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**Modernisation of Higher Education
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through New Technologies
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COMPENDIUM

OF GOOD PRACTICES

OF THE EU PARTNER UNIVERSITIES

IN THE FIELD

OF INNOVATIVE EDUCATIONAL TECHNOLOGIES

Project:
Modernisation of Higher Education
in Central Asia
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GOOD PRACTICES OF THE UNIVERSITY OF RUSE, BULGARIA IN THE FIELD OF INNOVATIVE EDUCATIONAL TECHNOLOGIES

In 2001 at the University of Ruse, with the decision of the Academic Council, a **Centre of Innovative Educational Technologies** (Centre of IET) (<https://ciot.uni-ruse.bg/home.html>) was created, which became a generator of such technologies and, accordingly, good practices in this area.

The Statute of the Centre of IET says that the Centre should:

- promote the adaptation of the educational system to the digital generation through the active and effective use of ICT-based innovative educational technologies, thereby contributing to the digital transformation of education;
- ensure the position of the university in the virtual national, European and global educational space.

The statute also states that the Centre must:

- implement innovative educational technologies adapting them to the conditions of the university;
- train PhD students in the field of innovative educational technologies;
- popularize innovative educational technologies and promote the transfer of good practices in this area on local, regional, national and international level;
- facilitate equipping all lecture halls, and subsequently, laboratories, with interactive presentation systems and laptops;
- present the innovative educational technologies and good practices used at the university to expert groups, official guests at national and international levels etc.;
- stay tuned for open calls for project funding under various national of European programmes related to the digital transformation of education and inform all faculties and university branches in a timely manner; initiate the participation of the university in such calls;
- conduct research that reveals the real benefits of the introduction of innovative educational technologies;
- participate in the organization of national and international seminars and conferences on the digital transformation of education;
- constantly update the content of its site;



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- popularize its activities on social networks.

The charter of the Centre of IET states that the Centre is an integral part of the University Research Complex (UNICOMP) and that it actively cooperates with:

- Distance Learning Centre;
- Continuous Education Centre;
- Technology Transfer Centre;
- Centre of Information and Computer Services.

According to the Statute, the Centre is headed by a person who holds the academic title “Professor” or “Associate Professor”. The head of the Centre is elected by the Academic Council of the University and is subordinate to the Vice-rector for academic affairs. The composition of the centre is dynamic and includes teachers, graduate students, students of various faculties and branches with a strong interest in the field of innovative educational technologies. Periodically they form temporary teams to solve specific tasks included in the Centre's operational plan.

The Statute of the Centre of IET also states that in order to ensure its sustainability the following funding sources will be sought:

- National educational and research programmes;
- European educational and research programmes;
- University funds;
- Donors and sponsors.

In its work, the Centre of IET is guided by three paradigms:

- information and communication technologies are not a panacea for all problems in the education system but only a tool that can make lectures and seminars more informative and attractive for the digital generation;
- lecturers must maintain their key role in student-centred interactive learning;
- students must be at the centre of the educational process which rests upon the competency-based approach that facilitates the development of students’ critical thinking, creativity and entrepreneurial skills so that young people meet the ever-increasing demands of the labour market.

The Centre of IET was assigned and successfully completed the following tasks:

1. Maintaining and guaranteeing the leading role of teachers through:

- 1.1. Writing a Handbook of Innovative Educational Technologies.
- 1.2. Publication of the Handbook and its distribution to all teachers in paper version and in interactive multimedia version on the Internet.
- 1.3. Creation of a public virtual library of video lectures on the main topics of the Handbook.



1.4. Organizing and conducting training courses for teachers on the following topics:

- use of interactive presentation systems;
- methodology for creating internet connected, interactive and multimedia presentations for lectures and seminars;
- methodology for creating electronic educational resources;
- conducting distance learning in real time using:
 - interactive presentation system;
 - video conferencing system;
 - virtual classroom;
- conducting distance learning at any time using e-resources in:
 - text / graphic format;
 - video format;
- using cloud technologies;
- using virtual reality;
- using augmented reality.

2. Developing traditional learning through:

2.1. Equipping all classrooms with interactive presentation systems, including laptops.

2.2. Training teachers to create and use shared cloud resources in teaching and learning.

2.3. Using effective feedback systems during lectures.

2.4. Equipping common areas of universities with interactive information screens (kiosks) that provide up-to-date information, incl. information about social, cultural, sports and other events.

3. Development of synchronous distance learning (in real time):

3.1. Using a video conferencing system;

3.2. Using a virtual classroom.

4. Development of asynchronous distance learning (at any time):

4.1. Creation and improvement of the virtual learning environment of the university - the e-learning platform.

4.2. Publication of lectures and seminars of all major courses on the e-learning platform in:

- text / graphic format;
- video format.

4.3. Creation of virtual laboratories for engineering courses.

4.4. Developing electronic interactive multimedia educational materials.

5. Development of blended learning (traditional + distance learning)

6. Use of other innovative educational technologies:

6.1. Using smartphones in education and turning them into personal virtual assistants for students.

6.2. Using social networks in the educational process.



6.3. Creation of a virtual university – this is a model of a university in the virtual educational space, i.e. a website that provides not only comprehensive information about the university, but also a full range of administrative and educational services, and most importantly, an opportunity for effective distance learning.

7. Using innovative didactic models in the educational process:

7.1. Transformation of traditional didactic models into innovative models using innovative educational technologies.

7.2. Using a competence-based approach in the creation of electronic educational resources in order to develop the basic and key professional competencies of students and help their successful future realization in the labour market.

7.3. Applying the Reversed Class model.

7.4. Application of the STEM, STEAM and STREAM model.

7.5. Gamification of the educational process.

8. Introducing a research approach to education.

9. Analysis of the results from the implementation of innovative educational technologies and didactic models

10. Promotion and dissemination of the results and good practices through publication / participation in:

10.1. Various Media.

10.2. Regional, national and international seminars.

10.3. National and international conferences.

10.4. Social networks.

Some of the above tasks were successfully solved thanks to the active cooperation with the **Distance Learning Centre** which was established in 2005.

Professor Angel Smrikarov and Professor Tzvetomir Vassilev, who were appointed heads of the IET Centre and the DL Centre, respectively, are coordinators of the HiEdTec project. In their opinion, the digital transformation of education should begin with the implementation of the following innovative educational technologies and good practices:

1. In the field of traditional learning:

- using an interactive whiteboard / interactive monitor;

- creating internet-connected, interactive and multimedia presentations for your lectures.

2. In the field of synchronous distance learning

(in real time):

- using a video conferencing system;

- using a virtual classroom.

3. In the field of synchronous distance learning

(at any time):



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-
- use of cloud technologies;
 - creation and publication on the Internet of interactive multimedia teaching materials;
 - recording and publishing video lectures;

4. In the field of blended learning – optimal combination of traditional and distance learning forms to obtain the maximum educational effect.



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GOOD PRACTICES OF THE UNIVERSITY OF PAVIA, ITALY IN THE FIELD OF INNOVATIVE EDUCATIONAL TECHNOLOGIES

The *Didactic Innovation and Digital Communication* (IDCD) Service of the University of Pavia aims to identify and develop methodologies, technologies and materials useful for increasing and innovating the quality, efficiency and effectiveness of educational processes of interest to the University. To this end, the IDCD Service also collaborates with national and international public and private entities.

The IDCD Service works within the *International Relations, Educational Innovation and Communication* Area of the University of Pavia. In particular, the Service deals with the following areas of expertise:

- Connection between physical and virtual spaces for learning communities;
- Platforms and technological tools for educational innovation and communication;
- Realization of multimedia courses;
- Multimedia editing and visual design;
- Personalized advice to teachers, tutors, and students on teaching and learning tools;
- Support to educational activities through the management of the infrastructures dedicated to them (computerized laboratories and multimedia classrooms).

Over the past eight years, the University of Pavia has created learning "spaces" and "contexts" for the academic community through several projects, among which *Virtualization experiments*, *Online community for teaching*, *Blended Learning*, *KiroLab Didactic Laboratory*, and *Digital Solutions for Lifelong Learning*.

Virtualization experiments in computer laboratories. More than 250 PCs in the University are managed by a single work group. The workstations are grouped in classrooms scattered throughout the university campus and are composed of HW and SW which differ from each other in configuration and computing power. To allow the use of some particular SW also from home, on the student's device, the AWS Workspace is used.

Online community for teaching. Over the years, the University has created a system of platforms for teaching called *Kiro*. In this online space, accessible to the entire academic community without compartments (each student can access any course available in Kiro), the teacher can set up didactic activities and deposit didactic material for the student. For their part, students, in full autonomy, can open discussion forums and help each other in the study and



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search for information, exchange of notes and papers, etc. Kiro consists of the set of platforms of the various Departments and Structures of the University of Pavia.

The project began in the 2007/2008 academic year at the Faculty of Pharmacy with the aim of integrating face-to-face teaching with web-based technologies. These allowed students to access teaching materials and videos, interact with other students, with teachers and tutors, and take online tests. This way students could access resources for free and without space and time constraints (for example saving time when travelling); in the same way, the project allowed the Faculty of Pharmacy to independently organize the entrance tests and better manage tutoring activities. The success of the project led, in 2010, to the establishment of CELID (*Center for E-learning and educational innovation*), which in 2014 became IDCD. Meanwhile, Kiro has grown into a community of thousands of users spread across multiple Departments. The name "Kiro" derives from the mythological figure of the Centaur Chiron, who gave rise to the use of herbs in the treatment of diseases. Since the project initially took shape at the Faculty of Pharmacy, it seemed natural to refer to the legendary origin of the first medical rudiments. The name Chiron was then shortened to Kiro to become a quick and recognizable word of mouth by users, especially students.

Until the academic year 2014-2015, Kiro was mainly used for the distribution of teaching material, but also as an important meeting point for students to share exercises and experiences, also with the support of specific tutors for each course. Over time, the platform has also assumed a significant value both for ongoing tests and for final exams, especially for courses attended by numerous students: approximately ,1,500 language proficiency tests are provided each year to select the students who will be entitled to access the Erasmus program.

From an organizational point of view, Kiro uses a central coordination unit belonging to IDCD, which oversees all technical-methodological aspects and that reaches the periphery through a network of structured collaborators (Kiro Managers) operating at the departmental level to give direct support to teachers.

Blended Learning. On 26 September 2013, the Ministry of Education, University and Research (MIUR) issued a Decree relating to university planning for the years 2013 – 2015. In that context, one of the objectives was the promotion of the quality of the university system, to be achieved also through actions to improve student services. Distance learning provided by non-telematic universities was explicitly mentioned among the possible actions to be implemented. Taking up this indication, the University of Pavia presented a project, positively assessed and financed by the Ministry, aimed at the preparation, by the academic year 2015-2016, of courses offered in blended mode and involving at least five degree courses. A Working Group was set up, composed of the Vice Rector for Didactics, the ICT Delegate, the Information Systems Area Manager, and the Head of the Didactic Innovation and Digital Communication Service, entrusted with the planning and management of the entire project. The action provided, on the whole, the



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live shooting of lessons in the lecture room via mobile direction, its post-production, and the upload to a video sharing platform (VIMEO), for which an ad hoc educational contract was signed.

In the end, six different degree courses expressed their interest. In order to technically implement the initiative, seven professional all-in-one audio-video directories were purchased. In June 2017, recorded online lessons were available for about 2,000 hours and for a total of 320 ECTS.

KiroLab Didactic Laboratory. The *KiroLab* didactic laboratory was inaugurated by the Rector of the University of Pavia on March 15, 2017. *KiroLab* was designed as a structure that could guarantee the pursuit of multiple objectives. The only large room available was tripartite. In the first room (more than 100 square meters), three soundproofed rooms were created, separated by glass walls communicating with each other with large sliding glass doors, each of which equipped with a maxi-smartboard, on the wall, with camera, connected to the Internet and with its own onboard PC. These smartboards can connect to and interact with mobile devices brought by users, in order to create a very simple and intuitive BYOD (*Bring Your Own Device*) environment.

This room is particularly suitable for active learning and project work with groups of students, who can work first in plenary and then in smaller groups. Everything discussed and produced in a web conference session can be recorded and then saved on the *Kiro* educational platforms.

Digital Solutions for Lifelong Learning. For lifelong learning, the University of Pavia uses a mixed model that exploits both face-to-face courses for small groups and e-learning methods based on web technologies. In particular, training based on ICT services was introduced in 2007, especially to manage courses of wide interest involving many users.

For providing online services, the University has adopted the Moodle Open Source Learning Management System, characterized by solid constructivist foundations.

In recent years, educational innovation at the University of Pavia has also led to:

- Renewal of "traditional" classrooms (better Internet connections);
- Setting up 130 classrooms with interactive smartboards;
- Creation of MOOC courses (thousands of videos are now available), for example for the pre-courses for some subjects.

Also, a project is currently starting to develop "open badges" to certify learning paths, to be included in the students' social profiles.



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GOOD PRACTICES OF THE UNIVERSITY OF LUXEMBOURG, LUXEMBOURG IN THE FIELD OF INNOVATIVE EDUCATIONAL TECHNOLOGIES

One of the key documents of the University of Luxembourg in the field of education is the educational strategy which covers innovative educational technologies.

The Charter lays out the educational values and practices to which the University's academic community commits itself. It attests to the cultural and scholarly diversity prevalent across the University campus and it highlights how students and staff harness this variety for a unique approach to learning and teaching.

The Charter is the result of a collective effort, at the heart of which is a group of dedicated faculty members who convened in 2017 and worked on this document over several months. From the outset, it was clear to this Working Group that the purpose of an Educational Charter is to become a 'living' educational mission statement, the starting point of an open-ended, university-wide dialogue involving all who participate in the University's educational life.

In this spirit, the present document presents a snapshot of an ongoing discussion, the continuation of which it hopes to stimulate and guide onto productive territory. Equally important, the Working Group has written the Charter to become a source of inspiration for pedagogical innovation. The real test for the Charter is whether it can bolster and spur pedagogical practices that make learning and teaching at the University of Luxembourg more efficacious, fruitful and rewarding. The University's study programs boast with a unique blend of dedicated students and teachers. It is for them, above all else, that the Charter is written.

With the Educational Charter, the University of Luxembourg seeks to live up to its mandate, established as part of the 'Contrat d'Établissement Pluriannuel 2014-17' with the Ministry of Higher Education and Research, to "offer an innovative and open education dedicated to the success of all students" (art. 5). The Charter testifies that, beyond individual efforts, this is an institutional commitment deserving our greatest attention.

The University of Luxembourg is a young, international research university in one of the most dynamic socio-economic environments of Europe. It is home to a diverse community of scholars and students from across the globe, who form an open and genuinely multilingual



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academic culture. It offers research-based higher education in selected study programs at bachelor, master and doctoral level, alongside professional training and lifelong learning opportunities.

With its 'Charte Pédagogique' the University affirms its commitment to offering an open, dynamic, and respectful learning environment. The Charter outlines the transdisciplinary purposes and practices of good higher education to which the University's academic community, in its diversity of disciplinary and academic cultures, is committed. It serves as a reference for reflection on teaching and learning and a yardstick for development of the University's curricula. It equally informs prospective students and stakeholders about the University of Luxembourg's education.

The Charter should be an essential instrument in order to help the University to reach its objectives in terms of student outcomes. As a research University with a stronger emphasis on post-graduate (master and PhD) programs, the University aims to train the leaders and responsible citizens that Luxembourg and the world will need in order to face the challenges and seize opportunities inherent in a changing society marked by digitalization and the third industrial revolution. In its course offering, the University includes several bachelor programs and curricula catering to the skillsets specific to the Luxembourgish context yet also firmly rooted in research. For all its programs, the University aims to provide its students with the essential transversal skills that will optimally prepare them for the lifelong learning needed to adapt to an ever-changing work environment.

Much of what makes learning efficacious, lasting, and productive, comes from interaction with peers and teachers. Peer learning can be particularly enriching when it occurs between students of different cultural backgrounds and academic interests. The University curriculum engages its diverse learners as partners in a joint discovery of the significance of specific knowledge and skills – for their personal development, for discovery and scientific enquiry, and for the crafting of solutions to socially relevant problems. To this end, the University is promoting collaborative learning environments that facilitate dialogue, peer learning, and teamwork. It encourages faculties to include interaction and dialogue in their courses, and maximize student participation through student presentations, debate, flipped classroom techniques, project-based learning, and the systematic use of student feedback. It fosters peer-to-peer feedback and collaboration among teaching staff across disciplinary borders. To bring together students with different disciplinary backgrounds, the University is working towards opening its curricula through shared and cross-disciplinary courses. Such an interactive approach to learning also means that study programs systematically involve students and their representatives in curriculum development.



The design and application of digital learning technology that enhances student interaction and peer learning is an essential part of this pedagogical strategy. Digital technology has the potential to better tailor our educational offer to students' needs and learning styles. By complementing classroom teaching with a virtual campus accessible on- and off-site, it continues peer and student-teacher interaction, facilitates content sharing and cross-disciplinary cooperation, and makes learning more inclusive. It familiarizes students with digital technology for professional collaboration, promotes digital literacy and nurtures a mature and unencumbered, yet responsible and critical use of digital tools. With its new Learning Centre, the University is currently creating a resource and infrastructure that will support a more interactive, participatory, and digitally enhanced pedagogy.

Hybrid Classrooms at University of Luxembourg

Interaction is critical into the learning process taking place in the classroom. Hybrid classroom aims at providing seamless interaction between on-site/on-line students.

To cover the present (Covid-19) and future needs, a broad upgrade of the classrooms has been performed (59 out of 83) with tracking camera, dual screens, ceiling microphone.

Campus	Belval	Kirchberg	Limpertsberg	TOTAL
Classrooms equipped for hybrid teaching	47	11	1	59
Total number of classrooms	59	21	3	83

Taking a bit of perspective, these Hybrid Classrooms open the doors to many use cases in ...

- ... **teaching:** hybrid, remote guest speaker, duplex across campuses, opening classes to sick, disabled or international students
- ... **working:** additional videoconference meeting rooms, PhD defense, collaborative space for students
- ... **events:** ideation camp, business challenge

Overall, it will help address the infrastructure challenges of a University growing faster than its buildings, or the new era of "remote" work.

Video - Hybrid Classroom @Uni.lu

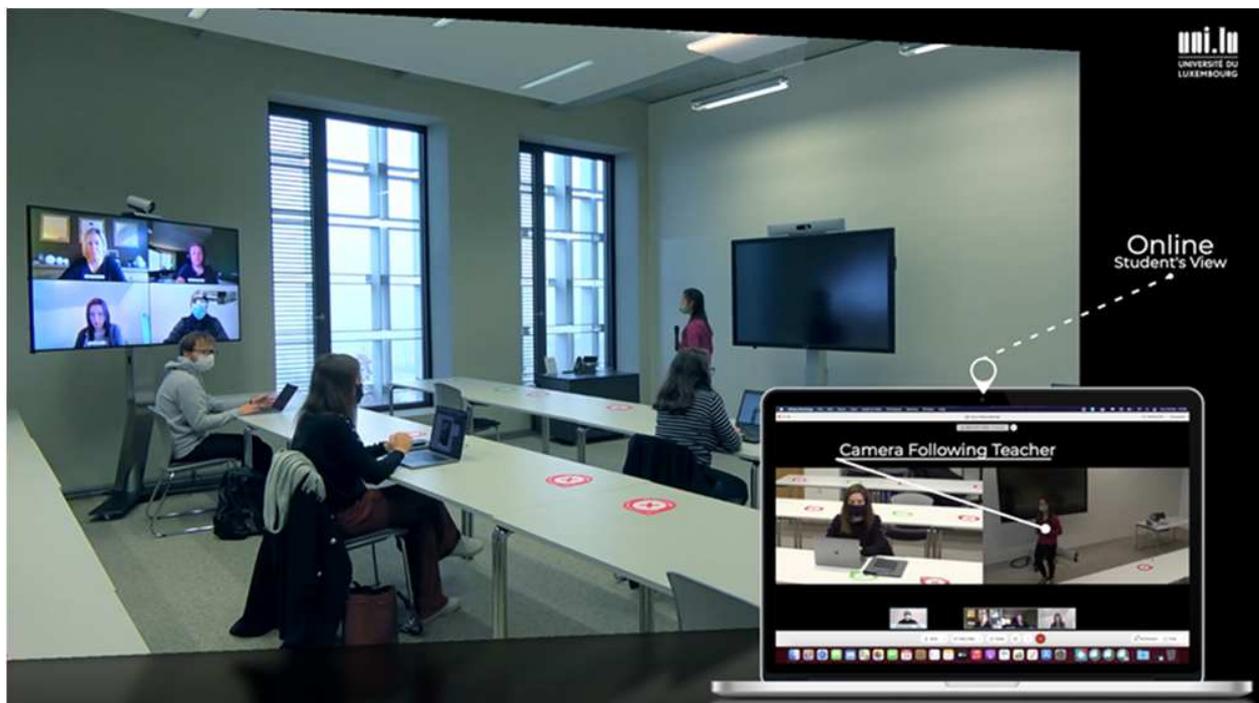


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Take a virtual tour of a Hybrid Classroom
remote.uni.lu – Platform with tutorials and guidelines helping teachers and students in
switching to remote activities



The **Institute for Teaching and Learning (T&L)** brings together researchers investigating the processes of education in communities of practice. As such, the description, documentation, analysis, explanation, understanding, and development of teaching and learning processes and related structures are at the heart of our work.

T&L study the interplay between learning and teaching in a range of contexts with the aim of developing, understanding and improving the quality of education. Contexts of inquiry in this inter- and multi-disciplinary research field can range from activities within classrooms, to extra-curricular settings, but also to initiatives outside of school contexts, including homes. Currently, T&L researchers carry out projects in the fields of language education, mathematics education, physical education, science education, teacher education, values education, computational thinking and educational technology practices.

T&L focuses on teaching or educational aspects by addressing the following topics:



- learning in and through interaction;
- pedagogy, didactics, and the practice of teaching;
- curriculum areas together with novel teaching resources and methods;
- the diversity of learning / teaching contexts in a multicultural society;;
- the influence of non-school factors on school success, low completion rates and school dropouts;
- assessment and evaluation.

In sum T&L researchers study learners in context and explore ways to improve practices, competences, skills and learning in various disciplines, for various age groups and in various settings. Researchers also seek to problematize the qualifications required by a society under digital transformation and in search of sustainability solutions, i.e., the need for thorough knowledge, skills and expertise in order to innovate and transit to a more sustainable future. The prospective flexibility and adaptability of the educational system as a whole (e.g., embracing kindergarten as well as vocational education and professional training) call for studies on the interplay between the education system and a changing society. This interaction constitutes a crucial challenge for today's societies and an important object of inquiry for educational research in T&L.

Individual approaches of Professors at University of Luxembourg

We collected individual answers of professors about teaching techniques used nowadays in the light of the current pandemic. Here is the summary:

- Intensively used Webex for the lectures and exercise discussions with the students (a tablet for writing and PDF slides for presenting reference solutions). Besides the online lecture, the students receive the slides (made with PDF latex) and extensive lecture notes (written in Latex). Every 3 weeks they receive an assignment sheet with problems, which they are requested to solve and submit to Moodle in PDF within 2 weeks' time.
- Regular tests via Moodle (so-called "Matching", which is similar to a "Multiple Choice", but different from that in evaluation). They have a duration of 30 minutes each and consist of 9 questions with 5 possible answers each, of which 0-5 are correct.
- Running in total around 4-5 tests per semester right after the discussion of a regular assignment sheet and closely related to its topics. This enables the students to answer advanced questions.
- The remote classes with power point and recorded audios/videos.
- Moodle for sharing all documents and exercises. For live sessions: Webex and Webex training. In Webex, using breakout sessions to divide the class in teams for small assignments.



- Using different commercial software products in project-based classes so that the students learn the instruments used in practice, for the exams using Moodle quizzes.
- The Beer Game' teaching supply chain dynamics through a board game.
- Visualization/diagramification is central in formal disciplines to explain the fundamental ideas of concepts and proofs.
- "Scrum for Education" thingy for discrete math.
- A "quiz" platform with prepared questions where you could see the spread in the answers.
- "Socrative".

Common end-user software provided by SIU (Information service of University)

- Adobe Acrobat - Software to produce and manipulate PDF documents
- Adobe Creative Cloud - Bundle of graphic and media software - Bridge, Photoshop, Lightroom, Illustrator, Dreamweaver, InDesign, Premiere Pro and AfterEffects...
- Adobe Spark - Create and share visual stories
- Geographic information system (GIS)
- DropIt - Cloud storage
- Endnote - Bibliographic Software
- iThenticate - Anti-plagiarism service
- Malwarebytes Endpoint Protection - Anti-malware
- Mathematica - Technical computing software
- Matlab - Numerical computing, data analyse, algorithms
- Ms Office - Office suite for word processing, spreadsheets, presentations, communication
- Ms Project - Project management software
- Ms Visio - Diagramming program
- Overleaf - Online LaTeX platform
- Parallels desktop - Run virtual machines on Mac
- SPSS Amos - Structural Equation Modeling
- SPSS Statistics - Statistical software
- Stata MP2 - Statistical software



GOOD PRACTICES OF THE UNIVERSITY OF COIMBRA, PORTUGAL IN THE FIELD OF INNOVATIVE EDUCATIONAL TECHNOLOGIES

The University of Coimbra has since the 1980s conducted research, coordinated and participated in projects, programmes and other initiatives that foster the use of Information and Communication Technologies (ICT) with educational purposes.

Distance Learning Unit

The University created a Distance Learning Unit (UC_D) in 2010. UC_D develops high quality distance learning courses in different fields of knowledge. The target audience of these courses are graduates that seek training courses, due to their demanding academic and/or professional careers.

UC_D is also very much aware of the need to develop research and to create or follow new contexts, therefore, within its scope it has developed research and cooperation in order to improve practices and to consolidate pedagogical models, as well as to develop new pedagogical and management instruments.

Therefore, within UC_D's scope are:

- Design, planning, development and management of UC's distance learning courses;
- Providing support to UC teachers in the development of distance learning courses, namely in the instructional design phase where the pedagogical strategy is defined in a way that it makes the best and most effective use and of the resources and means available in the Learning Management System (LMS) used by UC_D, thus contributing towards the high quality of the courses;
- Production of multimedia and other interactive resources to use in the online courses;
- Implementing courses in the LMS used by UC_D;
- On-going and permanent support in tutoring the courses, namely through technical and pedagogical monitoring and support provided to students and teachers during the course delivery;
- Whenever required and justified, the support in the technical and pedagogical design of curricular units from study cycles, namely 2nd and 3rd cycles;
- Evaluation processes related to UC_D's activity, as well as the specific evaluation of each course through satisfaction questionnaires applied to students and teachers;
- Development and management of UC_D platforms for training and communication, including the development of webpages to meet the specific needs in the scope of project and activities;



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- Support in the design and development of national and international projects contributing in the scope of distance learning;
- Development of research on topics related to distance learning or ICT in Education;
- Development and Delivery of UC Teachers' Training courses in its scope;
- Development of online resources for teachers, namely for the use of different platforms that support teaching and learning: ZOOM, Google apps.

Learning and Pedagogical Innovation Unit

A Learning and Pedagogical Innovation Unit (AIPED) was created at UC in 2020:

- To stimulate pedagogical Innovation within UC and transform its curricula and pedagogical practices;
- Leverage the continuous improvement of learning and teaching;
- Promote academic success and prevent early school drop out
- Prevent academic fraud and plagiarism;
- Promote pedagogical innovation and learning improvement projects;
- Promote innovative processes towards inclusion, literacy and tutoring.

AIPED has developed several activities to fulfil these aims:

- Brave New World Annual conference:
- Annual UC Pedagogical Innovation Awards: teachers with innovative pedagogical projects are the contenders and 5 projects are awarded by a panel. The winning projects in 2020-211:
 - AAI4all – Teaching Artificial Intelligence: using an innovative student centred method linked to scientific research.
 - Joining Knowledge at UC: stimulating students of artistic studies' creative process through research projects in the field of neurosciences.
 - Happy@UC – UC Campus Happiness Program
 - Histórias a Direito: a learning experience through YouTube
 - DÁ SAÚDE, group collaborative work to promote critical thinking to use Design to change Health Care.
- Design Thinking Initiatives
- Resources Database
 - Pedagogical resources for teachers
 - Complementary skills resources for students
 - Societal Challenges database
 - Volunteering opportunities
- UC Teaching Labs: training courses for UC teachers



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- New digital learning platforms @UC;
- Learn and teach on site and remotely: students and teachers' perspectives
- Flipped classroom & Peer Instruction;
- Project Based Learning (PBL);
- Planning, developing and implementing on a b-Learning environment
- Learn to live with the unforeseen and the isolation: impact
- Applying Multiple perspectives model
- Monitoring and evaluation strategies with digital resources;
- Planning, producing and using audio-visual digital contents in pedagogical contexts;
- Academic Fraud – Students and teachers' perspectives
- Students Skills@UC: workshops or short training courses for UC students.

Academic Management Information System and Teaching and Learning Platforms

The University of Coimbra has developed its own Academic Management Information System, which supports and manages the academic life of over 22.000 students.

More recently it has developed its own Platforms to support teaching and learning in face-to-face and blended environments. These platforms include private online rooms, synchronous streaming, exams, live chat and file sharing. They are fully integrated with UC's Academic Management Information System for security and reliability and they are undergoing further developments to offer even greater support to teaching and learning:

- UCTeacher;
- UCStudent.

Online libraries, repositories and databases

Seeking to support teaching, learning and research, UC has also developed online libraries, repositories and databases, or partnered with existing developers.

Any student in the University of Coimbra can access a wide range of documents, publications and multimedia content via local and national digital libraries. Online students can access: *iTunesU*; *Estudo Geral UC*; *UCDigitalis* and *B-on*. Some of the tools are only available on campus or after student authentication.

- ***Estudo Geral UC***

Digital Repository for the Scientific Production of the University of Coimbra
Website: <https://estudogeral.sib.uc.pt/?locale=en>

- ***UC Digitalis***

UC Digitalis is a global project of the University of Coimbra for the collection and dissemination of digital contents.



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Website: https://digitalis.uc.pt/en/content/uc_digitalis

- **iTunesU**

The University of Coimbra partnered with iTunesU to offer open resources developed by UC's teachers and researchers.

Website: <http://itunesu-repository.uc.pt/itunesu/>

- **B-On**

The *Biblioteca do Conhecimento Online* – b-on (Online Knowledge Library) makes unlimited and permanent access available, within the research and higher education institutions, to full texts from over 16,750 scientific international publications from 16 publishers, through subscriptions negotiated on a national basis with these publishers. This database is accessible to the students and staff of all national partners, including the University of Coimbra.

Website: <http://www.b-on.pt/en/>

More recently, the University of Coimbra has partnered with *Amazon Web Services Academy* for capacity building in digital competences and with *Microsoft Learn for Institutions* to provide training in *Digital Intelligence for Sustainability*.

UC Classroom Infrastructures

In general, classrooms are equipped with video projectors, and some have cameras and sound systems.

There are several Video Conferencing Rooms in the different campuses.

There is a Classroom of the Future in the main campus equipped with interactive boards and an interactive table, and there are some interactive boards in campus.



CONCLUSION

The current document provides a snapshot of the good practices and experience of the EU partner universities in the field of innovative educational technologies and their implementation into the teaching and learning contexts of each institution. Though positioned in different geographical areas and subject to different national regulations in the field of higher education, all four European universities comply with the agenda of the European Commission to improve the digital skills of European citizens taken during the Gothenburg Summit in November 2017 and outlined in the *Digital Education Action Plan (2021 – 2027)*¹. In fact, each of the four EU universities has started the process of digital transformation of education earlier than 2017 due to the need to respond to demands of a new generation of learners – the so called “digital natives” who are tech savvy and who prefer to get information quickly while multi-tasking, to collaborate online and to communicate using various digital channel.

The good practices of the four European universities in resetting education and training for the digital age presented in the Compendium can be summarized in the light of the priorities of the European Commission as specified in the *Digital Education Plan (2021 – 2027)*, namely:

1. MAKING BETTER USE OF DIGITAL TECHNOLOGY FOR TEACHING AND LEARNING

All four EU universities have taken action to:

- equip their education spaces with digital technologies that allow for the provision of online or blended teaching and learning opportunities (incl. the provision of high speed internet access and sufficient number of devices such computers, work stations, computerized laboratories etc.);
- make structural changes on institutional level to create relevant units that lead and support the implementation of digital technologies in education on institutional level – e.g. the *Centre of IET* (University of Ruse, Bulgaria), the *Didactic Innovation and Digital Communication (IDCD) Service* (University of Pavia, Italy), the *Distance Learning Unit (UC_D)* (University of Coimbra, Portugal);
- constantly review and update their existing digital strategies in order to fill in existing technology gaps in their infrastructure, devices and capacity to offer and deliver high quality modes of learning and teaching (hybrid, remote or on-site);
- use existing or design their own digital platforms to suit a number of purposes:
 - to upload digital training resources targeted at academic staff and / or students – e.g. the *Virtual Library* (at the Centre of IET, University of Ruse), *Online community for teaching – Kiro* (University of Pavia, Italy), the MOOC

¹ https://ec.europa.eu/education/sites/default/files/document-library-docs/deap-communication-sept2020_en.pdf



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courses and video lectures (University of Coimbra, Portugal) and the Hybrid Classrooms (University of Luxembourg, Luxembourg);

- administrative management of students and teaching staff – e.g. the *Academic Management Information System and Teaching and Learning Platforms* (University of Coimbra, Portugal);

2. DEVELOPING RELEVANT DIGITAL SKILLS AND COMPETENCES FOR DIGITAL TRANSFORMATION

All four EU universities have taken action to create:

- structural units that:
 - contribute to the development of educators' digital skills and competences in order to foster digital teaching and learning – the *Centre of IET* (University of Ruse, Bulgaria), the *Didactic Innovation and Digital Communication (IDCD) Service* (University of Pavia, Italy), the *Institute for Teaching and Learning (T&L)* (University of Luxembourg, Luxembourg), the *Learning and Pedagogical Innovation Unit* (University of Coimbra, Portugal);
 - support the implementation of digital pedagogy and tools, along with the development of teacher's expertise in digital training and assessment;
 - foster the development of learners' digital skills through curricula reforms on institutional level and provide open spaces for digital training and collaboration of learners.

3. IMPROVING EDUCATION SYSTEMS THROUGH BETTER DATA ANALYSIS AND FORESIGHT

All four EU universities have a long-term experience as coordinators or participants in projects developed under different European programmes and frameworks which allows them to exchange information, good practices and know-how in the field of the digital transformation of education. Thus, they are able to not only follow the recent developments in the national digital education initiatives across Europe, but also strive to enrich the scope of their digital teaching and training activities and engage the active participation of key stakeholders in them.