of traditionally published textbooks, such as access and affordability (Hilton, 2016). However, other less prominent OER, such as learning activities and assignments, have been gaining popularity. These are considered an essential part of OER and can be defined as actions carried out by actors participating or interacting in learning processes (Avila Garzon, 2018).

Some appealing examples are open networked activities, such as wikis and web blogs (Ferran-Ferrer, Vaquer-Suñer, Bonich & Santos-Hermosa, 2012), WebQuests (Sadaghien & Marandi, 2016), with-video assignments (Pappas, Giannakos & Mikalef, 2017). Other "traditional" and more knowledge-focused learning activities that require mainly analytical and synthetic strategies, but less active engagement with content and network, also have meaning for students (Negovan & Osiceanu, 2012).

This emergence of open learning activities and assignments may be due to the adoption of the massive open online course (MOOC) model in many universities and the need for follow-up tasks and tools to assess the learning process (Jaramillo-Morillo, Solarte Sarasty, Ramírez González & Pérez-Sanagustín, 2017). Another reason could be the empowerment of learners as co-producers on their lifelong learning process (Geser, 2007) and the conceptualization of open educational practices (OEP) in relation to the collaboration, co-creation and open assessment of learning (Koseoglu & Bozkurt, 2018).

As for the creation of open activities – and any other kind of OER – this involves the participation of different actors. According to Lane and McAndrew (2010), teachers play the main role in the design of teaching activities, experiences or modules. However, OER producers are not just the designers or creators of OER but also those who interact with these resources (Thoms & Thoms, 2014). In this sense, academic staff and librarians act as producers as well, since they are responsible for creating educational resources that are included in educational repositories (Atenas-Rivera et al., 2012).

Therefore, academic staff, managers and institutions support the work of teachers as the main creators of OER by defining open policies,

References

Atenas-Rivera, J., Rojas-Sateler, F. & Pérez-Montoro, M. (2012). Repositorios de recursos educativos abiertos. *El Profesional de La Información*, 21(2), 190–193.

Ávila Garzón, C (2018). Tracing the creation and evaluation of accessible Open Educational Resources through learning analytics. Tesis Doctorales en Red. Universitat de Girona.

Butcher, N. (2011). A Basic Guide to Open Educational Resources (OER).

European Commission (2013). Analysis and mapping of innovative teaching and learning for all through new Technologies and Open Educational Resources in Europe.

Ferran Ferrer, N., Vaquer-Suñer, C., Bonich, M., & Santos-Hermosa, G. Engaging students in an e-learning experience: how to manage information resources through wikis and web blogs. Institutional Repository (O2). Universitat Oberta de Catalonia.

Geser, G. (2007). Open educational practices and resources: OLCOS Roadmap 2012. Salzburg, Austria: EduMedia Group.

Hemingway, A, Angell,C.,& Heller, R.F.. (2011) An emerging model for publishing and using open educational resources in public health. *Perspectives in Public Health*, 131 (1), 38-43.

Hilton, J. (2016). Open educational resources and college textbook choices: a review of research on efficacy and perceptions. *Educational Technology Research and Development*, 64(4), 573-590.

Jaramillo-Morillo, D., Solarte Sarasty, M., Ramírez González, G. & Pérez-Sanagustín, M. (2017). Follow-Up of Learning Activities in Open edX: A Case Study at the University of Cauca. In: Delgado Kloos, C., Jermann, P., Pérez-Sanagustín, M., Seaton, D. & White, S. (eds). Digital Education: Out to the World and Back to the Campus. EMOOCs 2017. Lecture Notes in Computer Science, vol. 10254. Springer, Cham.

Koseoglu, S. & Bozkurt, A. (2018). An exploratory literature review on open educational practices. *Distance Education*, 39 (4), 441-461.

making decisions or launching OER initiatives.

Repositories as OER initiatives

For years, educational resources have been created with a wide variety of tools. Although openness in OER does not depend on the technology, some studies have mentioned the role of different platforms for supporting creators of OER (Hemingway et al., 2011). For instance, educational repositories provide support for dissemination and other collaborative tasks by allowing users to create, edit, share and asses OER.

Therefore, outside the classroom and as extra support, repositories can be environments in which students and teachers access OER, use them and provide feedback for the author to improve the learning content and activities (Avila Garzon, 2018).

The European Commission (2013) has reiterated that improving the visibility of good-quality OER produced in the EU by 2020 should be achieved through the development of open digital repositories of OER using investment funds.

Currently, a wide range of educational resources has been identified in OER repositories, including assessment materials (activities, essays, quizzes, assignments, tests, exams, etc) (Santos-Hermosa, Ferran-Ferrer & Abadal, 2017). While educational repositories, such as OER Commons, include specific categories for learning activities[1] ("Activity Lab" and "Assignment") and large amounts of them, this kind of OER is a rare find in institutional repositories.

Although we could assume that educational features are more present in OER-exclusive repositories, which are created to meet educational needs, most available OER repositories are institutional – mainly created by universities and government bodies (Butcher, 2011). Accordingly, here we consider the collection of OER in higher education institutional repositories and, more concretely, in the Spanish ones.

Spanish institutional repositories

The repositories working group within the Spanish Network of University Libraries (REBIUN) has recently published a report about the situation of OER (REBIUN, 2018) which concludes that Spanish universities are showing interest in publishing the educational resources they create, although the vast majority do not have specific policies regarding this issue.

In 77.4% of the cases, these resources are published in open access in the institutional repository. These are followed by other open platforms such as OpenCourseWare and consortium repositories, among others (MOOCs, blogs, video channels, etc).

Similarly, the study points out that assessment activities only represent 26.4% of the total number of OER, a small percentage when compared with the more common type: classroom materials, which account for over 60% of the total. Finally, as for open Creative

Lane, A. & McAndrew, P. (2010). Are open educational resources systematic or systemic change agents for References 179 teaching practice? *British Journal of Educational Technology*, 41(6), 952–962.

Lidice, A. & Saglam, G. (2013). Using Students' Evaluations to Measure Educational Quality. *Procedia - Social and Behavioral Sciences*, 70, 1009–1015.

Negovan, V. & Osiceanu, M.-E. (2012). Does the type of seminar activities differentiate undergraduate psychology students' learning outcomes? *Procedia - Social and Behavioral Sciences*, 33, 850–854.

Pappas, I.O., Giannakos, M.N. & Mikalef, P. (2017). Investigating students' use and adoption of with-video assignments: lessons learnt for video-based open educational resources. *J Comput High Educ* (2017) 29: 160.

REBIUN (2019). Recursos educativos abiertos: estado de la cuestión y pautas para su impulso en las universidades españolas.

Sadaghian, S., & Marandi, S. S. (2016). Using WebQuests as Idea Banks for Fostering Autonomy in Online Language Courses. *Research-Publishing.Net*, 2016.

Salam, S. (2017). Developing Needs Analysis-Based Reading Comprehension Learning Materials: A Study on the Indonesian Language Study Program Students. *Advances in Language and Literary Studies*, 8(4), 105–113.

Santos-Hermosa, G., Ferran-Ferrer, N., & Abadal, E. (2017). Repositories of Open Educational Resources: An Assessment of Reuse and Educational Aspects. *The International Review of Research in Open and Distributed Learning*, 18(5).

Thoms, J. J. & Thoms, B. L. (2014). Open educational resources in the United States: Insights from university foreign language directors. *System*, 45, 138–146.

Commons licenses, 62.2% of repositories use the most restrictive form (BY-NC-ND), followed by BY-NC-SA, with others using the more permissive versions (BY and BY-SA).

Learning activities at the UOC's institutional repository, O2

Of the small percentage of Spanish institutions with learning activities collections, the case of the Universitat Oberta de Catalunya (UOC) is the most recent.

For the first time, the **UOC's institutional repository, O2,** includes four collections of continuous assessment activities. This is thanks to a pilot test run with the Faculty of Economics and Business with the support of the UOC Library. The faculty-librarian collaboration consisted in teachers taking the role of creators and pioneers in publishing this kind of resource, and librarians being responsible for assigning metadata and depositing them in the repository.

The new collection of learning activities includes forty items in total, which correspond to fifteen assignments taken from nine different courses and covering subjects such as marketing, microeconomics and accounting. These assignments are available in open access and in two languages. They are taken from past semesters and some also include the answer sheet.

"Our assessment model allows our students to better their skills", stated the dean of the Faculty of Economics and Business, Àngels Fitó. In this regard, "providing continuous assessment activities from past semesters bears out our assessment processes' educational potential", she added.

In addition, this current Faculty of Economics and Business pilot trial has also been able to answer some student requests to access past tests as a learning model. At this juncture, it is obvious that students have a great impact on shaping universities' vision and encouraging them to adapt and improve their services (Lidice & Saglam, 2013).

Finally, this pilot will help the UOC move forward in its aim to open up knowledge to society through the promotion of learning resources that are free of copyright and accessible at no charge.

Discover the complete OER collections of UOC learning activities here:

- Business administration and Management
- Labour relations and employment
- Market Research and Techniques
- Tourism

Student Mobility

Cathrin Vogel, Noëlle Diegel, Olga Firssova, Päivi Kananen, Christian M. Stracke and Francis Brouns

FernUniversität in Hagen, Open University of the Netherlands and University of Jyväskylä

Studying in a Virtual Mobility Context: An International Pilot in the Domain of Educational Science

Innovative impact

This project was innovative for the three partners in more than one way. Staff members of three different universities, operating within different national and institutional traditions as well as scientific cultures and academic age, contributed to a joint course development that resulted in a successful implementation in regular curricula.

A mixed level target group of students from different universities in different countries learned together by designing an educational product using an innovative mobile gaming platform. Students demonstrated a high level of self-organisation and self-regulation, project management and virtual mobility skills, in order to deliver designed artefacts within the eight weeks course. Within this group work, they had to bridge time constraints, distance and cultural differences as well as possible differences in background domain knowledge and skills or affinity with mobile technology.

Both the joint course production by teachers across Europe and cross-border collaborative work by students designing a joint educational product brings innovation to the curricula. It not only allows co-production, it also allows co-creation by students.

Introduction

Virtual mobility aims at enriching Higher Education through facilitating exchanges and collaboration among students across institutional and country borders (Erasmus+ programme guide, 2018). Generally speaking, virtual mobility programmes are designed and offered by universities specifically for the purpose of organizing online learning experiences for those students who do not use physical mobility opportunities. By means of virtual mobility students can enrich their curricula with courses and other learning activities in higher education in other countries. They can do it online, using digital tools and online systems and yet in intensive interaction with learners from different universities, different cultures and contexts. By participating in virtual mobility programmes students get a chance to develop skills and competences that are not normally included in educational programmes, such as intercultural or networking skills.

This article reflects on a joint development and implementation of an international online course in educational design by teams from University of Jyväskylä, Finland, Open University of the Netherlands and FernUniversität in Hagen, Germany. In this project, students of three different study programmes in Educational Science collaboratively developed a mobile learning scenario based on theories and models of educational design and realized this design in a mobile learning application. In small international groups of maximum five students, an initial idea on an educational media product was conceived and afterwards, the theoretical foundation, design, implementation and evaluation were developed in iterative cycles. The course ended with a final online presentation, evaluating the results.

International cooperation project: Instructional design – Creating an educational media product

The quality and learning design of Higher Education is in need of further improvements to future challenges in work and life (Stracke, 2017; 2019). In order to enable such improvements and to promote international collaborative work in teaching and learning three European universities developed a joint online course 'Instructional Design - Creating an educational media product', and implemented it as a pilot in winter semester 2018/2019 for the first time. The course

Comparable examples

Digital Competent Teachers: international cooperative Short Learning Programme project (Erasmus+ KA3), targeted to support teachers in gaining digital competencies. University of Jyväskylä (coordinator), FernUniversität in Hagen, Universidade Aberta and Anadolu University (2018-2020).

LECHe: The Lived Experience of Climate Change developed innovative teaching methods in the field of distance learning on sustainable development and global climate change with FernUniversität in Hagen, Open University of the Netherlands and others (2009 – 2012).

OpenVM: Open Virtual Mobility Erasmus+ project has developed and validated a virtual mobility competence framework as a step towards designing a Learning Hub for developing these competences (Buchem et. al., 2017).

MOOQ: the European Alliance for the design and quality of Massive Open Online Courses developed quality guidelines for online learning design in close collaboration with more than 10,000 MOOC learners, designers and providers (Stracke et al., 2018).

References

Erasmus + Programme Guide (2018). Retrieved from https://ec.europa.eu/programmes/erasmus-plus/sites/erasmusplus2/files/erasmus-plus-programme-guide2_en.pdf

European Commission (2017): Digital Competence Framework for Educators. Retrieved from https://ec.europa.eu/jrc/en/digcompedu.

combined development of professional skills at university level with international project management and international collaboration competences.

The target group consisted of students in master programmes. They were recruited from different programmes: pre-master and a Master of Science programme in Educational Science for educational practitioners (Open University of the Netherlands), a Master of Arts programme E-education (FernUniversität in Hagen, Germany) and a Master programme in Educational Sciences of the Faculty of Education and Psychology (University of Jyväskylä, Finland). The idea was to offer a rich international learning experience for adult students, who may be less mobile due to their life situation, e.g. who combine studies and work and family duties (Vogel et al., 2018). Thus, a high degree of heterogeneity was given, even though an obvious commonality was the educational background of the study programmes.

In order to motivate students and enable them to have an experience close to their future profession, students received an authentic task to develop an educational media product (Herrington, Reeves, & Oliver, 2010). Having a solid foundation of the product in mind, students were expected to find an adequate solution to a real life educational problem in a chosen domain by combining instructional design, technology use and a reliable grounding in educational theories.

The task was to plan, implement and evaluate an educational media project, based on mobile learning design. For this purpose, an open source software application for mobile learning design, called ARLearn, was provided by the Open University of the Netherlands. Students were expected to work collaboratively in mixed groups in an online learning environment (Moodle) that was accessible for all participants, provided by FernUniversität in Hagen. Course learning objectives included both domain specific and generic skills and competences, such as project management and online international collaboration.

In the course, a variety of learning resources and support, like introductory videos, online meetings, wikis, as well as handouts and H5P presentations were provided. Displaying the content from beginning on and providing communication tools allowed students to work in own time and tempo on their media designs. To scaffold students' self-organized learning, support was provided through embedded instruction and supervision by tutors. The principle of streamlining the learning process through Salmon's 'e-tivities' (2013) was used to help students in structuring their group work as well as to make expectations, ways of feedback and deliverables transparent.

At the end of the eight week course, seven of the initial nine groups completed the course by presenting their designs and demonstrating their mobile applications to the teachers and each other. In their presentations, students demonstrated the developed artefacts, provided theoretical underpinnings, elaborated on the embedding of the designed mobile apps in the relevant instructional settings and showed the results of their evaluation. Furthermore, all students reflected on the design process and collaboration with students from other countries. So far, the feedback from students showed, that the

Herrington, J., Reeves, T. C., & Oliver, R. (2010). A Guide to Authentic e-Learning. New York & London: Routledge.

Salmon, G. (2013). E-tivities: The key to active online learning. New York & London: Routledge.

Stracke, C. M. (2019). Quality Frameworks and Learning Design for Open Education. The International Review of Research in Open and Distributed Learning. (Accepted, in print).

Stracke, C. M. (2017). The Quality of MOOCs: How to improve the design of open education and online courses for learners? In P. Zaphiris & A. Ioannou (Eds.), Learning and Collaboration Technologies. Novel Learning Ecosystems. LCT 2017, Part I, LNCS 10295 (pp. 285–293). doi:10.1007/978-3-319-58509-3_23

Stracke, C. M., Tan, E., Texeira, A., Pinto, M., Vassiliadis, B., Kameas, A., Sgouropoulou, C., & Vidal, G. (2018). Quality Reference Framework (QRF) for the Quality of Massive Open Online Courses (MOOCs). Retrieve from http://www.mooc-quality.eu/QRF [Open Access]

Ubachs, G., & Henderikx, P. (2018). EADTU Mobility Matrix, (pp. 26). Maastricht, NL: EADTU. Retrieved from https://tinyurl.com/EADTU-mobility-matrix

Vogel, C., Hochberg, J., Hackstein, S., Bockshecker, A., Bastiaens, T. J., & Baumöl, U. (2018). Dropout in distance education and how to prevent it. In EdMedia+ Innovate Learning (pp. 1788-1799). Association for the Advancement of Computing in Education (AACE).

joint task demanded a high level of self-organisation and focus, task division and clear communication. According to students, provided communication facilities were not sufficient for effective collaboration and students turned to social media and dedicated tools of their own choice to communicate and work together. This information and the results of two surveys (formative and summative), which were made available to students during the course, should in future help to ensure an improved continuation of the course. All in all, evaluation results of the first pilot were very positive despite some technical and organisational challenges caused by different working routines and cultural traditions.

Further information:

- Teaser: https://www.youtube.com/watch?v=j6Z-X1Vd5uU
- Welcome video: https://www.youtube.com/watch?v=fbORTXxPbwA
- ARLearn: https://streetlearn.appspot.com

Conclusion

The project offered an innovative opportunity for both the course designers/lecturers as well as the students. The lecturers could explore new approaches for introducing online collaboration in the existing study programmes and benefit from the experiences of the other universities as the Digital Competence Framework for Educators suggests (European Commission, 2017). The three universities with their different backgrounds and expertise gained insights on how to enrich and improve future course design. The students were highlighting in their feedback and evaluation the unique chance for them to get in contact with students from foreign universities and to collaboratively work together on a specific task.

This international pilot course, implemented by University of Jyväskylä, FernUniversität in Hagen and Open University of the Netherlands fits very well into a relatively new strand of virtual mobility. It is suitable in the category of transnational online distance education as categorized at the EADTU Mobility Matrix (Ubachs & Henderikx, 2018). Partners developed a joint curriculum with embedded virtual mobility at the course level. To proceed towards official virtual exchange mobility partner universities need to agree and sign institutional agreements and learning agreements between engaged universities. It can be summarized that the pilot is a good starting point for both improvements at course design level and the continuation of such cooperation in the future opens the door to a regular and increased institutional collaboration and virtual mobility for the three universities and their lecturers and students.

Learning Analytics and Artificial Intelligence

Rozita Tsoni,
Elias C. Stavropoulos, and
Vassilios S. Verykios

Big Data Analytics and Anonymization Lab,
School of Science and Technology,
Hellenic Open University

Leveraging Learning Analytics with the Power of Words

Innovative impact

Learning Analytics has revolutionized the way we gain knowledge about students, educational content, and learning methods. However, new technological achievements allow us to go the extra mile to harvest the crops of having invested in a data rich environment.
Analysing written text from the interaction of students with their instructors through forums among other things, is very productive in an educational setting as it can reveal insights that go deeper than other obvious Performance Key Indicators (PKIs), like student grades or login counts. Natural Language Processing (NLP) and sentiment analysis tools provide an opportunity to translate messages and forum posts into learning needs and provide assistance accordingly.
Furthermore, conversational AI technologies, like Chatbots, can aid the students in an automated and instant way, and at the same time, create a large unstructured test data pool. In this research, our scope is to embed all available data and information resources in a holistic approach of providing quality on teaching and learning.

Introduction

Learning Analytics has truly revolutionized the way we gain knowledge about teaching and learning. A typical example concerns educational video design: the guidelines about educational videos based on previous pedagogical theories proposed that their duration should not exceed 30 minutes, while a massive data analysis of the dedication time on MOOCs videos came to eliminate this duration to 6 minutes (Guo et al., 2014). In the same year, Pennebaker and his team (Pennebaker et al., 2014) analyzed more than 50000 admission essays to conclude - against all odds- that the use "small words" (auxiliary verbs, pronouns, adverbs, conjunctions, and negations) can be a strong indicator of future success.
At the same time, a crucial factor for educational planning is the characteristics of the target groups. The new generation of students is highly familiar with the results of Artificial Intelligence (AI) in their everyday life. They are used to putting up their data in order to have personalized feed in their social media platforms, in their Google search or in their music apps. Students to come, are going to expect the same flexibility from their learning platform as well (Dabbagh & Fake, 2017).
Higher education institutions are starting to adopt prescriptive analytics methods as an advanced step in data employment. Performance Key Indicators (PKIs) are used to evaluate and predict students' performance in order to act accordingly. In the Global Guidelines concerning Ethics in Learning Analytics (Slade & Tait, 2019), produced recently by the International Council of Distance Learning (ICDE), one of the core-issues presented is "*the Instructional responsibility and the obligation to act"*. Thus, results that could drive decisions and enhance actions are necessary.
However, data science effectiveness has to go beyond algorithms, visualization and predictive models. Domain expertise is required to understand and interpret data into actionable information. In this case, the results of educational data analysis could make a significant impact only inside a domain specific framework and only as long as they are embedded in an organized, holistic institutional approach. Learning Analytics should be the "brain" that coordinates evidence-based improvements of the educational ecosystem. Most of the developments in data analytics are driven by industry and commerce. However, academia comes to play an important role by enriching these developments with the contribution of a variety disciplines, providing a humanitarian modification, which is needed for these developments to apply in education. Meaningful learning analytics in education implies human-oriented methods of analysis and interpretation. For this

References

Agathangelou, P., Katakis, I., Koutoulakis, I., Kokkoras, F., and Gunopulos, D. (2017). Learning Patterns for Discovering Domain Oriented Opinion Words, Knowledge and Information Systems Journal, 6, 1-33, 2017.

Dabbagh, N., and Fake, H. (2017). College students' perceptions of personal learning environments through the lens of digital tools, processes and spaces. *Journal of New Approaches in Educational Research (NAER Journal)*, *6*(1), 28-36.

EDUCAUSE (2019) Horizon Report Preview. Higher Education Edition.

Gkontzis A., Karachristos, C.V., Panagiotakopoulos, C.T., Stavropoulos, E.C., and Verykios, V.S. (2017a). Sentiment Analysis to track Emotion and Polarity in Student Fora. In *Proc. of PCI 2017*.

Gkontzis, A., Kotsiantis, S., Tsoni, R., and Verykios, V. (2018). An Effective LA Approach to Predict Student Achievement. In *Proc. of PCI 2018.*

Gontzis, A., Panagiotakopoulos, C.T., Stavropoulos, E.C., and Verykios, V.S. (2017b). A Holistic View on Academic Wide Data through Learning Analytics Dashboards. In *Proc. of EADTU annual conference 2017*, 12-27, ISBN: 978-90-79730-29-2.

Guo, P. J., Kim, J., and Rubin, R. (2014). How video production affects student engagement: An empirical study of MOOC videos. In *Proc. of the 1st ACM conference on Learning @ scale conference*, 41-50.

purpose, it is required to include perspectives from the social sciences and humanities.

Learning Analytics and Artificial Intelligence

Artificial Intelligence (AI) is a broad term that includes all these actions made by machines resulting in mimicking advanced humans' actions, like the cognitive functions of learning and problem-solving. Methods based on machine learning and AI can enlighten -up to a point- the "black box" of the learning process. In other words, AI can reveal a part of the mechanism that leads from teaching to learning. There is a certain skepticism about the use of advanced methods in order to understand how students learn better, implying that machines cannot replace the value of a human teacher. However, AI does not invade teachers' territory, rather than acts as an objective observer enabling evident-based improvements. Moreover, AI can enhance learning in two ways: by providing means and infrastructure for effective learning and by revealing the meta-level of learning by accumulating data and up-to-date analysis methods.

Ethical issues are raised concerning the future of education, as AI is increasingly applied in the teaching and learning process. However, Rose Luckin and Keng Siau consider AI promising as a democratiser of education in case it is developed in close cooperation with pedagogues (Palmén, 2019).

Analyzing Words to Advance Learning

In Distance Learning, in order to gain insight into the educational needs, we have to seek for additional context in the data mined. By equating a conceptual construct with a single variable, there is a risk in creating a problem of construct validity. For example, engagement cannot be measured just by counting the number of students' loggings. Consequently, a more holistic approach has to be undertaken. In a face to face course, the instructor evaluates a series of information to assess the learning progress. These data are not always directly related to the learning process itself. Instructors often develop expectations of their students based on a hunch. But hunches are usually the result of the subconscious interpretation of secondary and seemingly irrelevant data that are acquired in conditions of physical presence. The aim is to discover these "irrelevant" data and embed them in the analysis in order to eliminate the disadvantages of distance learning.

Natural Language Processing (NLP) can provide a link between data analysis and educational design in order to make AI pedagogy-driven. By analyzing human language, information is gained, not only about PKIs like grades or dedication time, but also about the students' emotional condition that strongly affects their actions. Visualization tools can also help in the processing of human language. For example, a "most important words" plot could reveal the main subject of a discussion or of an e-mail and could help in the classification of the students' messages to create a significance scale for the tutor.

Given that Distance Learning Programs are more preferably among adult learners, who have prior "silent" knowledge and skills, there might be a grand heterogeneity between co-students, even though they study in

Kyritsi, K.H., Zorkadis, V., Stavropoulos, E.S., and Verykios, V.S. (2019). The Dark Side of Learning Analytics. Journal of Interactive Media in Education, to appear.

Palmén, M. (2019). Artificial intelligence cracks open the black box of learning. Electronic Platform for Adult Learning in Europe.

Pennebaker, J.W., Chung, C.K., Frazee, J., Lavergne, G.M., and Beaver, D.I. (2014). When small words foretell academic success: The case of college admissions essays. PlOS one, 9(12).

Slade S., and Tait A. (2019). Global guidelines: Ethics in Learning Analytics. ICDE. ISBN: 978-82-93172-43-7.

Tsoni R., Samaras C., Paxinou E., Panagiotakopoulos C., and Verykios, V. S. (2019). From Analytics to Cognition: Expanding the Reach of Data in Learning. In *Proc. of CSEDU 2019*, to appear.

Verykios, V.S., & Stavropoulos, E.C. (2018). Exploring the Power of Learning Analytics. *The Envisioning Report for Empowering Universities*, 9, 9-11.

the same subject area. Thus, it is crucial to adjust the way of teaching to the variety of their knowledge histories. This can become possible by engaging advanced methods that include NLP, sentiment analysis and network analysis.

In Distance Learning Programmes what is needed is personal assistance that provides a full set of help to students without getting over-interfering in their learning. Interactive technologies like Chatbots can aid the students in an automated and instant way, and at the same time, create a large unstructured test data pool. Moreover, the use of Chatbots can help us solve one of the most common problems in NLP: classifying text according to intent. Chatbots are already programmed to recognize users' intents and they are trained to answer accordingly. As a result, we get an already classified set of data that is highly manageable.

Using unlabelled data often results in a grand abundance of conclusions. Yet, it could become difficult to manage, process and interpret. It could turn out faster and simpler to find and label enough data to train a model on, rather than trying to optimize a complex unsupervised method. In our Lab, a combination of tools is used to achieve that. For example, the Greek free software DidaXto (Agathangelou et al., 2017), which supports both English and Greek language, find the polarity of each forum post and subsequently IBM's Cognos Analytics analyzes students' and tutors' networks. A description of the main projects of our LAB is presented our relevant publications (Gkontzis et al., 2017a; Gkontzis et al., 2017b; Gkontzis et al., 2018; Kyritsi et al., 2019; Tsoni et al., 2019; Verykios & Stavropoulos, 2018). We strongly believe that these kinds of synergies are necessary in order to create an overview of students' and tutors' actions that would form the "big picture" of the learning process.

Planning the future

Andrew Moore, head of Google Cloud's AI, states that the idea of human-computer interaction exclusively based on speech, language, and vision is obsoleted. Human emotional state is a key element for creating effective virtual assistants who are in the "time-to-adopt" list for the five next years in the Horizon Report Review for Higher Education (2019). Our intention is to create and embed in our research all available data and information resources in a holistic approach aiming to provide quality on teaching and learning. Cognitive computing is an enhancement in computer science that allows making sense of an excessive amount of data by compromising different components. Hence, cognitive computing is the next step in the course of actions in our Laboratory.

José Bidarra & Henrique Mamede

Universidade Aberta

Artificial Intelligence and Blockchain in Online Education

Innovative impact

Artificial Intelligence, in general, and more specifically Machine Learning are the hottest jobs in the IT industry right now, and it is expected AI to grow exponentially in the next five years. In education it will include looking at new models of teaching. Online courses have raised the possibility of changing the business of learning, while AI may be able to change the nature of teaching, providing more personalised platforms and free teachers to spend their time more effectively.

The learning environment isn't fixed and technology is far from static, so instead of developing new digital learning spaces, perhaps universities may be better off embedding digital technologies across the spaces they already have. This means that spaces and application interfaces won't be as important as "smart" solutions - such as AI and blockchain - that can respond in real-time based on the analysis of data and the patterns of personalized use.

Introduction

The stakeholders who make decisions concerning the introduction of online learning in universities are deeply aware of the social impacts of emerging technologies and of the role of real people in shaping those technologies. However, people are no longer the only ones using computers, phones, tablets, and devices to connect online. Increasingly, our cars, thermostats, refrigerators, and a host of other objects form a networked, physical world. Furthermore, Artificial Intelligence (AI) today brings the ability of algorithms to process massive amounts of data and make inferences about the interactions between underlying factors. As we read, study, search and navigate the world, inferential machine learning is getting smarter by finding, observing, and recording hidden models that explain our behavioural patterns. More, this data can be used to change parameters in cyber-physical systems that live around us and positively influence Education.

Learning from vast amounts of data

Intelligent systems may be able to respond directly to students and teachers based on the huge amount of data gathered through e-learning platforms and management systems. So, without losing ourselves in controversies and open questions, we can say that AI's future will surely have an impact on organizations, which means the replacement of our current analytical tools with intelligent agents, state-space problem representations, uninformed and heuristic search, game playing, logical agents, and constraint satisfaction problems. This is not new and AI techniques can also be used to create new ideas in three ways: by producing novel combinations of familiar ideas; by exploring the potential of conceptual spaces; and by making transformations that enable the generation of previously impossible ideas (Boden, 1998). However, the potential of AI has taken a long time to be exploited and is today more common in search tools (Google) and commercial applications (Amazon), for example. Recent advances, such as machine learning provided by Microsoft, Google or IBM (e.g. Watson), have not reached (yet) a widespread use nor they represent recognizable trends in society, and certainly not in educational applications. However, there is an initiative by EADTU to organise action lines on Artificial Intelligence in teaching and learning with the participation of other European universities.

The emergence of blockchain

Blockchain has been proposed initially in a paper from Nakamoto

References

Ateniese, G., Faonio, A., Magri, B., & De Medeiros, B. (2104). Certified bitcoins. In: *International Conference on Applied Cryptography and Network Security*. pp. 80–96. Springer.

Boden, M. (1998). Creativity and artificial intelligence. In *Artificial Intelligence*. 103 (1-2), p. 347-356. Elsevier. DOI: https://doi.org/10.1016/S0004-3702(98)00055-1

Brandão, A., São Mamede, H., & Gonçalves, R. (2018). Systematic review of the literature, research on Blockchain technology as support to the trust model proposed applied to smart places. In *World Conference on Information Systems and Technologies* (pp. 1163-1174). Springer, Cham.

Burbules, N. C. (2014). Meanings of "ubiquitous learning". *Education Policy Analysis Archives*, 22, 104. doi:10.14507/epaa.v22.1880

Chakrabarti, A., & Chaudhuri, A. K. (2017). Blockchain and its Scope in Retail. *International Research Journal of Engineering and Technology*. 4(7), July.

Cope, B., & Kalantzis, M. (Eds.). (2010). *Ubiquitous learning*. Chicago: University of Illinois Press. Retrieved from http://manchesterileap.pbworks.com/f/Ubiquitous+Learning+Book+Review.docx

Decker, C., & Wattenhofer, R. (2104). Bitcoin transaction malleability and MtGox. In *European Symposium on Research in Computer Security*. pp. 313–326. Springer.

Grech, A., & Camilleri, A. F. (2017). *Blockchain in education*.

(2008), as a solution for cryptocurrencies. It is a decentralized technology that allows to perform transactions through shared network participants, supported by new forms of distributed software architectures. This technology improves the transparency of products, the management of the supply chain and more efficient data chain, better loyalty management system, improving customer profiles and preventing counterfeiting (Chakrabarti & Chaudhuri, 2017).

The blockchain technology presents itself as valuable solution in a decentralized exchange environment where all transactions are recorded visibly open to everyone. The goal of blockchain is to provide confidence in data, although these attributes also configure many technical challenges and limitations that need to be addressed (Brandão et. al., 2018).

The blockchain proposed by Satoshi Nakamoto (Nakamoto, 2008) for the bitcoin cryptocurrency, intended to present it as a ledger, where transactions of bitcoin users were stored, so that different transactions using the same monetary value could not occur without a centralizing entity to validate them. In Nakamoto proposal, the transactions are visible to the members of the network through a node value transfer to another node on the network, identified in advance. The solution to achieve defense against modifications, tampering or other fraud attempts in the ledger involves the simple detection by the network users. To get this control over changes in the elements of the ledger, the blocks are interconnected, forming a chain.

In a simplified way, the blockchain has in its foundation: a distributed peer-to-peer network (Decker & Wattenhofer, 2014); the time of creation or modification (timestamp) (Ateniese et. al., 2014); the one-way function with the application of applying hash functions; the digital record of the author of the amendment; and the generation of a new mechanism blockchain block.

The supported confidence in Blockchain technology is evaluated by McKnight et. al. (2017) and suggests an opportunity for regulators and policymakers to shape the development and commercialization of disruptive innovation. Privacy and security are two of the issues that can justify the more widespread use of Blockchain technology.

The application of blockchain

Why does it seem so important and why everybody is talking about it? The main reasons that could explain this success are: a single entity does not own the data stored inside the blockchain; the data is cryptographically stored inside the blockchain; the blockchain is immutable, so no one can tamper with the data that is inside the blockchain; the blockchain is transparent so one can track the data if needed.

It seems, according to several authors, that the use of blockchain technology will have no limits of application. Of course, this includes the more particular area of Education. Several use cases are already in place and were studied by Grech & Camilleri (2017). In Education there are several potential applications for this technology, namely, for the purpose of increasing efficiency and transparency, and maintaining

Publications Office of the European Union 2017, 132 S. - (JRC Science for Policy Report). Luxembourg.

Hwang, G. J., & Tsai, C. C. (2011). Research trends in mobile and ubiquitous learning: A review of publications in selected journals from 2001 to 2010. *British Journal of Educational Technology*, 42(4), E65-E70. doi:10.1111/j.1467-8535.2011.01183.x

McKnight, L. W., Etwaru, R., & Yu, Y. (2017). *Commodifying Trust: Trusted Commerce Policy Intersecting Blockchain and Internet of Things*.

Nakamoto, S. (2008). *Bitcoin: A peer-to-peer electronic cash system*. Retrieved from the web on 21/Feb/2019 in http: //bitcoin.org/bitcoin.pdf

a high level of security. A few examples of applications:

- Certification of student degrees between institutions: this will allow for a better mobility of students across the European Union and, eventually, between universities and schools that adhere to the system;
- Creation (and maintenance) of a student academic CV: a digital document that can be shared with employers, safeguarding all GDPR aspects, with some restricted nodes, such as universities, to be able to access the fields to update;
- Student identity: which can be unique across all institutions, sharing the same base platform;
- Professor identity: in the same way as the student's.
- Records management: reducing or eliminating paper-based processes across a campus or between universities.
- Smart Contracts and verifiable transactions: to support agreements, and being able to validate attendance and assignment completion. Also, for Distance Learning, blockchain applications could be used to minimize fraud attempts;
- Authorship: validation of educational resources authorship using blockchain.

Conclusion

The last years brought new advances and general access to Artificial Intelligence through availability of algorithms provided via cloud models, allowing high volumes of computer and data processing. Also, the inclusion of those built-in algorithms into applications is now of great simplicity. This opened up new ways to develop disruptive solutions for Education in general, and for distance learning in particular.

On the other hand, blockchain is also a technology with enormous disruptive power that, after a few years of intensive implementation as a cryptocurrency base, is now proving to be an open resource with multiple possibilities in different fields. The key interest in this technology lies in its ability to move from a centralized data logging system to a distributed system that ensures no change in information and keeps the privacy of data.

There is a growing interest in AI and blockchain technologies today. So, for this interest to become a real contribution to the development of Education it will be necessary to open our minds. Online education may benefit from many of these new tech developments, and there is a need to clarify what these are to make sure investments are directed to the right solutions.

Quality Assurance

Andre Vyt

AQARTO Agency, Ghent University & Artevelde University College

Smartly using PDCA in quality of distance teaching

Innovative impact

Teams supervising projects of designing or redesigning distance teaching, can use basic concepts and methods of quality management. PDCA is one of them. A result-based approach is needed, as well as an investment in preparatory actions. To ensure this, the 9A-cycle is introduced.

Introduction

In the past 25 years I've had the privilege of participating in quite a number of higher education curricular reforms, as a lead, a coach, an expert, or an auditor. In most cases, study programs had to be reoriented in such a way that presential teaching activities are replaced by forms of e-learning and distance teaching in a blended approach. Such projects of change frequently employ basic concepts and methods of project management and quality management. To be fully effective, however, the use of these concepts and methods needs a comprehensive approach and also a skilful application. In this article I clarify this with regard to the formulation of SMART goals and the application of the PDCA-cycle, two of the most well-known concepts.

The SMART-based formulation of goals

This acronym is well-known in quality management as well as in project management, and since the end of the past century also in teaching and learning. Clear goals need to orient our actions: they need to be specific, measurable, accepted/acceptable, realistic, and well-timed or time-based. Actions are then formulated in a road map, ensuring a timely development and successful implementation of an innovation or an upgrading of a program (Audette et al., 2017).

Three common errors are frequently seen in such roadmaps. First, road maps can list a series of consecutive actions to undertake without mentioning the expected results of these actions. One preparatory action could be, for example, to explore some inspiring examples of innovative projects run by other institutions before starting to develop things on your own. But what should be the result of this exploration? Would you expect a report with a description of examples, or would you rather like to have clarified what pitfalls have been avoided, what opportunities have been seized, and how they have handled weaknesses in the organization? Or maybe you can use examples to derive a list of quality criteria which can be used to assess the quality of your new project. So each action in the road map should yield a specific result.

A second error is the definition of deadlines or time windows allocated to each action. Very frequently, dates linked to actions are interpreted ambiguously as dates to start with the defined actions – and no one then knows when the actions will produce a desired result. This error is committed more often when the roadmap only lists actions without expected outputs and when these actions are vaguely defined.

The third error is committed by taking only a prospective planning, starting with the first actions that should be taken without completing the roadmap with the further actions on the road ahead. When

References

Audette, J.G., Baldew, S.S., Chang, T.C., de Vries, J., Tham N.H., Janssen, J., & Vyt, A. (2017). Utilizing the 'Plan, Do, Study, Act' framework to explore the process of curricular assessment and redesign in a physical therapy education program in Suriname. *Frontiers in Public Health 5* http://hdl.handle.net/1854/LU-8608164

Gabor A. (1990). *The man who discovered quality*. Penguin books.

Vyt, A. (2019). *Samen werken aan kwaliteit in onderwijs en opleiding [Working together for quality in education and training*]. Turnhout: Gompel & Svacina.

Kear, K., Rosewell, J., et al. (2016). *Quality Assessment for E-learning: A Benchmarking Approach* (3rd edition). Heerlen: EADTU. https://e-xcellencelabel.eadtu.eu/

implementing e-learning or distance teaching, program leads tend to start, for example, with installing a new digital platform, experiment with it, and then see further from there. Instead, retrospective planning should be used, starting with the desired final outcome and then look back to see which actions should be taken step by step. So for each step one needs to complete the phrasing "in order for this step to be successful, we need to ensure that…" and then formulate that condition as a previous step.

The three errors frequently are closely linked to each other, and the common basis is a neglect of result-based methodology. So a department or a program needs to define very specifically the desired outcomes in terms of quality criteria and final performance of e-learning and distance teaching that is implemented. Thereafter stepwise actions with expected outcomes are defined, and a time is set for which these outcomes are expected. This way of working will not ensure that everything runs smoothly, but it will prevent failure on essential aspects. A roadmap will have to be revised regularly, and it should be a product of regular discussion in team.

Teams can use tools such as *E-xcellence* (Kear, Rosewell et al., 2016) to self-assess whether their e-learning meets essential requirements, formulated as benchmarking statements. It can be used for specific programs or departments but also institution-wide. Application of the tool has to result in a roadmap of actions to undertake.

The use of the PDCA cycle

This concept has been originally formulated by Walter Shewhart (together with the method of statistical process control), and more widely spread in a (rather oversimplified) diagram by William Deming (see Gabor, 1990). Simple things tend to last longer, as they are memorized more rapidly and people have a tendency to simplify complex things to make these more manageable. So it seems easy: when you have a project to innovate or improve processes, you first start to plan things by designing or redesigning these processes. Then you execute the plan simply by doing as planned, and you assess the execution by checking measurements, upon which you may decide on changes needed to adjust your action. It seems fairly simple: plan-do-check-adjust/act, and then you start over again.

Deming's focus was on industrial production processes, closely linked to continuous improvement and innovation. His ideas found fertile ground, for example, in the automobile industry in Japan and the US in the second half of the 20th century. For educational institutions, change rather occurs on relatively longer-term basis, and also more on a wider strategic level closely linked to evolutions in society that are largely beyond of the span of control of institutions.

For an institution working with online and e-learning nowadays, technology and information management have become very influential components in their core processes, and even have become essential core processes themselves. So key performance indicators need to be formulated for these, and they can be very much dependent on rapid evolutions. So a distance teaching university needs to work on both

long-term and short-term scale, and in fact the difference between the two timescales has become debatable. A flexible institution should be able to revise a long-term strategy swiftly when needed.

So PDCA is applicable both in strategic planning as in management of processes. In order to counter the tendency to oversimplify this method, I introduced the 9 actions-in-a-cycle (abbreviated as 9A):

Figure: the 9A-cycle of 9 actions-in-a-cycle (Vyt, 2019)

The traditional PDCA-components are placed in the lower part of the cycle. Three steps precede it and two additional steps complete it. Before planning, you need to *aggregate* the information you have and you can gather, you need to *anticipate* evolutions (in society but also in technology), and you need to *analyse* the available data well before you start planning with designing or redesigning. An institution once decided to implement e-learning and decided to spend a large part of the budget in necessary infrastructure for ICT for students and staff. The project was to invasive that more than a year was needed to set up the project, set out a tender, and engage a contractor to start with the execution. The execution took one year longer than foreseen. The result was that 3 years later the foreseen infrastructure for ICT was already lagging behind the latest evolutions, wifi has become more interesting, and on top most students by then already had online access through their mobiles. If this institution would have devoted more attention to the first three preparatory steps in the 9A-cycle, the project could have been more successful: financial investments could have been reoriented to what is most needed in short and long term.

Two steps complement the traditional PDCA-cycle: once you have successfully implemented an innovation or improvement you have to think about aspects that can assure its longevity and sustainability. Mechanisms can be put in place to *anchor* it: this is quality assurance. Finally, you may learn from mistakes made and adapt processes to avoid mistakes: *adaptation* defines the survival of the fittest. Institutions and teams can employ this 9A-cycle. The can do this together with the E-xcellence tool in a framework of integrative quality management underpinned by PROSE (www.prose.eu).

Student Support

Hilary Lindsay & Inma Alvarez

The Open University, UK

A Framework for the Development of Researching Professionals

Innovative impact

When the Researching Professional Development Framework (RPDF) was first piloted with year one EdD students at the Open University in the UK, they found it very valuable. It gave them a tool that helped them reflect and work on three key learning dimensions. It also helped them consider, at the start of their degrees, how their identity might change during and after their doctoral studies; that their studies were not an end in themselves but a means to their becoming a researching professional. Moreover, the framework helped them to think beyond their studies; to imagine what their post-doctoral futures might look like and how they might make a difference through their research and through the skills they were developing.

The RPDF has now been integrated into the OU's EdD programme where doctoral researchers are not only using the planning tool regularly, but are also sharing their recorded reflections and plans with their supervisors. The framework will be a key resource in future PD programmes at the OU.

The OU has also plans to make the RPDF available online to other institutions. It is keen to share knowledge of this resource more widely. For more information, please contact: WELS-Prof-Docs@open.ac.uk

Introduction

The Researching Professional Development Framework (RPDF) is an online reflective resource that supports the development of students on a professional doctorate (PD) programme. The framework has been designed from empirical research undertaken with students enrolled in a Doctorate in Education (EdD) and graduates with such a degree. The resource prompts students to reflect on their own development as researchers. Following a successful pilot with EdD year one students, the resource is now being introduced in PD programmes across the Open University (OU) in the UK.

What distinguishes Professional Doctorates?

Those studying for a PD are likely to be self-funded, mid-career, experienced professionals who are undertaking research to inform their ongoing professional practice (Mellors-Burne et al., 2016). This contrasts with the Doctorate in Philosophy (PhD) which tends to be pursued as an early-career qualification, with the expectation of a subsequent career in academia. This distinction can be summarised by saying that while the PhD creates *professional researchers*, the PD creates *researching professionals* (Bourner et al., 2001; Butcher and Sieminski, 2006). In similar vein, Maxwell & Shanahan contrast the knowledge created by a PhD with the "knowledge in practice" gained through a PD (1997, p. 142).

The theory behind the RPDF

In her EdD research into the learning of professional accountants, Lindsay (2013) had built a framework based on the three dimensions of learning developed by Illeris (2002): cognitive, emotional and social. Later, Keegan (2009) described them as the cognitive, intrapersonal and interpersonal. Both Illeris and Keegan recognised that although learning (or education as it was often then described) had favoured the cognitive dimension, the other two dimensions, the more personal aspects of learning, were increasingly important in the ever-changing world of the twenty-first century. The framework Lindsay (2016) developed subdivided the triangle created from the three dimensions into nine sub-triangles, each comprising a different element of learning. She emphasised that if learning activities encompassed all nine areas, then learning and development would be as complete as possible. Lindsay had also aligned the three dimensions of learning to equivalent learning metaphors. The cognitive

Comparable examples

The inclusion in the RPDF of the areas 'Blending Theory and Practice' and 'Reflecting on Theory and Practice' intend to capture the specific nature of PDs. An individual's professional experience and context is at the heart of the research process where the aim is to develop as a *researching professional*.

This development model contrasts with the Vitae Researching Development Framework which "describes the knowledge, behaviour and attributes of successful researchers" and is widely used in conventional PhD degrees where the intention is to develop them as *professional researchers*.

References

Bourner, T., Bowden, R. & Laing, S. (2001). Professional Doctorates in England. *Studies in Higher Education,* 26(1), 65-83.

Butcher, J. & Sieminski, S. (2006). The Challenge of a Distance Learning Professional Doctorate in Education. *Open Learning,* 21(1), 59-69.

Illeris, K. (2002). *The Three Dimensions of Learning,* Roskilde: Roskilde University Press.

Kegan, R. (2009). What "Form" Transforms? A Constructive-developmental Approach to Transformative Learning. *Contemporary Theories of Learning,* edited by K. Illeris, 35-52. Abingdon: Routledge.

Lindsay, H. (2013). *Patterns of Learning in the Accountancy Profession: the Roles of Continuing Professional Development and Lifelong Learning,* The Open University. Available at:

and interpersonal dimensions were aligned with the metaphors of learning as acquisition and learning as participation (Sfard, 1998) and the intrapersonal dimension with learning as becoming (Wenger, 1998). Overall, the framework very much reflected the learning on the job that was a key element of the learning of all professionals.

Developing the RPDF

After achieving her own PD, Lindsay became an Affiliated Researcher at the OU. Conversations with her mentor led to the realisation that her framework had the potential to be used in any context which involved learning from theory and from practice, not least in the OU's EdD programme itself. As a result, a programme of research was undertaken in which nine current and former EdD students were interviewed about their learning experiences. Rigorous thematic analysis led to the identification of the three overarching themes (reflecting the three dimensions) and nine areas of learning that make up the RPDF (Figure 1).

Figure 1 - The Researching Professional Development Framework (Lindsay et al., 2017)

Developing the RPDF interactive tool

The RPDF was subsequently developed into an online interactive tool for EdD students at the OU. Each segment of the framework is clickable and takes doctoral researchers to a page where one specific aspect of their development is explained. Here they are also invited to read and reflect on the quotes from other students, and then identify development actions using the Researching Professional Development Plan (RPDP) (Lindsay, et al., 2017). The intention behind the quotes from doctoral researchers is to help them realise that others had had similar concerns and faced similar issues as they did. This aspect of the framework also aims at contributing to the building of a sense of community among part-time students in dispersed locations.

http://oro.open.ac.uk/43595/

Lindsay, H. (2016). More than 'CPD': a Proposed New Learning Model for Professional Accountants, *Accounting Education: An International Journal,* 25(1), 1-13.

Lindsay, H. & Floyd, A. (2019). Experiences of Using the Researching Professional Development Framework, *Studies in Graduate and Postdoctoral Education (in press)*

Lindsay, H., Kerawalla, L. & Floyd, A. (2017). Supporting Researching Professionals: EdD Students' Perceptions of Their Development Needs, *Studies in Higher Education (available at: http://dx.doi.org/10.1080/03075079.2017.1326025)*

Maxwell, T.W. & Shanahan, P.J. (1997). Towards a Reconceptualisation of the Doctorate: Issues Arising from Comparative Data Relating to the EdD Degree in Australia. *Studies in Higher Education,* 22(2), 133-150.

Mellors-Burne, R., Robinson, C., & Metcalfe, J. (2016). *Provision of Professional Doctorates in English HE Institutions*. Cambridge: Higher Education Funding Council for England, Careers Research and Advisory Centre.

Sfard, A. (1998). On Two Metaphors for Learning and the Dangers of Choosing Just One. *Educational Researcher*, 27(2), 4-13.

Wenger, E. (1998). *Communities of Practice: Learning, Meaning and Identity*, New York: Cambridge University Press.

Piloting the RPDF

The online resource was piloted with six doctoral researchers during their first year of study and a second programme of research conducted. Each participant was interviewed at the start, middle and end of the year (Lindsay & Floyd, 2019). The quotes from the interviewees included below give an indication of their overall experiences of using the three dimensions of the RPDF.

Working as a researcher

"It helped me to think more broadly about the skills and attitudes I need to bring to the EdD." (student 1)

"It gave me insight from the students' comments that it is a very up and down journey and it is okay to not know what you are doing and have times of self-doubt." (student 2)

Developing ways of thinking

"*Developing my Identity* is something I am only just starting to grapple with. Not only do I need to develop my criticality, but I need to be aware of my own stand in the world, my principles and underpinning beliefs when reading and writing." (student 3)

Moving on with your research

"I think that I wouldn't have dared to have a page or sign in on ResearchGate because I'm not so confident as a person. The framework has made me think about other listings also. Otherwise I would be hiding, I think, and shy in a corner and wouldn't talk about my research until I have my results." (student 4)

Conclusion

While a considerable amount of attention has been directed to the development of PhD students' research and employability skills, not enough has been done to address the specific development needs of those studying a PD. The research conducted by Lindsay since 2015 has focused on the design and testing of a learning tool for PD researchers.

The testing showed that doctoral researchers begin their studies assuming that their learning would primarily be by acquisition (Sfard, 1998) through the development of appropriate knowledge and skills. However, through using the RPDF they realise that they also need to consider who they are and who they might become (Wenger, 1998) through their doctoral studies. They are also made aware of the wider research community to which they could belong and in which they could begin to participate (Sfard, 1998), even early in their studies.

In her final interview a student reflected on her overall development: "As the year has gone on, I've looked back at the framework from time to time and it's more about developing me as a researcher as a whole which has been valuable."

Course Design

Jon Rosewell & Karen Kear

The Open University, UK

Changing pedagogies: The Open Networking Lab

Innovative impact

In the changing pedagogical landscape, universities will teach non-traditional students using non-traditional methods.

We illustrate this with a case study of teaching computer networking to young vocational learners. Materials were designed as open educational resources for flexible use and reuse by students and educators. Learning design encouraged active learning, with simulation to support experiential learning of a practical subject, and embedded self-assessment.

Initial evaluation with several hundred UK Further Education students shows that they valued the pedagogical approach. They particularly liked the active learning elements: practical activities with a network simulator; and quizzes with feedback to test and support learning.

The resources were provided freely as a 'Badged Open Course' on the UK Open University's OpenLearn OER platform. Teachers and students used the resources flexibly to support their different learning and teaching needs.

This case study shows that, through online education and flexible, open approaches, universities can serve a wider population of learners and educators.

Introduction

As the Higher Education context rapidly changes, universities need to reconsider who their students might be in the future, and how they will teach them. In years to come, students might: be younger (or older) than most HE students are now; already be employed and needing to retrain; have lower prior qualifications. Teaching this range of possible learners will require new approaches and flexibility.

In this article, we illustrate these challenges with a case study of teaching computer networking to young vocational learners. These learners have different backgrounds, motivations and attitudes to study compared to traditional university students. We are therefore developing a course which assumes no previous knowledge, teaches networking using a hands-on, practical approach, and uses examples from both home and workplace contexts.

The Open Networking Lab

The course, called the Open Networking Lab, will be an open educational resource that can be used in flexible ways to suit different learning contexts — ranging from an individual learner studying at a distance to classroom use supported by a teacher. The final product will be offered on the UK Open University's OER platform OpenLearn as a 'Badged Open Course' (BOC). A BOC is a form of MOOC offering a complete educational experience, including assessment, recognised by a badge and certificate of completion. Unlike cohort-based MOOCs, UK Open University BOCs are open for individuals to study at any time and any pace. The material has a CC-BY-NC-SA licence on OpenLearn Create, allowing educators to retain, reuse, revise, remix and redistribute the learning material (Wiley, n.d.).

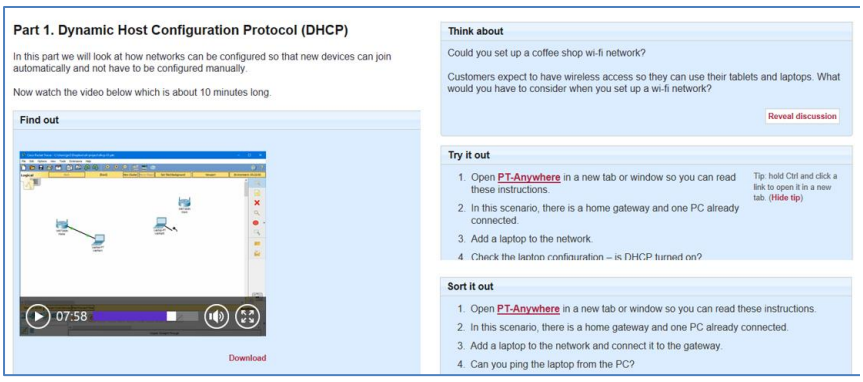


Figure 1 Learning material includes embedded screencasts and interactive activities under the headings: Think about*,* Try it out*,* Sort it out *and* Test yourself

Links

OpenLearn:
www.open.edu/openlearn

OpenLearn Create:
www.open.edu/openlearncreate

Open Networking Lab:
onl.kmi.open.ac.uk

Forge:
ict-forge.eu

Cisco Networking Academy:
www.netacad.com

Acknowledgements

The Open Networking Lab team gratefully acknowledge funding and support from the Ufi Charitable Trust and Cisco. We also thank participants (students and teachers) in the pilot studies.

References

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. Educational Researcher, 18 (1), 32-42.

DiCerbo, K. E., Kovac, R., West, P., Frezzo, D. C., Behrens, J. & Sehnalakova, J. (2010). Individual practice and collaborative inquiry: Instructional configurations in a simulation environment. In: Networking and Services (ICNS), 2010 Sixth International Conference on, pp. 335-339.

Kolb, D.A. (1984). Experiential learning: experience as the source of learning and development. Englewood Cliffs, NJ: Prentice Hall.

Mikroyannidis, A., Gomez-Goiri, A., Smith, A. & Domingue, J. (2017). Online experimentation and interactive learning resources for teaching network engineering. In: 2017 IEEE Global Engineering Education

The subject of computer networking is a practical one, best approached through experiential learning (Kolb, 1984), but individual learners and pupils in many college contexts would not have access to the hardware required. Instead, in the Open Networking Lab, a web-based network simulator is used, opening up the subject by removing the cost barrier for FE colleges, and enabling individual learning in the home or workplace. The simulator, *PT Anywhere*, (Mikroyannidis et al., 2017) provides a simplified and easy-to-use 'layer' over the industry standard *Packet Tracer* simulator (DiCerbo at al., 2010). PT Anywhere hides the complexities of the Packet Tracer interface but supports authentic practical investigations; it can be used through a browser on any device without installation, opening it up to many more learners.

The pedagogical approach used in the Open Networking Lab (see Figure 1) combines acquisition and participation (Sfard, 1998), and maximises active learning (Brown et al. 1989). Concepts and techniques are introduced by screencasts and videos rather than written texts. Students are given opportunities for hands-on work using PT Anywhere, to reinforce their learning from the screencasts, and to enable exploratory learning (for example 'troubleshooting' problem networks). Embedded self-assessment questions/quizzes provide feedback to students to guide their learning. A further two quizzes, one at the mid-point and one at the end of the course, provide the summative assessment that leads to a badge and certificate of course completion.

Evaluation

We have evaluated the material in pilot presentations with 383 students at 14 partner colleges through the Cisco Networking Academy community. Evaluation methods included student surveys, classroom observation, teacher interviews and analytics (Rosewell et al., 2018). The Open Networking Lab material was made available to classes of students through their teachers, who chose a variety of different ways to use it within their own teaching. Because the pilots were carried out late in the academic year, some students encountered the material as revision and consolidation rather than initial learning.

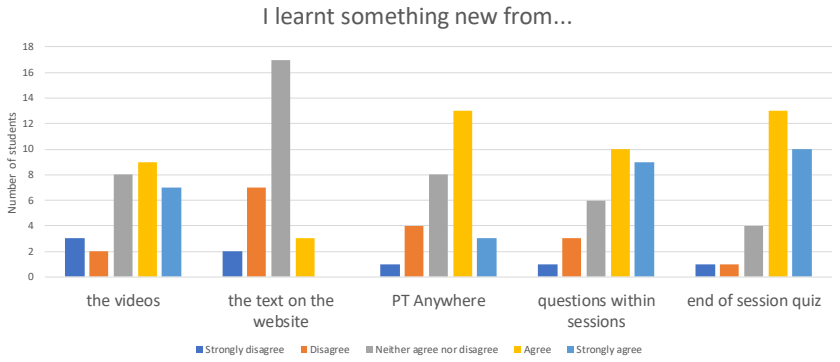


Figure 2 Students' responses to 'I learnt something new from...' different course components (5-point Likert scale: Strongly disagree *to* Strongly agree*)*

Conference (EDUCON), 25-28 Apr 2017, Athens, Greece, IEEE, pp. 181–188.

Rosewell, J., Kear, K.; Jones, A., Smith, A., Donelan, H., Mikroyannidis, A., Peasgood, A., Sanders, C., Third, A., Wermelinger, M., Moss, N., Williams, J. & Connolly, T. (2018). Open Networking Lab: online practical learning of computer networking. In: The Online, Open and Flexible Higher Education Conference: Blended and online Learning: Changing the Educational Landscape, 10-12 Oct 2018, Aarhus University, Denmark.

Sfard, A. (1998). On two metaphors for learning and the dangers of choosing just one. *Educational Researcher*, Vol. 27, No. 2, pp.4-13.

Wiley, D. (n.d.) Defining the "Open" in Open Content, Online: http://opencontent.org/definition/

The evaluation showed that students found the learning approach effective and enjoyable, and they would like to study further using the same methods.

> *"I understood what was being taught to me and it was a fresh way of learning."*

Students valued the components of the material differently. They reported learning most from the components which required them to engage actively, such as the PT Anywhere activities and the quizzes (Figure 2).

Although students liked the use of video and screencasts, they strongly favoured shorter durations (5 minutes or less).

> *"This video is very long and needs to be split into shorter segments of a few minutes each."*

This is a challenge to authors who wish to include enough context and content to support learning.

Overall it was encouraging to see that students' perception of the value and importance of the components matched the learning design envisaged by the course team.

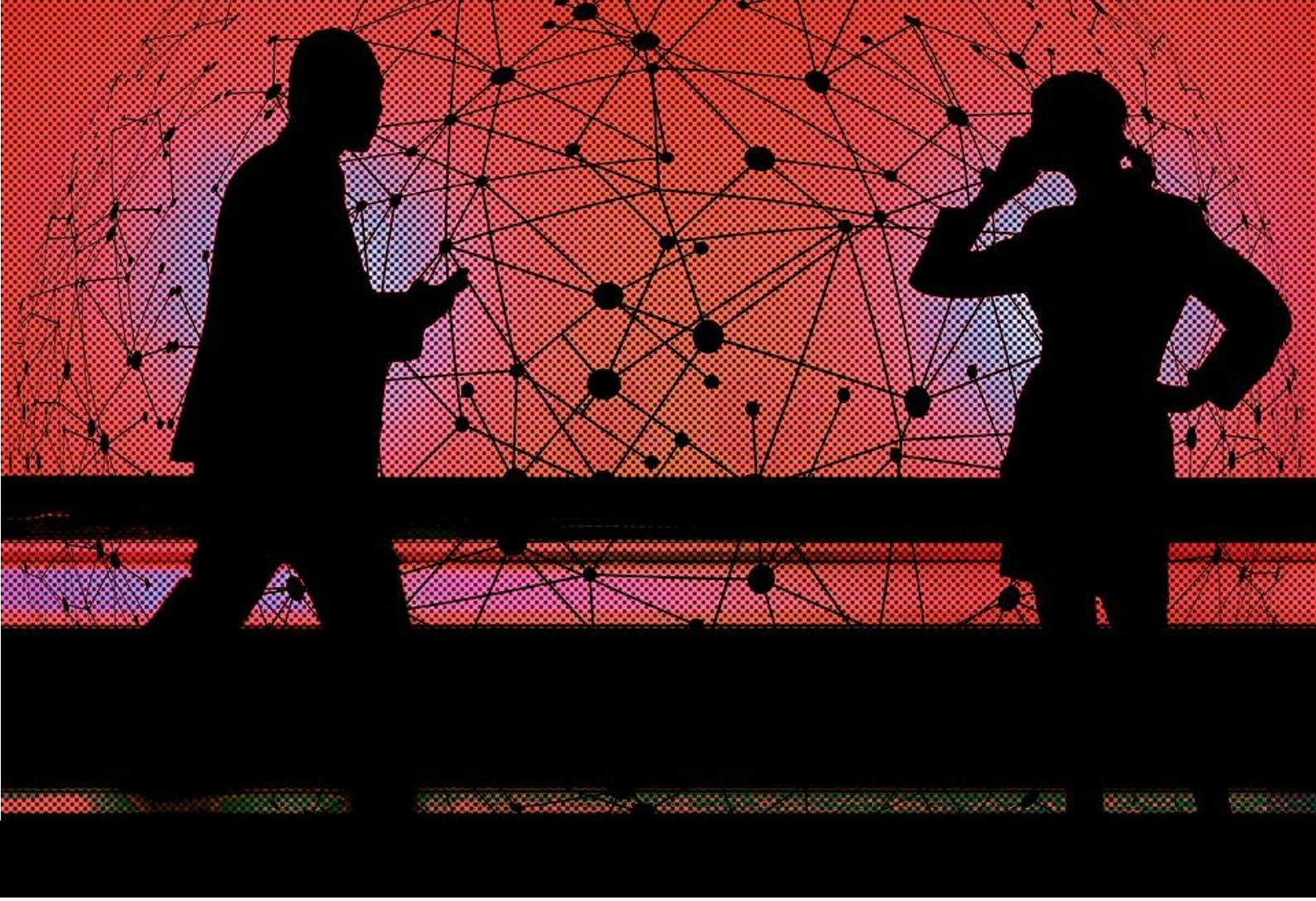
Of particular note is that the material was used in a range of different ways, both by classroom teachers and by individual students. Teachers were observed to use the material as: an introduction to the subject; for revision; to fill in gaps of knowledge; to replace or complement teacher-led lessons. Anonymous server logs also reveal very different patterns of use by individual students. Some spent the whole study time viewing the website, others downloaded material as epub or pdf; some watched the video on mobile devices alongside using a computer for the practical activities.

Conclusion

The pilot evaluation showed that the pedagogical approach — experiential online learning through screencasts, practical activities using a network simulator, and automated assessment — is a good one for these mainly young vocational learners.

Offering the Open Networking Lab material as an open educational resource allows it to be used and reused in a variety of ways. It will be open to students in formal education and to lifelong learners; it can be used as self-directed learning by individuals or in classroom contexts.

We hope this case study demonstrates that universities can broaden their approaches to be inclusive to different kinds of learners in a range of learning contexts.



Contributing institutions

European Association of Distance Teaching Universities (EADTU) | The Netherlands
FernUniversität of Hagen (FernUni) | Germany
Ghent University (UGENT) | Belgium
Hellenic Open University (HOU) | Greece
International Telematic University UNINETTUNO | Italy
Universidade Aberta (UAb)| Portugal
Universitat Oberta de Catalunya (UOC) | Spain
Universiteit of Jyväskylä (JYU) | Finland
The Open University (OUUK)| United Kingdom
The Open University of the Netherlands (OUNL) | The Netherlands

Published by: European Association of Distance Teaching Universities, The Netherlands

ISBN/EAN: 978-90-79730-37-7