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

e-DESK

Digital & Entrepreneurial Skills
for European teachers

A Methodology for Digital and Entrepreneurial Teachers

CISE Centro Internacional Santander Emprendimiento UCEIF
UC Universidad de Cantabria
Editorial Universidad Cantabria
foi University of Zagreb Faculty of Organization and Informatics Varaždin
LUT Lappeenranta University of Technology
NOVA University Lisbon

TOOLKIT/GUIDE FOR EDUCATORS

INDEX

e-DESK METHODOLOGY

Introduction. The e-DESK project

This methodology was created as a core for e-DESK (Digital And Entrepreneurial Skills For European Teachers) project, an intervention co-funded by the European Union through the Erasmus+ programme.

e-DESK is about hybrid university education, fostering the digital and entrepreneurial skills of teachers and students. The COVID-19 pandemic has turned our lives upside down. We live surrounded by technology, but this situation has made visible some gaps that university education needs to fill to offer young Europeans a development in line with today's demands.

To address these needs, e-DESK puts the focus on continuous teacher training. We want to enhance teachers' digital skills and entrepreneurial competencies by designing a hybrid methodology in which face-to-face teaching and digital environments are combined. The final idea of e-DESK is to bring education closer to all students, to understand their way of using technology so that education adapts to new uses and to blur the frontiers through the possibilities offered by digital environments.

For that, our project has designed this hybrid methodology you are now about to use, to develop education, both in physical classrooms, outdoors and in digital environments, and to bring education closer through a hybrid methodological solution (physical and digital) to reach students anywhere in Europe and the world.

We aim to support the professional development of university teachers to make them able to respond to the needs of their students, to help develop the digital skills of educators and to know methods for their effective incorporation into lessons.

e-DESK is also about entrepreneurial competencies for educators to better understand European youth's needs to improve their employability and social integration, knowing the use that young people make of technology, in order to adjust the design of our teaching activities.

The e-DESK Methodology guided the implementation of the MOOC course "Digital and Entrepreneurial Teachers for a Fast-Changing World" for HEI teachers, designed by the project. It gave a frame on

how to create MOOC modules, selecting modules in hold and represent the modules logically in the MOOC. The methodology guarantees that MOOC users will get a wide and thorough understanding of digital and entrepreneurial skills teachers need in today's world.

The e-DESK methodology also contains key concepts based on the EntreComp framework, for educators to learn entrepreneurial skills to be part of an educational system that needs to be alert and responsive to change and capable of designing and implementing new solutions to complex challenges.

All e-DESK deliverables are an Open Educative Resource, free to use under a Creative Commons Licence, for individuals that want to develop their skills or, on an institutional level, to implement digital and entrepreneurial teaching in education. The e-DESK methodology aims to serve as a reference for educational institutions and educators all over Europe for designing, adapting, implementing and/or measuring hybrid educational programs and teaching methodologies.

The e-DESK programme is targeted for the HEI teachers to skill up entrepreneurship education competence in online teaching methods/practices and to develop their online teaching skills and to enhance the entrepreneurial competences for their learners.

Forewords

As of July 2020, 98.6% of learners worldwide were affected by the pandemic. It is estimate of 1.725 billion students from pre-primary to higher education in 200 countries were affected by lockdowns (United Nations, 2020). The other way to depict the scale of the magnitude of the Covid-19 is well stated by Kaplan et al. (2020) when a third of the global population worldwide was on a quarantine lockdown in spring 2020. The teachers and their teaching practices world widely changed from traditional face-to-face to different modes of digital learning in short time if not instantly.

The e-DESK programme is targeted for the higher education teachers to skill up entrepreneurship education competence in online teaching methods and practices and to develop their online teaching skills and to enhance the entrepreneurial competences for their learners. The objective of the e-DESK programme is to introduce the future of education trends in an online environment. Participating teachers are introduced to concrete entrepreneurship methods, and online tools that may be applied in their teaching practices to enhance their learners' entrepreneurial skills, competence, and mindset.

At the latest this unprecedented global pandemic brought the online learning and distance education as a daily teaching practice. With its newness though, it brought its challenges both to learner and to teachers. According to the literature the changeover from traditional face-to-face learning to online learning has been experienced differently by students and the teachers. Yet, everyone has had to adapt to it with the knowledge, skills, and resources they have had available. Challenges on online education were met differently depending each country, of course according to the existing infrastructure system and even on each institution level. Those institutions with an advanced IT strategy just shift into e-learning mode nearly instantly; for the others it took longer. Yet, similar challenges were widely identified with e-learning; first is naturally the IT accessibility, affordability, and flexibility, followed by pedagogical competence combined with the online teaching and learning methodologies and modes (Murgatroyd, 2020).

Adding to the challenges in digital teaching competences, online learning environment makes the provision of entrepreneurship education (EE) difficult (Liguori & Winkler, 2020; Kassean et al., 2015; Kuratko, 2005). It is said that entrepreneurship education as a discipline requires students to acquire practical competencies by learning by doing and gain experiences in real world settings (Liguori & Winkler, 2020).

IT- technology is advancing rapidly. Thus, innovative, and new learning upskilling is needed not only for IT- skills but also in teaching methods and modes of practices. Recently OECD (2021) calls for upgrades in

digital curriculum, that is personalized, cross-sectional and competency based; yet to be aligned with its previous recommendations on uplifting the teachers' skills (OECD, 2018; 2020).

The e-DESK methodology is built with the objective of upgrading the teachers' IT skills and entrepreneurship education competence in their teaching practices. The methodology chapters are weighted based on the survey results that were equally and carefully analysed.

Introduction to the e-DESK methodology

The main purpose of this e-DESK methodology, as any basic research, is to generate knowledge by evidence research practices in applying entrepreneurship education to the online digital teaching environment, namely in the hybrid teaching format.

First the project seeks, predicts, and understands the change in teaching practices during the phenomena forced by Covid-19 pandemic all over the world as almost all teaching was shifted to online learning environment (Radha et al., 2020). Its goal is to provide tools, methods and means to enhance online teaching practices that are needed. Further its objectives are to enhance entrepreneurship education in an online environment.

The research process for developing the e-DESK methodology takes its shape from the results of initial survey that was conducted in four European countries and bases on findings it exposes. Its key choices are thus based on the needs of the target group: HEI teachers.

The initial survey itself is developed in cooperation with all partners of the e-DESK project. The survey was compiled based on the objective of e-DESK programme:

The ultimate objective of e-DESK project is to prepare European teachers and educators for using meaningful education and pedagogical tools in an increasingly globalized and rapidly changing environment, by developing key skills demanded by the needs of their students.

Such a project only makes sense when considered transnationally, firstly because the motivation behind the creation of this project came because of a pandemic crisis that left no one out of its impacts and secondly, because education is the pillar of any society, and we should aim at developing international strategies that can reduce the inequalities and the unfairness of the educational system.

The formulation of the e-DESK methodology reflects to the ongoing discussions of OECD (2020) the teachers and school leaders (OECD, 2018) within European Union feeling not well prepared for using digital technologies in their daily work. The challenges might be directly technological or focus on how to engage learners on an online environment. Thus, by seeking the specific obstacles via the evidence-based inquiry and reflecting them toward the digital competencies (DigComp) as well as consultation of several experts in both digital education field and entrepreneurship education field gives a baseline for the MOOC course formulation.

The basic research was carried out as it was necessary for the formulation of the survey itself to reach the set goal of the programme. The goal is to upskill teachers in applying entrepreneurship education practices in an online environment.

The teachers' own online education skills are crucial in understanding how students use technology for educational purposes, and they are also explored to adjust their needs accordingly (OECD 2021). Further the teacher role in delivering the entrepreneurship education in their classrooms regardless of the format is pivotal (Ruskovaara, 2014).

Entrepreneurial education skills, methods and mindsets are essential for the future generation of young people to improve their employability and contribute to creating new opportunities, better jobs, and solutions to the big challenges that are faced in our society in European Union and beyond (EC, 2018). Therefore, it is important that the teachers to have an understanding about the entrepreneurial competencies (Bacigalupo et al., 2016).

The methodology focuses on entrepreneurship education and teaching practices in an online learning environment, especially in a hybrid education mode. In addition, it examines the assessment methods applicable in online education.

The hybrid education involves the knowledge, planning of the course and creation of an environment that places students at the center of the teaching process, being able to combine both the digital and face-to-face environment, depending on the context, to answer to new societal demands (Gornitzka & Maassen, 2000) and to deliver the entrepreneurial competences to students. It focuses on the challenges of and adoption of new methods of assessment on hybrid modes.

The ultimate objective of the course is to prepare teachers to the design and production of a stand-alone digital course (MOOC) with needed skills and tools for educators to successfully manage their teaching activity on a digital environment with entrepreneurial competences. It facilitates an online learning design tool presented later in the methodology. The target group is the higher education teachers.

RECENT RESEARCH EVIDENCE

The information and communications technology (ICT) has been recently more and more applied in delivering education. Sun et al., (2008) already more than ten years ago predicted that e-learning will be an emerging paradigm of modern education (Sun et al., 2008). The predicted scenario came into full speed under the prevailing conditions erupted in the spring 2020 due to the Covid-19 pandemic and worldwide lockdown. The digital learning became at times the only solution and means to deliver education (Radha et al., 2020).

To enhance the teachers' competence in online teaching practices, the first essential step is to review the recent studies that assess students' experiences in online learning. The literature reveals that COVID-19 related factors naturally impact students' intention to engage on online learning either by challenges or its awareness directly (Nikou and Maslov, 2021). According to Nikou and Maslow (2021) students' perception on online learning effects can be mediated through perceiving how useful practices are and how easy it is to use the e-learning systems or platforms.

The challenges that rise from the above-mentioned survey are how to motivate, engage learners to participate in online learning lessons, and how to build learning groups, or apply the right kind of group dynamics (Nikou and Maslov, 2021). According to Hattie & Yates (2014), staying focused on something over 15–20 minutes at a time is not possible. Thus, even more in an online environment than in a classroom, the educator needs to find ways to facilitate learning by using many different methods, and keeping the students motivated and participating actively. This may be achieved by variation of working individually, discussing, and solving problems in pairs or in small groups between lectures, and by integrating videos, games, polls, etc. to teaching (Biggs, J. & Tang, C., 2011).

Research results by Nikou and Maslow (2021) showed that the educational institution's preparedness does not directly impact the intention of students to participate in e-learning during COVID-19. The results highlight that for example the length of the use of e-learning systems impact students' e-learning systems use (Nikou and Maslov, 2021).

Teachers are increasingly using IT technology in their teaching practices; and they replace some of the traditional face-to-face classroom sessions partly with modes that are entirely online (Nikou and Maslov, 2021). The e-learning takes place in both an online environment and a face-to-face setting or offline.

Survey research results as a base for the methodology

By leaning on the evidence, the survey research results highlight the hybrid learning challenges being the utmost experienced challenges in online teaching. Further it raises the need for the upskilling of the assessment methods. The e-Desk provides online toolboxes; introduces various online learning methods and modes. It introduces the most common EE practice methods, and those tested to be delivered in an online learning environment. To summarize it introduces a Learning Design Tool for the Teacher to assist them in their own course planning and design. At the end it presents the practices that are presented in the following chapters.

The e-DESK project collected data from European teachers in 2020 of their experiences of the change in teaching practices at the beginning of the pandemic. The data is rich and manyfold, and in line with other research data collected. What came out clearly was the need for deepening the teachers' own skills in embedding entrepreneur education in teaching and learning as well as need for improving the teachers' own digital skills, both in a hybrid education mode and blended learning mode. This is where e-DESK methodology together with MOOC course design can make a difference for the future. Improving their own entrepreneurial competencies will make it possible for the teachers to convey the importance of an entrepreneurial mindset in their students, thus giving the students significantly better competencies in their future careers, as active members of society, better qualified to create value for others. When increasing their own digital teaching skills and being able to apply the appropriate methods of delivery fluently irrespective of the learning environment, teachers can focus on the content of their teaching and give their best performance.

The analysis report on the survey is part of the project deliverable documents like this methodology document. Furthermore, the research paper was published based on the results (Svetec et al, 2022).

LEARNING AND TEACHING MODES

The e-Desk project defines the online learning mode concept as follows:

Full digi = In full digital learning, the student completes the course entirely online. Full digi does not require the presence of the student on campus.

Blended learning = Blended learning can include many different teaching methods and their applications. The learning environment consists of an online environment and contact teaching.

Hybrid learning = In hybrid teaching, participants are simultaneously present in the same classroom either / or remotely over a network connection.

In the following, we will explain three, today very common teaching modes in more detail, that is, blended learning, flipped classroom, and to a more detail, hybrid learning, which is at the core of e-DESK.

Though blended and hybrid teaching modes are today distinguished from each other, it needs to be noted, that still quite recently they have used interchangeably in the same context. Therefore, some care needs to be executed in discussing the different teaching modes, both in peer discourse and in interaction with students, especially.

Hybrid

The term hybrid, by definition, means something that is formed by combining two or more things; of mixed character, composed of different elements. Hybrid learning means there are less or different routine classroom meetings with every learner present at once. In the hybrid learning session contacts are maintained through multiple channels. The hybrid classroom can be called a multi-local classroom, where simultaneously some of the students are present at a classroom site and some are in distant locations, so in a broad sense, a singular environment.

In the sense of hybrid work, the hybrid learning concept may have existed since early 1990s when distant learning and a flexi-work concept were introduced (Pekkola, 2002).

The hybrid learning became a daily routine at the wake of the COVID-19 in spring 2020. The idea of remote or distant learning that has been developed in the last two decades caught up in full speed in one instant worldwidely. In times of crisis there is a need for some degree of improvisation with educational methods that incorporate entrepreneurial thinking (Krishnamurthy, 2020). Hybrid teaching and learning is part of the phenomenon that is changing the nature of the classroom.

The technological revolution allows the change with multiple different IT tools and workspaces such as communication tools and learning platforms or portals. The technology is now intervowen (Ratten & Jones, 2020) into everyday teaching and learning. However, hybrid teaching and learning is more than just transferring former teaching models and lessons online. Although it seems to be convenient by saving time, and even saving the classroom spaces and facilities, it is more than just working with learning platforms, and operating computers online.

The hybrid teaching allows many new opportunities, yet to sync multi-locations, few issues such as the 'house rules' seem to be essential. It means the instructions for the learners must be made clear right at the beginning of the course or sometimes even repeated at the beginning of each lecture session. It is essential that all learners know what technology is being applied, how to access and where, to enhance the usefulness and effectiveness of online learning (Nikou and Maslow, 2021). The clear instructions will ease using the e-learning systems. It is equally important to enhance the students' perception on online learning effects by giving clear assignments, timetables, and assessment criteria as it would be done in the traditional classroom. Further, the clear schedule of time lapses on the screen and breaks are recommended since it has been noted that engagement. (Nikou & Maslow, 2021)

The hybrid teaching necessitates the understanding changes in classroom dynamics. In hybrid classroom, the original teacher's led authority or control shift more and more to the learner's responsibility. The teacher's traditional role shifts from more and more from the traditional center stage lecturer to enabler and facilitator. It leaves openness and responsibility to the learners and emphasises the importance of the learner's self-efficacy (Bagicalupo et al., 2016).

The entire organizational dynamics in classroom changes by adding many new constraints that were not a concern before. Although the technology is developing fast, and it is easing the distant learning, it still sometimes disrupts in the flow of teaching. The technology related obstructions tend to happen, and it can hamper the entire learning situation. The internet technology disruptions or systems collapses have happened both in teaching and learning ends. The statement 'you have a bad connection' is familiar to all by now. Yet as time is limited, the impediments will simply limit the operations. It is something to consider when planning the lessons.

All the teaching approaches, whether the traditional lecture or case study, group discussion, individual presentation, individual written report, group project, formal lectures, guest speakers, action learning, seminar on web-based learning go through though online window (Lonappan, 2011). Thus, an alternate technological option needs to be sorted to proceed e.g., video recording. To summarize, the 'plan B' becomes essential.

Other issues the hybrid world brings with contacts are maintained through multiple channels, the supervision of the classroom participation and performance. It is not only harder to follow lectures online than being on site; similarly, it is harder to follow if participants are remote, let alone how they engage as a team in the learning process.

The term 'Hybrid Learning' indicates to a learning method that simultaneously combines traditional contact instruction and distribution of learning online. It is characterized by the asynchronous involvement of different digital technologies. The highly advancing digital technologies and tools make it possible to learn in a hybrid mode: part of the learners are present, and part of the learners are online and learning in distance mode. The modern IT technology allows simultaneous interpersonal interaction. Even more significant is the fact that this interaction is happening in real time and instantaneously. Yet hybrid teaching requires different skills and competences of a teacher than if teaching took place in an all e-learning environment in a full-digi mode or in an all-traditional contact learning environment.

The main goal of the e-DESK is to present how to design and plan hybrid educational programs by best practices available. It also

collects the best practice samples and lines up the common key success factors. Sun et al. (2008) suggests that in hybrid lesson planning it is essential to consider that the perceived e-learning satisfaction is depended on the six dimensions: learner, instructor, course, technology, design and environmental especially in times of crisis but also in general. Some degree of extemporization with educational methods that incorporate entrepreneurial thinking are essential (Krishnamurthy, 2020). Furthermore, hybrid lessons need to consider the critical factors pointed out by Nikou and Maslov (2021) that are crucial in affecting learner's perceived satisfaction. They are the key elements that reduce learners' computer anxiety and are indispensable of instructor's attitude toward e-learning. Some examples are e-learning course flexibility, e-learning course quality, perceived usefulness, perceived ease of use, and diversity in assessments (Nikou and Maslov, 2021).

Research and literature on hybrid learning is emerging rapidly, and besides academic publications, there are quite many blogs which teachers can quickly and easily explore for more insight on good practices.

Another way of inspecting the characteristics as well as benefits of hybrid teaching and learning is presented below, followed by an overview of differences between various teaching modes. These are, of course, examples, but can give hints how to approach the subject from different points of view when planning a hybrid session.

According to Barron et al. (World Bank Blogs, 2021) there are three distinctive features to categorize hybrid learning:

- Time (when): which can be synchronous (at the same time, also known as "real time") or asynchronous (sequential, at different times) or it can have a bit of both.
- Space (where): which can be in person (also known as face-to-face, sharing the same physical location) or can be remote (two or more people in different physical locations).
- Interaction (how): which can be unpacked in terms of the direction of the communication (one-way; bi-directional or multi-directional) or type of engagement, from no-participation (an individual is learning alone without interaction with others), limited participation (where the interaction with others is limited, structured, or controlled) and high participation (active and dynamic exchange with others is regular and essential).

Comparing learning modes (hybrid/online/blended/flipped):

	HYBRID LEARNING	ONLINE LEARNING	BLENDED LEARNING	FLIPPED LEARNING
Meaning	In hybrid learning, the teachers conduct both offline and online classes for the students simultaneously.	As the name suggests, online learning aims at teaching the students completely online. The complete academics (theoretical instruction) of the student is executed via online mode with no in-person involvement.	Blended learning is the combination of offline learning with an online learning experience.	It is a type of blended learning approach that 'flips' the traditional method of a teacher teaching by one or many students being independently engaged in activities that boost their potential.
Mode and platform	Conducted both online and in-person; it depends on the students how they want to attend the classes.	The teachers conduct live classes via online applications like *Google Meet and Zoom meetings.* The students are also provided with online study material.	The physical presence of both the students and educators is usually required. Apart from the dominance of traditional teaching methods, students are also engaged in online educational activities, computerized learning, and other digital means of learning.	This may require both the online and offline presence of the students. It involves an *experiential learning strategy* that demands the active participation of students in their classes.
Note	Students are provided with online study materials, and they can attend the classes from anywhere they wish to.	Since last year [2020], almost every educational institution has taken up this mode of teaching.	It is different from hybrid learning as it requires the presence of all the students for offline classes which are assisted with digital learning techniques.	It doesn't mean that students are not taught in the class. It aims at make them capable of experiment, analyze and comprehend the assigned tasks under the guidance of the teachers.

Blended

Blended learning is understood as a combination of two different learning systems, namely, the traditional face-to-face learning and digital online learning systems. The blended learning has expanded as the IT technology has enhanced the availability of new communication technologies (Bernard, Borokhovski, Schmid, Tamim, & Abrami, 2014; Moskal, Dziuban, & Hartman, 2013). In addition, blended learning includes virtual environments (Powell, 2015) that are facilitated by using internet-based technology and computer aided tools, for example, the learning design tool, learning management platforms (Moodle) and communication forums (Zoom, Teams), and other communication means like e-mail and communication applications (Heinze & Procter, 2004). Here we refer to the traditional learning system as face-to-face learning. The main characteristics of traditional teaching methods are often teacher-centered (teacher is the only expert, authority) whereas students have observing and passive roles. Yet in EE the learner is the center of learning and action, and the teacher role shifts to a moderator, a coach or even a mentor (Ruskovaara, 2014).

The main concept of blended learning is referred primarily on both the physical and digital learning (Anthony et al. (2020) or alternating them in a sense that e-learning itself takes place both in an online environment and in a contact or face-to-face setting or offline or in full-digi mode. However, Hrastinski (2008) points out that it is important to remember that e-learning participation does not only occur online but also takes place offline (Hrastinski (2008). He states that the learning requires time and energy, to process the learned information and knowledge, to communicate about it, to think and finally to assess and reflect what has or has not been obtained. This process normally happens physically Hrastinski (2008). Learning in e-environment is time-consuming and differs from the learning process in traditional learning settings, as the distraction in an online environment and a physical classroom environment are different.

ENTREPRENEURIAL EDUCATION

Our survey results indicate that the teachers themselves feel pedagogically competent, and experienced. The target teachers rate their own IT skills and knowledge at a reasonably high level. Yet at the same time, during the pandemic more IT support is welcome.

Based on the survey results for this methodology the informants were not very familiar with EE learning, yet online learning was something all had engaged in prior to Covid-19; and fully engaged during and after pandemic. Some were more than happy with an online learning environment, producing videos and materials; yet some were not. A common dilemma seemed to be how to engage, motivate and keep students participatory in the lessons.

The objective of entrepreneurship education is to be learner centred. This is to say that the learner himself or herself is agent of one's own learning. To activate the learners' entrepreneurship education uses various learning environments, tools, and good goals/best practices of the educational institution. Teaching emphasizes social and working life skills, entrepreneurial mindset and initiative, teamwork skills, responsibility, innovation, and creativity, as well as self-awareness and self-efficacy.

Various tools, pathways and operating models have been created to support entrepreneurship education. Training has been developed for teachers to help them understand the purpose and goals of the education itself as well as understand how entrepreneur-ship education supports the implementation of the curriculum (Oksanen, 2020).

Entrepreneurship education may be considered as a method for the teaching practice and a content of teaching and learning (Ruskovaara, 2014; Seikkula-Leino 2006: 2007). Gibb (1996; 2000; 2002a, 2005) crystalized entrepreneurship education being about learning through, for, and about entrepreneurship, taking place in an entrepreneurial learning environment, and being about dealing with, creating, and enjoying uncertainty and complexity (Ruskovaara, 2014; Gibb 1996; 2000; 2002a, 2005).

Entrepreneurship education prepares and enables the learners in their career planning, provides an entrepreneurial way of examining and executing matters and can be used to characterize teaching and learning (Ruskovaara, 2014; see also Cooper et al., 2004; Fiet, 2000a, b; Pittaway & Cope, 2007; Rae & Carswell, 2001; Steyaert & Katz, 2004).

Following our investigation, we aim to utilize entrepreneurship education as an option to participate, engage and motivate learning.

Entrepreneurship teaching methods

Earlier studies on teachers' role as entrepreneurship educators (e.g., Fiet, 2001a; Bennett, 2006; Birdthistle et al., 2007; Löbler, 2006; Hytti & O'Gorman, 2004; Jones, 2010) state that the teachers' role is pivotal in delivering EE (Ruskovaara, 2014). It applies also in an online learning environment. Thus, teachers' EE competence is valuable when determining the appropriate teaching and learning methods in EE in an online learning environment and respective learning objectives must be taken in account.

Teaching entrepreneurship dialog is presented multifold and there is no one possible way to apply it. Ruskovaara (2014) states in her thesis, "learning through, learning for, and learning about entrepreneurship" by Gibb (2005) being the most used way. Similarly, Pittaway and Edwards (2012) recommend applying all "through, for and about" embeddedness into practice. This means according to Hytti and O'Gorman (2004) to learn to understand entrepreneurship, learn to become entrepreneurial and/or to be-come an entrepreneur.

Ruskovaara continues that the "about entrepreneurship" is to increase students' awareness, knowledge of the subject or content in question. She continues that the "for entrepreneurship" is to engage into tasks, project-based learning in an experimental way that develops skills and competencies. In addition, Ruskovaara (2014) explains that the "through entrepreneurship" is learning by doing in a real-life context or practice environment, e.g., practice enterprises. Ruskovaara (2014) highlights the word "embedded or in" which means that EE is embedded across the curriculum and across subject lines. It can be thought across all disciplines (Ruskovaara, 2014).

There are plenty of EE methods available. Ruskovaara (2014) concludes that it appears that the more 'hands-on' the teaching method is, the greater its chance of success." The EE students "get their hands dirty and have fun. They learn by experimenting, doing, discovering unexpected outcomes." is the famous statement by Draycott & Rae (2011). Furthermore, problem-based learning, action learning, and work-oriented learning approaches are suitable and useful in entrepreneurship education. Those methods engage students working in cross-disciplinary groups learn not only their own discipline, but also from each other's disciplines, and offer them useful team-working skills needed in future work (Baeger, 2011; Ruskovaara, 2014).

To investigate the EE learning in the online context, the e-DESK methodology reviews the most popular EE evidence-based methods (Ruskovaara, 2014) and cooperatively selected outcomes according to the EntreComp Framework (Bacigalupo et al., 2016). The methodology also suggests the digital EE online teacher competence to focus on DigComp Framework (Annex 2.).

The programme methodology proposes to base its entrepreneurial competence on the EntreComp-framework (Bacigalupo et al., 2016) and its six pedagogical principles: creative thinking in e-learning, using the real-world examples for inspiration, promoting collaboration with a purpose digitally, include the value creating thinking in the lessons, and thought-provoking reflection on the learned, as well as learning from experience with peers, group. In conclusion it intends to make entrepreneurial learning visible. (Grigg, 2020). In 2016, the European Commission launched EntreComp: The Entrepreneurship Competence Framework. EntreComp flower presented in Annex 3. EntreCompEdu framework for teachers to teach entrepreneurial competences was created later based on EntreComp. EntreCompEdu description text in Annex 4. And EntreCompEdu framework 6 pedagogical principles by Grigg in Annex 5.

Entrepreneurship education may be considered as a method for the teaching practice and a content of teaching and learning (Ruskovaara, 2014; Seikkula-Leino 2006: 2007). In the following table we have included a table of EE methods suggested by Ruskovaara (2014).

Practices	Sources (e.g.)
Had students prepare entrepreneurship related calculation exercises, presentations, writings, and interview	Fayolle & Gailly (2008); Shepherd (2004); Solomon (2007); Gibb (2002b); Liñán et al. (2011)
Used stories about entrepreneurs as teaching material	Fletcher (2007); Gartner (2008); Shepherd (2004); Neck & Greene (2011); Pittaway & Hannon (2008); Korsgaard & Neergaard (2010); Blenker et al. (2011)
Had students play games related to entrepreneurship	Jones (2007b); Löbler (2006); Neck & Greene (2011); Gibb (2002b); Liñán et al. (2011); Hytti & O'Gorman (2004)
Arranged or took part in an entrepreneurship-related competition	Blenker et al. (2011); Gibb (2002b); Holmgren & From (2005); Lüthje & Franke (2003); Hytti & O'Gorman (2004)
Introduced local businesses in teaching	Henderson & Robertson (2000); Pittaway & Cope (2007b); Pittaway & Hannon (2008); Shepherd (2004)
Invited entrepreneurs or representatives of the business world to take part in instruction	Cooper et al. (2004); Pittaway & Cope (2007b); Solomon (2007); Pittaway & Hannon (2008); Kuratko (2005)
Arranged a field trip to a business enterprise	Kickul et al. (2010); Solomon (2007); Bell et al. (2004); Hytti & O'Gorman (2004)
Invited an entrepreneur to present their work in the school	Pittaway & Hannon (2008); Shepherd (2004); Solomon (2007); Fuchs et al. (2008)
Guided learners to utilize experts	Fayolle & Gailly (2008); Gibb (2011); Solomon (2007); Shepherd (2004); Fuchs et al. (2008)
Discussed entrepreneurship related to the subject with learners	Gibb (2002b); Neck & Greene (2011); Solomon (2007); Shepherd (2004); Fuchs et al. (2008)
Discussed entrepreneurship related to hobbies	Gibb (2002b); Solomon (2007)
Discussed current financial news with learners	Gibb (2002b); Shepherd (2004); Solomon (2007)
Discussed the economic effects of different actions with learners	Gibb (2002b); Shepherd (2004); Solomon (2007); Fuchs et al. (2008)
Guided learners to manage their own finances	Shepherd (2004)
Organized a voluntary work project with students	Blenker et al. (2011); Neck & Greene (2011)
Enabled learners to organize a jumble sale, hold a sales stand, etc.	Blenker et al. (2011); Jones & Matlay (2011)
Facilitated a project created by the learners (Presentation, event, newspaper, video, book, etc.)	Gibb (2002b); Löbler (2006); Pittaway & Cope (2007b)
Facilitated an enterprise or working world-driven project by learners	Cooper et al. (2004); Gibb (2002b); Pittaway & Cope (2007b); Pittaway & Hannon (2008); Shepherd (2004); Kickul et al. (2010); Jones & Matlay (2011); Fuchs et al. (2008)
Had learners complete a business idea assignment	Blenker et al. (2011); Gibb (2002b); Neck & Greene (2011); Fayolle & Gailly (2008); Hytti & O'Gorman (2004); Honig (2004)
Enabled learners to create marketing or other material for a business	Cooper et al. (2004); Pittaway & Cope (2007b); Solomon (2007); Pittaway & Hannon (2008)
Enabled learners to create a practice enterprise or a business of their own	Neck & Greene (2011); Pihkala (2008); Blenker et al. (2011); Leskinen (1999); Birdthistle et al. (2007); Fuchs et al. (2008); Drakopoulou Dodd & Hynes (2012)
Organised a theme day or study module related to entrepreneurship	Gartner (2008); Pihkala (2008); Shepherd (2004); Leskinen (1999); Blenker et al. (2011)

The table of suggested EE methods

Challenges in applying Entrepreneurial education

Digital and online learning incite challenges in entrepreneurship education (EE) as it is a discipline, which requires students to acquire the knowlegde by "learning by doing" that is to say get their hands into practical actions (Draycott & Ray , 2011) and experiences in an authentic setting as said above (Liguori & Winkler, 2020; Kassean et al., 2015; Kuratko, 2005).

Gibb (1996; 2000; 2002a, 2005) crystalized the entrepreneurship education being about learning through, for, and about entrepreneurship, taking place in an entrepreneurial learning environment, and being about dealing with, creating, and enjoying uncertainty and complexity.

Up till now Sousa et al. (2018) have studied entrepreneurship education methods that are applicable in an online learning environment and list them as follows (see BLUES methodology).

- **business plan (project-based learning; problem-based learning; digital stories; online learning environments; technology integrated teaching methods; digital storytelling; educational games; active learning)**
- **choice and structuring of the idea for the enterprise (collaborative communities; cooperative learning; network participation)**
- **pilot project of the entrepreneurial idea (augmented reality; web-based video; gamification; simulation)**
- **market and product analysis (web-based video; narrated stop-motion animation; generic modelling language; digital video; augmented reality; gamification; simulation; webinars)**
- **achieving sustainability of entrepreneurial ideas (collaborative communities; cooperative learning; collaborative learning; network participation**
- **evaluation of entrepreneurial skills and characteristics (flipped classroom using digital media; cooperative learning; collaborative learning; moving from fixing to online space; experiential online development; open educational practice; online learning environments; technology educational practice; digital storytelling; educational games; active learning).**

Regardless of the obstacles, the online learning environment creates other new opportunities for entrepreneurship education (Ratten & Jones, 2020) such as virtual company visits (Oksanen, 2021) that have an opportunity to create worldwide experiences to learners.

Some other studies concentrating on the EE methods, practices, entrepreneurial learning, and related learning environments (Ruskovaara & Pihkala, 2013; 2016) are also taken into consideration in building the e-DESK methodology.

Traditional entrepreneurship training in HEI

In context, it is important to point out that the most traditional manner to teach entrepreneurship in HEI and universities is in formal lectures, case studies and business plans (Solomon 2007). Those approaches utilize traditional teaching methods or rely heavily on lectures which can be considered traditional. (Mwasalwiba, 2010) In addition, Lonappan et al. (2011) categorize teaching approaches followingly: case study, group discussion, individual presentation, individual written report, group project, formal lectures, guest speakers, action learning, seminar, web-based learning, video recording.

The traditional way to look at entrepreneurship education leans toward new business development. Some key features are presented by Jamieson (1984). According to Jamieson the EE is geared toward new business and new venture creation. He highlights the following:

1. **education about entrepreneurship (enlightenment of students on entrepreneurial procedures and features of entrepreneurship)**
2. **education for entrepreneurship (exposure of student to creation of ventures they can lay claim to) and**
3. **education in enterprise (practical exposure of participants to their own ventures).**

In addition, in a similar note by Garbuio et al. (2018) tends to summarize EE approaches in business planning and framing them to the approaches to teaching and learning. In the following table displayed adapted version of EE approaches mentioned above.

Approach and main references	Approach to teaching and learning
Business plan development: (Barringer, 2009; Honig, 2004; Kaplan &Warren, 2009; Kuratko, 2003) The systematic analysis and business plan are used to collect information that helps entrepreneurs make decisions in highly complex and uncertain environments.	• Teach and monitor production of business plans internally or via jury • Usually done in groups where individuals split tasks and produce a report
Contingency planning: (Abetti & Phan, 2004; Gruber, 2007; Honig, 2004) Adaptive business planning that accounts for environmental factors. In highly dynamic environments, only specific activities are planned to speed up the starting up process, while in slow environments, in-depth planning is preferred.	• Taught as unrelated modules • Like the approach used to train medical interns who follow an expert and make diagnoses
Effectual entrepreneurship: (Dew, Read, Sarasvathy, & Wiltbank, 2009; Sarasvathy, 2001) Entrepreneurs do not start with concrete goals but constantly develop them on the fly through personal strengths and available resources.	• Use cases and guided discussions to help students adopt and practice an entrepreneurial mind-set • Focus on differences in framing between expert entrepreneurs who redefine the frame to look for new solutions (effectual) and novices who accept the frame and look for opportunities within it • Analogical reasoning allows students to go beyond data.
Process perspective: (Aulet, 2013; Baron, 2006; Hjorth & Johannisson, 2007) Entrepreneurial process begins with opportunity recognition; can be learned; and entrepreneurs can be trained to better recognize opportunities.	• Focus on a process that unfolds over time, with each stage requiring different knowledge and skills • Opportunity identification taught through classic strategy tools (e.g., market segmentation, end user profile) and cognitive framework • Focus on training entrepreneurs when to direct their attention and on the process of searching for patterns
Opportunity-centered learning: (Rae, 2003) Exploration and development of an opportunity through individual and group investigation, understanding, selecting, and acting on an opportunity.	• Students to explore the opportunity (through brainstorming, use of Post-It notes, and directed creativity); relate the opportunity to personal goals, plan to realize the opportunity, and act to make the opportunity happen • Use of exploratory questions and a short case to illustrate an entrepreneurial learning process
Lean startup approach: (Blank, 2013; Ries, 2011) Hypothesis-driven approach that focuses on experimenting rather than planning. Directly engaging with customers through a minimum viable product, built iteratively and incrementally, according to customer feedback	• Often uses graphical representation of business models, i.e., lean canvas (Maurya, 2012) or business model canvas (Osterwalder & Pigneur, 2010), to develop testable hypotheses • Engage in a dialogue with customers about product development (agile development) instead of forecasting financial return

Table EE approaches in business planning

In conclusion entrepreneurship teaching methods that gear toward new business and venture creation are feasible to be applied in an online learning environment as well.

Online learning toolbox

Online teaching is the process of delivering pedagogical sessions in virtual environments, through live online classes, video conferencing platforms, webinars, and other online resources. Nowadays, teachers and students have access to a wide range of solutions to improve the online teaching and learning experience. In fact, technology is advancing fast to improve distance education and at the same time, the need to equip teachers with the necessary skills to keep up with this digital evolution increases.

Adapting and rethinking the design of an online course to this new reality presents challenges such as:

- **Effectively interacting and engaging with students virtually, promoting active learning**
- **Choosing the best strategies and resources to prepare synchronous and asynchronous activities**
- **Ensuring the alignment of all three components: learning outcomes, teaching methods and assessment (constructive alignment - John Biggs, 2011)**

The European Framework for the Digital Competence of Educators (DigCompEdu, 2017) Framework suggests six main areas which enclose the competences that can help teachers in approaching digital teaching.

Area 1 - Professional Engagement refers to the set of competences that teachers require to interact with their peers, students, and parents, through the use of digital technologies, in favour of their organization's proper functioning and development.

Area 2 - Digital Resources encloses the digital skills needed for content creation and modification and subsequent responsible use of resources.

Area 3 - Teaching and Learning focuses on the development of digital skills that support teaching processes, promoting collaborative and self-regulated learning.

Area 4 - Assessment includes the use of digital technologies to enhance assessment strategies, evidence analysis and feedback.

Area 5 - Empowering Learners addresses the importance of actively engaging students, considering their diverse learning needs, ensuring accessibility and inclusion to different target audiences.

Area 6 - Facilitating Learners' Digital Competence lists the set of competences required to help student's digital development, such as:

- **Information and media literacy**
- **Digital communication and collaboration**

- Digital content creation
- Responsible use
- Digital problem solving

This framework represents a guide to support teaching in different learning environments, namely, to contribute to the design of a successful remote or hybrid experience.

To cover the competences presented by DigCompEdu, it is essential to use resource centers, toolboxes that contain the necessary information to facilitate the design and implementation of digital-based teaching strategies.

The content of a toolbox should include simple and practical tutorials (easy to navigate, preferably containing videos), about digital tools and pedagogical methods, suitable to meet the challenges mentioned earlier, regarding the design of an online course.

In case more dedicated attention is needed regarding a particular subject, method or a more complex tool, there is always the possibility to search for specialized training sessions. That is why a toolbox should include a section with updated information on events, webinars, and online courses.

In terms of tools to be included in the toolbox and following DigCompEdu once again, there are standard digital requirements to be covered. Please note that it is important not to clutter this resource center with an overwhelming amount of information, but rather a controlled and objective number of effective tools.

Learning Management Systems (LMS)

LMS are platforms created to support online courses creation, allowing the content to be available online, including lessons, assignments, and assessments. A teacher can build a course using a LMS providing various types of content, such as syllabi, lectures, multimedia files and readings. These systems promote communication and collaboration through direct messaging or discussion forums. Most LMS also feature quizzes and tests, that allow student assessment.

A widely used LMS is Moodle (https://moodle.org/). It was created to enhance the interaction between teacher and students, and it is available as an Open-Source platform. In addition to the basic elements of any LMS, Moodle presents many features, such as activities integration, internal messaging system, students' progress monitoring and evaluation.

Video Conferencing Platforms

Video conferencing allows people to connect in real time, from distant locations, allowing video and audio interaction, in addition to enabling the direct sharing of content (presentations, files, images). And as

technology evolves (as well as the needs of users), these platforms present more resourceful and engaging features.

Zoom (https://zoom.us/) is a good example. This video conferencing platform is a solution for online meetings (either by video or audio-only or both) and it allows group video conferences, live chats, screen sharing, session recording and breakout rooms, among other features.

Gamification and Polling Tools

Gamification can be used as technique to engage with students, promoting collaboration and interaction. The audience is given challenges and goals through game mechanics and dynamics, available on specific online platforms, built for this purpose. As students interact with a gamification program, they receive immediate feedback on performance and are guided towards new achievements. For example, Kahoot! (https://kahoot.com/) is a widely used gamification platform.

On the other hand, resorting to a polling tool (student response systems) can be a quick and easy way for gaining insight for both teachers and students. These online applications are easy to use and can be accessed through any mobile device. Here two examples of effective polling tools:

- Mentimeter (https://www.mentimeter.com/)
- Poll Everywhere (https://www.polleverywhere.com/)

Both gamification and polling elements can be added to a LMS course.

Video material creation

Creating video materials is an online solution to engage and to deliver educational content to students. Using video edition, it is possible to add captions and text to instructional materials, to link to interactive content (quizzes, posts, other activities to assess knowledge acquisition), or to divide a long video into shorter segments, as to keep the audience interested and motivated.

Incorporating animations in educational videos can also be an effective way to introduce concepts, to reinforce important ideas, or to summarize relevant information.

Video content can be available through an online video repository/library, an LMS or live, using a video conferencing or streaming platform.

Below two online solutions for basic video editing and hosting:

- Youtube Studio (https://studio.youtube.com/)
- Vimeo (https://vimeo.com/).

Flipped classroom

The Flipped Classroom model alternates the study mode from online lesson and face-to-face lectures online (Bergmann & Sams, 2012). Flipped Classroom means a change in the teaching culture in which the teacher becomes a learning instructor and a producer of active teaching materials. Typically, these are instructional videos that are uploaded online for learners to learn (Mehtälä, 2016). It also focuses on student centered learning. The method emphasizes the students own action and responsibility for his or her learning; and allows students the freedom to study flexibly as best suits one's own learning manner.

Time in the classroom, that was previously intended for lectures, is in a Flipped Classroom model spent on some group work or experiential activities. (Mehtälä, 2016)

The evidence shows that the flipped classroom which relies on videos as learning material, improved student, and teacher satisfaction at school (Mehtälä, 2016). In addition, previous studies have shown, that the Flipped Learning method can improve student satisfaction and in some cases test results. (Mehtälä, 2016) The Findings from (Divjak et al, 2022) indicated that those who had used flipped classroom approaches in face-to-face or blended learning environments more successfully continued to use them in online environments than those who had not used it before.

ASSESSMENT

The base survey results show that there are significant challenges in adopting the traditional assessments to the online environment.

Assessment and reflection of the learned is an important part of learning. The most important element upon completion of the project work of any sort is the learners' reflection on their own successes and failures as a learning lesson. Learners will reflect on their own learning, make choices and set targets accordingly. Formative assessment is woven seamlessly into tasks and activities and used purposefully by learners and teachers alike.

In turn, studies concerning measuring and evaluating entrepreneurship education practices (Pittaway & Edwards, 2012; Fayolle et al., 2006; Fayolle, 2008; 2013; Edwards & Muir, 2012; Falkäng & Alberti, 2000; Matlay & Carey, 2007; Dickson et al., 2008), the study goals, objectives, contents, targets, methods, and evaluation of entrepreneurship education are all important (Ruskovaara, 2014) when setting up the course, syllabus or even an individual lecture.

In line with this, Jones & Matlay's (2011) heterogeneous view of entrepreneurship education presents a model where the student, educational processes, educator, community, and institution are intervened in relationship and role in a dialogic entrepreneurship education system (Ruskovaara, 2014). This involves the cooperation with and inspiration from a real-world context and learning beyond the school walls.

Assessment in hybrid teaching and learning environment has specific challenges. (Divjak et al, 2022c) found it important that technology should not distract students during assessment tasks and considered cheating in a controlled e-assessment environment to be no more frequent than in face-to-face assessment.

The research base for the methodology

The research base for the e-DESK methodology is a quantitative survey. The quantitative survey inquiry is formulated based on the literature review on the topics of entrepreneurship education and online learning. The survey questionnaire was formulated, sought, acquired, formed, and justified based on two European frameworks: EntreComp and DigComp. Further it was reviewed and consulted among the experts in the participating universities in four countries in collaboration.

The survey questionnaire consisted of questions on Likert scale and yes and no questions. All the questions were assessed descriptively, and a summary of the results was drawn. The survey allowed the informants to answer each section also with qualitative remarks. Those qualitative answers were collected and measured question by question. Later the grouping by the topics were made.

The core of the methodology is built on to the research results collected by the survey from the participating HEI teachers and trainers (n167) of the four universities involved in this project.

The quantitative survey results and the qualitative answers within are evaluated. The results are reviewed and reflected to the previous research evidence. Inquisitive research is based on rational and cogent reasoning and seeks to avoid unfounded assumptions.

Thus, the research results were assessed by mean value received on five scale Likert, and positive and negative information received from yes and no -format. Further some of the topics were collected from the multiple-choice answers in a more the relevant principle.

In addition, the open answers received via survey were grouped with their relevance to be noted in developing the methodology. Both quantitative and qualitative results were reflected to the available research evidence of both entrepreneurship education and digital online learning to draw a systematic, common understanding of teachers' quests in their e-learning delivery and entrepreneurship education competence.

Learning outcomes

For the design of the learning outcomes for this course, both the EntreComp framework on entrepreneurial competencies and the DigComp framework on digital competencies have been considered by the e-DESK team.

After completion of the MOOC learner/teacher (MOOC participants) will be able to:

- **LO1 - Describe pedagogical approaches, teaching and assessment methods that enhance students' engagement to develop students' entrepreneurial competences in online learning environment. (Weight: 10)**
- **LO2 - Identify what entrepreneurial competences students need in the contemporary world to seize and create opportunities and meet challenges to generate value. (Weight: 15)**
- **LO3 – Identify relevant pedagogical approaches to support students to analyse the impacts of ideas, opportunities, actions, created values and ethical implications in the selected real-world environment. (Weight: 15)**
- **LO4 - Use appropriate technology to support sound pedagogical approaches that contribute to the development of students' entrepreneurial and problem-solving skills. (Weight: 10)**
- **LO5 - Evaluate individual and group strengths and weaknesses of students and staff regarding hybrid and digital teaching and learning about entrepreneurial competences. (Weight: 10)**
- **LO6 – Create interactive learning designs and sessions developing students' entrepreneurial competences, minding students' pre-competence, available resources and pedagogical techniques that enhance students' engagement and motivation. (Weight: 20)**
- **LO7 - Integrate the learning material available in the MOOC with other appropriate teaching and learning resources to foster entrepreneurial competences and ethical and sustainable thinking. (Weight: 10)**
- **LO8 – Evaluate the learning process and students' acquisition of learning outcomes related to entrepreneurial competences. (Weight: 10)**

Digital stand-alone MOOC for the target HEI teachers

The e-DESK professional development programme is designed to combine a Massive Open Online Course (MOOC) with a Toolkit providing guidelines for the introduction of these delivery modes into the university classroom. The methodology will assist in the design of this MOOC in an online learning environment by introducing the Balanced Learning Design Planning (BDP) and tool (Divjak et al, 2022b). This BDP tool has been designed by University of Zagreb's Faculty of Organization and Informatics and used by the e-DESK team in the design and conception of the MOOC structure, modules, and activities.

As the online learning environment and distance learning course provides a new EE opportunity (Ratten & Jones, 2020), the e-DESK program will enhance teachers EE learning on Massive Open Online Courses.

The course is to be provided on a platform with high-quality learning resources, accessible anywhere anytime. The e-DESK methodology concentrates on the end users, i.e., the HEI teachers so that they benefit most of the course.

The online professional learning MOOC course is cost efficient (Li & Dervin, 2018) and as it is open access, it is available for teachers to dwell on information or to review the material any time they find suitable. Secondly the online MOOC course is available and connected to the teachers' everyday teaching (Avalos, 2011; Clarke & Hollingsworth, 2002; Borko, 2007). The MOOC by its user-friendliness is available to support the daily practice (Opfer, 2016; Kraft, Blazar & Hogan, 2018; OECD 2018).

The MOOC content development evolves logically and helps teachers adapt to the unprecedented demands. It proceeds to purposefully adapt to remote teaching with efficiency, integrity, creativity, compassion, and enthusiasm (Healey-Benson et al., 2021) by presenting an online learning design tool.

The e-DESK programme utilises the following six pedagogical principles (Grigg, 2020) developed in EntreCompEdu by adapting creative thinking, looking into the real-world for inspiration, promoting collaboration with a purpose, creating value for others and stimulating reflection, flexible thinking and learning from experience in other words assessment. In conclusion make entrepreneurial learning visible so that the learners know what to do and how to do it (Hattie, 2008) regardless of the subject or topic.

The e-DESK MOOC assists the teacher design an online learning course by:

1. Introducing knowledge and information of the online learning methods in combination of the EE principles according to EntreComp-Framework (Bacigalupo et al., 2016) and EntreCompEdu framework (Grigg, 2020).
2. Proceeding to planning of the course.
3. Introducing tools and methods that are available for online learning in addition to the EE tools and methods that are applicable to online learning environment.
4. Proceeding to assessment and reflection of the online learning concept, as the reflection and review are important part of learning process.
5. Providing the best practices collected in the pilot learning phase.

The goal is according to prevailing curricula (Spain, Portugal, and Croatia) e.g., to create critical and creative thinkers, so that learners can identify problems and go from ideas to action and endeavor to leave the world better than they found it. Further it emphasizes the work-based learning (borrowed by the Finnish curricula) in real-world context in online learning environment (Oksanen, 2021 in review process).

It is demanding to pivot the teaching online digitally. Online learning requires frequent contact with the learners and reflecting on the lessons learnt. Contacting learners needs to be routine. Communication may take place via email, or messaging on LMSs or other communications means (SMS, What's App, Messenger etc.) The individualized feedback or reflection on learning in online accounts is necessary to engage learners in distance similarly it is important to the learners in the schools left open for others to enter in (Millán et al., 2014). The online learning creates conditions for an increased appetite for entrepreneurial competence development and personal resilience, unleashing a form of entrepreneurial persistence (Millán et al., 2014).

The Balanced Learning Design Planning (BDP)

The Balanced Learning Design Planning (BDP) tool is an innovative learning design (LD) tool developed by the Faculty of Organization and Informatics of the University of Zagreb. The BDP concept and tool build on existing LD concepts and tools, at the same time implementing the findings of contemporary research and the relevant theoretical framework. The BDP concept and tool are founded on learning outcomes (LOs) and student workload, as bases of student-centered learning approaches, aiming to ensure their alignment at the study program and course level. The concept and tool focus on establishing constructive alignment between course LOs, teaching, and learning activities (TLAs) and assessment, as well as ensuring assessment validity by assigning LOs with relative weights. The tool

also makes use of advanced analytics in enhancing LD planning, supporting innovative pedagogies. (Divjak et al, 2022b)

Particularly, the BDP concept and tool provide theoretical guidance and practical support to practitioners in LD planning. On the study program level, the BDP concept relates study program LOs to course LOs, to ensure vertical alignment. For each course LO, corresponding TLAs and assessment are defined, ensuring horizontal constructive alignment. Student workload is determined accordingly. On the course level, the BDP concept links course LOs with specific topics. Topics are linked with units, which are divided into activities, assigned with descriptors. The descriptors include the TLA types (acquisition, discussion, investigation, practice, production, assessment), as well as student workload, delivery modes, an indication of collaborative activities, as well as detailed information on assessment and feedback provided to students. One of the essential elements in the overall BDP concept refers to determining the relative weights of LOs at both the study program and course level.

The BDP tool also enables analyses of a planned LD, focusing on curriculum analytics. The analytics dashboard presents an overall picture of a study program with its courses, helping practitioners to reflect on their LD planning. The tool enables to establish whether study program LOs are covered by course LOs, as well as gives analyses of delivery modes, TLA types, collaboration, and assessment, which is important in determining if an LD is in line with the intended pedagogical concept. It also provides analytics of student workload, supporting meaningful workload planning, and helps the planning of credits (e.g., ECTS) allocated to courses, ensuring their coherence with the workload. Importantly, the BDP tool also provides an overview of the evaluation of intended LOs through assessment activities. (Divjak et al, 2022b)

The e-DESK MOOC syllabus

The syllabus of the MOOC developed by the e-DESK took the learning outcomes compiled in section 10 for the design of the modules and activities that compound the MOOC. The stand-alone online training is composed of the following modules:

0. **Introduction.** This module aims to serve as a guide for participants to get to know what they will encounter throughout the MOOC and to reflect on their expectations and assess their own pre-knowledge about the contents of the MOOC. Also, it will serve as a roadmap for participants and provide them with information about the certification criteria.

1. **Competences, skills and values in general.** This module provides an introduction to competences, skills and values, focusing on

entrepreneurial competences, and pedagogical approaches which can support the acquisition of such competences.

2. **Developing entrepreneurial competences.** This module aims to serve as an introduction to entrepreneurial competences and, especially to the EntreComp Framework and its adaptation to entrepreneurial education, EntreCompEdu.

3. **Real-world requirements for entrepreneurial competences.** This module aims to provide successful examples of application of entrepreneurial education in real-world contexts. Also, it aims to foster participants' research of best practices and application of these competencies in the university sphere.

4. **Relevant pedagogical approaches.** This module gives an opportunity to gain deeper insights into innovative pedagogical approaches. There is a number of such approaches of which participants might be using some or many of them in your everyday practices. However, some of these approaches are still not that widespread, and this module aims to bring them closer to participants and inspire their teaching practice.

5. **Evaluating the digital teaching and learning skills of students and staff.** This module serves as an overview of how technology can support learning and how we can define and assess the digital skills needed to promote this enrichment.

6. **Learning design concept and tool.** This module will provide you with guidelines and a tool which will support you in designing learning in line with the intended learning outcomes and pedagogical approaches.

7. **Learning resources.** This module aims to provide teachers with resources to include ethical and sustainable thinking in their classes, but also to prevent plagiarism, learning resources to include in their classes, etc.

8. **Evaluation and quality assurance.** This module focuses on the importance of quality assurance in the different dimensions of Higher Education, for example, in assessment. It also provides examples of quality assurance standards useful for European university educators.

9. **Delivery models of teaching and learning.** This module aims to differentiate and introduce the main delivery modes contemplated by the e-DESK methodology. Moreover, it provides best practices on the implementation of these delivery

modes within the university classroom and fosters participants' reflection on the application of these delivery modes in their institutions.

10. **Further personal development.** This module aims to serve as a guide for those participants willing to deepen their knowledge on the different delivery modes and innovative methodologies included in the course modules. It serves as a first step to take a step forward to further research on the topic.

Face-to-face training

In order to complement the knowledge acquired with the MOOC, the e-DESK methodology proposes a face-to-face training aimed at analyzing and adapting what is taught in the MOOC to the individual characteristics of each educator or institution. To do this, this section provides a detail description of this face-to-face training and goes through its syllabus, the resources needed and recommendations for the implementation.

The e-DESK face-to-face training syllabus

The face-to-face training syllabus has been designed, as the Massive Open Online Course taking as a reference the learning outcomes in Section 10 and providing a more practical approach to the knowledge acquired in the MOOC. The main modules developed in the face-to-face training are the following:

1. **Gallery walk.** The main objective of this module is for participants to get to know how entrepreneurial education and digitalization are being included into other institutions, schools within the same university, departments, etc. In addition, participants will be able to share their reflections about how this is being done within their own environment, fostering self-reflection.
2. **From MOOC to own reality**. Assessing training needs. This module is aimed at taking the reflection made in the previous module to the next level. In this module, participants need to assess the needs of their teaching and institution in order to be able to adapt the knowledge they got from MOOC to them.
3. **Hybrid or not hybrid? That's the question.** This module aims to clarify and solve any questions about what hybrid delivery mode is and what differentiates it from other delivery modes such as blended learning, with which it is often confused.
4. **When and why shall we use the hybrid approach?** This module aims to provide the main reasons to opt for a hybrid approach in their classes, paying special attention to the moments when this delivery mode is suitable.

5. **Hybrid: How to plan, to do, to evaluate.** Since the hybrid mode entails some challenges to educators regarding how to fit and fulfil the needs and expectations from both the students in class and those who are on remote, this module aims to help educators discover the best ways to organize and plan their lessons, how to carry out activities and how to assess the knowledge from their students.
6. **Hybrid: From the Global to the Institutional reality.** After understanding the main characteristics of hybrid teaching and learning, this module aims to help educators adapt what they have learnt to their reality based on the analysis carried out in previous modules.
7. **An institutional Case.** When organizing the face-to-face training it is interesting to include am example of usage of these delivery modes, something participants can relate to and understand the feasibility of the inclusion of these models into the university classroom.
8. **Assembling a customized portfolio.** This module aims to provide the space and help for each educator to develop their own way to implement the knowledge they got from both the MOOC and this face-to-face training into their own reality. This portfolio will then guide them through the implementation of the methodologies, delivery modes and tools in their course curriculum and classes.

Recommendations for the implementation

Based on the experience gained through the piloting of this methodology, we have developed the following recommendations that could help you organize this training:

- **Select the delivery mode to be used. Decide how you want this training to be implemented. Consider the possible risks ahead and ensure all participants will have a good experience.**
- **Work in interdisciplinary teams to widen participants' burdens and enhance ideas exchange.**
- **Try to include the contents as participative as possible, so teachers participating get engaged into the activities.**
- **Ensure all participants have completed the digital training. If not possible, make a short summary at the beginning. This way, you are all on the same page and can build-up from that point.**

ANNEXES

Annex 1. DigComp Framework

(https://ec.europa.eu/jrc/en/digcomp/digital-competence-framework)

The Digital Competence Framework 2.0

DigComp 2.0 identifies the key components of digital competence in 5 areas which can be summarised as below:

1. **Information and data literacy: To articulate information needs, to locate and retrieve digital data, information and content. To judge the relevance of the source and its content. To store, manage, and organise digital data, information and content.**
2. **Communication and collaboration: To interact, communicate and collaborate through digital technologies while being aware of cultural and generational diversity. To participate in society through public and private digital services and participatory citizenship. To manage one's digital identity and reputation.**
3. **Digital content creation: To create and edit digital content to improve and integrate information and content into an existing body of knowledge while understanding how copyright and licences are to be applied. To know how to give understandable instructions for a computer system.**
4. **Safety: To protect devices, content, personal data and privacy in digital environments. To protect physical and psychological health, and to be aware of digital technologies for social well-being and social inclusion. To be aware of the environmental impact of digital technologies and their use.**
5. **Problem solving: To identify needs and problems, and to resolve conceptual problems and problem situations in digital environments. To use digital tools to innovate processes and products. To keep up-to-date with the digital evolution.**

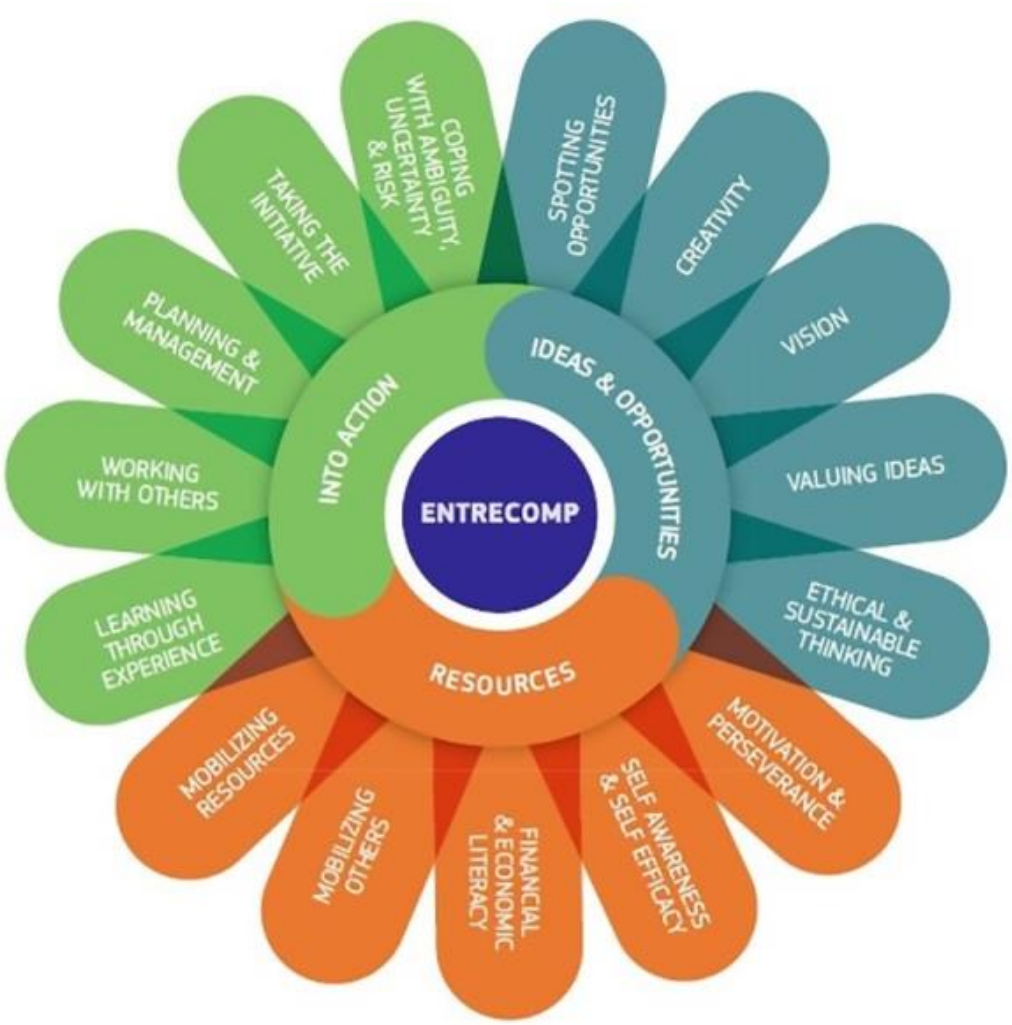
Annex 2. EntreComp / Description and EntreComp Flower

(https://ec.europa.eu/social/main.jsp?catId=1317&langId=en)

The European Commission has developed EntreComp: the European Entrepreneurship Competence Framework as a reference framework to explain what is meant by an entrepreneurial mindset.

EntreComp offers a comprehensive description of the knowledge, skills and attitudes that people need to be entrepreneurial and create financial, cultural or social value for others.

EntreComp is a common reference framework that identifies 15 competences in three key areas that describe what it means to be entrepreneurial.



Annex 3. The e-DESK MOOC Syllabus

This syllabus was designed with the Balance Learning Design Planning (BDP) tool developed by the Faculty of Organization and Informatics of the University of Zagreb. (Divjak et al, 2022b).

MOOC

Planned ECTS: 2, **Number of learners:** 50, **Mode of delivery**: Online
Status: IN PLANNING, **Course public access**: Private
Contributors: Darko Grabar, Petra Vondra, Valentina Kirinić, Blaženka Divjak, Barbi Svetec, Pirjo Kuru, Alba González Calleja, Paulo Belo Costa, Jose Carlos Ceballos, Priscila Parra, Ivan Sarmiento, Hilkka Laakso

Course learning outcome	Level	Weight
Describe pedagogical approaches, teaching and assessment methods that enhance students' engagement to develop students' entrepreneurial competences in online learning environment.	Understanding	10
Use appropriate technology to support sound pedagogical approaches that contribute to the development of students' entrepreneurial and problem-solving skills.	Applying	10
Integrate the learning material available in the MOOC with other appropriate teaching and learning resources to foster entrepreneurial competences and ethical and sustainable thinking.	Applying	10
Identify what entrepreneurial competences students need in the contemporary world to seize and create opportunities and meet challenges to generate value.	Analysing	15
Identify relevant pedagogical approaches to support students to analyse the impacts of ideas, opportunities, actions, created values and ethical implications in the selected real-world environment.	Analysing	15
Evaluate individual and group strengths and weaknesses of students and staff regarding hybrid and digital teaching and learning about entrepreneurial competences.	Evaluating	10
Evaluate the learning process and students' acquisition of learning outcomes related to entrepreneurial competences.	Evaluating	10
Create interactive learning designs and sessions developing students' entrepreneurial competences, minding students' pre-competence, available resources and pedagogical techniques that enhance students' engagement and motivation.	Creating	20
		Total Weight: 100

Topic / Unit name	Workload	Learning type	Mode of delivery		Groups	Collaboration	Feedback	Assessment		
								Points	Types	Providers
Introduction										
Introduction										
Introductory video This video should summarize the main aspects and relevant contents/characteristics of the MOOC. Maybe it could be done after we have the rest of the final draft materials. *To keep the narrative, we could do very short introductory videos (using the same voice/person/character) to all modules/submodules.	20 min	Acquisition	Online	Asynchronous	Teacher not present	No	No	No	No	
Self assessment Entrepreneurial competences and teaching methods. The main objective of this assessment shall be to make participants aware of what they already know and from where they depart.	30 min	Assessment	Online	Asynchronous	Teacher not present	No	No	No	0	Summative	Self
Glossary A compilation of the main terms that will be used during the MOOC and can cause doubts.	10 min	Acquisition	Online	Asynchronous	Teacher not present	No	No	No	No	
Total unit workload	1h									

Topic / Unit name	Workload	Learning type	Mode of delivery			Groups	Collaboration	Feedback	Assessment		
									Points	Types	Providers
Competences, skills and values in general Describe pedagogical approaches, teaching and assessment methods that enhance students' engagement to develop students' entrepreneurial competences in online learning environment. (**70%**), Identify what entrepreneurial competences students need in the contemporary world to seize and create opportunities and meet challenges to generate value. (**10%**)											
Entrepreneurial competences											
Pre-reading + introductory video Reading and audiovisual materials regarding the basics of entrepreneurial education.	60 min	Acquisition	Online	Asynchronous	Teacher not present	No	No	No	No		
Quiz Formative assessment based on the pre-reading. Multiple choice questions. Can be used as an entry pre-competence test (to check the level of teachers´ pre-competence).	60 min	Assessment	Online	Asynchronous	Teacher not present	No	No	Automated	3	Summative	Automated
Videos of best practice Short videos (3 - 6 mins) with good examples. Can be existing or newly recorded videos.	60 min	Investigation	Online	Asynchronous	Teacher not present	Yes	Yes	No	No		
Disscussion based on reading, videos and own experiences Discussion based on questions. For this forum assignment we recommend having only 2-3 questions not focused exactly on the videos, but maybe things ans characteristics shared by all/most examples.	90 min	Discussion	Online	Synchronous	Teacher not present	No	Yes	Peer	2	Summative	Peer
Total unit workload	4.5h										
Pedagogical approaches, teaching and assessment											
Videos Videos on pedagogical approaches, learning outcomes, learning theories, constructive alignment etc.	115 min	Acquisition	Online	Asynchronous	Teacher not present	No	No	No	No		
Quiz Short formative assessment related to the pre-reading.	60 min	Assessment	Online	Asynchronous	Teacher not present	No	No	Automated	3	Summative	Automated
Videos/materials on best practice Participants will be provided with materials on good practices in flipped classroom and work-based learning approaches (E+ project RAPIDE).	60 min	Investigation	Online	Asynchronous	Teacher not present	Yes	Yes	No	No		
Discussion based on the pre-reading, videos	90 min	Discussion	Online	Synchronous	Teacher not	Yes	Yes	Peer	2	Summative	Peer

and own experience Participants will be divided in groups and provided with questions for discussion.					present						
Total unit workload	5.41h										
Final test											
Final test - Copy	30 min	Assessment	Online	Asynchronous	Teacher not present	No	No	No	10	Formative	Automated
Total unit workload	0.5h										

Topic / Unit name	Workload	Learning type	Mode of delivery	Groups	Collaboration	Feedback	Assessment		
							Points	Types	Providers
Developing entrepreneurial competences Describe pedagogical approaches, teaching and assessment methods that enhance students' engagement to develop students' entrepreneurial competences in online learning environment. (**10%**), Evaluate individual and group strengths and weaknesses of students and staff regarding hybrid and digital teaching and learning about entrepreneurial competences. (**40%**), Evaluate the learning process and students' acquisition of learning outcomes related to entrepreneurial competences. (**10%**)									
Evaluating the pre-knowledge on entrepreneurial competences									
Introductory videos Videos about the entrepreneurial competences framework - ENTRECOMP Europe.	30 min	Acquisition	Online	Asynchronous	Teacher not present	No	No	No	No		
Discussion Discussion on the entrepreneurial competences framework. E.g. Participants in groups discussing various aspects or dimensions of the entrepreneurial competence framework.	60 min	Discussion	Online	Synchronous	Teacher not present	No	Yes	No	No		
Introduction to EntreComp Edu Get to know how to apply the EntreComp framework to education.	30 min	Acquisition	Online	Asynchronous	Teacher not present	No	No	No	No		
Final test	30 min	Assessment	Online	Asynchronous	Teacher not present	No	No	No	10	Formative	Automated
Total unit workload	2.5h										

Real-world requirements for entrepreneurial competences Describe pedagogical approaches, teaching and assessment methods that enhance students' engagement to develop students' entrepreneurial competences in online learning environment. (**10%**), Identify what entrepreneurial competences students need in the contemporary world to seize and create opportunities and meet challenges to generate value. (**90%**)									
Real-world requirements									
Introductory presentation videos and readings Videos on the future of jobs. References: Frey & Osborne 2013 and 2017, World Economic Forum, ENTRECOMP and sustainability etc.	90 min	Investigation	Online	Asynchronous	Teacher not present	No	No	No	No

Case-study analysis Examples of entrepreneurial stories. Several stories, analyzing them from different points of view (scientific fields, countries, regions), producing essays on students´ entrepreneurial skills needed for this particular entrepreneurial environment. Making generalizations.	60 min	Production	Online	Asynchronous	Teacher not present	No	No	No	No		
Peer-review Assessing the essays according to rubrics. [For moving the course to the WP platform, it shall be turned into self-assessment based on the criteria from the rubrics]	90 min	Assessment	Online	Asynchronous	Teacher not present	No	No	No	10	Summative	Peer
Total unit workload	4h										

Relevant pedagogical approaches

Describe pedagogical approaches, teaching and assessment methods that enhance students' engagement to develop students' entrepreneurial competences in online learning environment. (**10%**), Use appropriate technology to support sound pedagogical approaches that contribute to the development of students' entrepreneurial and problem-solving skills. (**10%**), Identify relevant pedagogical approaches to support students to analyse the impacts of ideas, opportunities, actions, created values and ethical implications in the selected real-world environment. (**80%**)

Relevant peadgogical approaches

Branching scenarios Possibility of creating a character; selecting relevant pedagogical approaches related to the acquisition of spotting opportunities, sustainable and ethical thinking, creating values.	60 min	Practice	Online	Asynchronous	Teacher not present	No	No	Automated	9	Summative	Automated
Discussion Discussion about the scenarios.	60 min	Discussion	Online	Synchronous	Teacher not present	No	Yes	Peer	2	Summative	Peer
Introductory materials Introductory videos (10 mins per video) and other materials on pedagogical approaches (strategies): - in general - flipped classroom - problem/project based learning - inquiry-based learning - work-based learning.	60 min	Acquisition	Online	Asynchronous	Teacher not present	No	No	No	No		
Total unit workload	3h										

Evaluating the digital teaching and learning skills of students and staff

Use appropriate technology to support sound pedagogical approaches that contribute to the development of students' entrepreneurial and problem-solving skills. **(50%)**, Evaluate individual and group strengths and weaknesses of students and staff regarding hybrid and digital teaching and learning about entrepreneurial competences. **(40%)**, Evaluate the learning process and students' acquisition of learning outcomes related to entrepreneurial competences. **(10%)**

Digital skills for teaching and learning

Self-assessment of digital skills (first part) A rubric for self-assessment. Comparing to the average according to different criteria. Gap analysis and feedback. Evaluating pre-knowledge of digital skills according to the DigComp framework, using the Digital Skills Assessment tool from the European Commission platform (https://digital-skills-jobs.europa.eu/en/digital-skills-assessment).	30 min	Assessment	Online	Asynchronous	Teacher not present	No	No	No	0	Summative	Automated
Content provision and practice Provision of different scenarios and choosing the tools that can enhance teaching and learning for that scenario. The scenarios are chosen according to the results from the first self-assessment, for each skill.	75 min	Practice	Online	Asynchronous	Teacher not present	No	No	No	No		
Self-assessment of digital skills (second part) A rubric for self-assessment. Comparing to the average according to different criteria. Progress analysis and feedback. Evaluating resulting knowledge of digital skills according to the DigComp framework, using the Digital Skills Assessment tool from the European Commission platform (https://digital-skills-jobs.europa.eu/en/digital-skills-assessment).	60 min	Assessment	Online	Asynchronous	Teacher not present	No	No	No	0	Summative	Automated
Introductory Videos General videos on technology enhanced learning. These videos should focus on digital skills necessary for different scenarios. (The different modes of delivery will be further explored on the Delivery Models of Teaching and Learning module).	30 min	Acquisition	Online	Asynchronous	Teacher not present	No	No	No	No		
Reflection on digital skills at own institutions Essay on ways to improve faculty digital skills at your institution. Use your strengths/weaknesses as examples.	60 min	Production	Online	Asynchronous	Teacher not present	No	No	No	No		
Peer-review Peer-review of the essays with suggestions for improvement.	75 min	Assessment	Online	Asynchronous	Teacher not present	No	Yes	Peer	5	Summative	Peer
Total unit workload	5.5h										

Learning design concept and tool

Use appropriate technology to support sound pedagogical approaches that contribute to the development of students' entrepreneurial and problem-solving skills. (**10%**), Identify relevant pedagogical approaches to support students to analyse the impacts of ideas, opportunities, actions, created values and ethical implications in the selected real-world environment. (**10%**), Create interactive learning designs and sessions developing students' entrepreneurial competences, minding students' pre-competence, available resources and pedagogical techniques that enhance students' engagement and motivation. (**80%**)

Learning design concept and tool

Introductory video Video on learning design concept and the tool (10 min in total). BDP Learning Design tool: https://learning-design.eu/en/	90 min	Acquisition	Online	Asynchronous	Teacher not present	No	No	No	No		
Case-study analysis Several case-studies provided and discussed in groups. Delivery mode is hybrid.	120 min	Investigation	Online	Synchronous	Teacher not present	Yes	Yes	Peer	No		
Preparing learning design Preparing learning designs/sessions in an LD tool based on the discussion related to the case-studies based on the hybrid delivery mode. (Self-assessment instead of teacher assessment in	280 min	Production	Online	Synchronous	Teacher not present	Yes	Yes	Teacher	30	Formative	Teacher
Quiz A short automated quiz related to the learning design concept.	10 min	Assessment	Online	Asynchronous	Teacher not present	No	No	Automated	2	Summative	Automated
Total unit workload	8.33h										

Learning resources

Use appropriate technology to support sound pedagogical approaches that contribute to the development of students' entrepreneurial and problem-solving skills. (**10%**), Integrate the learning material available in the MOOC with other appropriate teaching and learning resources to foster entrepreneurial competences and ethical and sustainable thinking. (**80%**), Create interactive learning designs and sessions developing students' entrepreneurial competences, minding students' pre-competence, available resources and pedagogical techniques that enhance students' engagement and motivation. (**10%**)

Learning resources

Discussion Discussion on the takeaways from this course related to learning resources and what´s missing. Finding information to support ethical and sustainable thinking.	90 min	Discussion	Online	Asynchronous	Teacher not present	No	Yes	Peer	No		
Video Videos on how to find relevant and reliable resources about ethical and sustainable thinking.	60 min	Acquisition	Online	Asynchronous	Teacher not present	No	No	No	No		
Preparing resources on ethical and/or sustainable thinking Based on the discussion and the video, participants prepare (collect and systematize) materials on the selected topic and for a selected group of students (taking into account the educational level and pre-knowledge of students).	75 min	Production	Online	Asynchronous	Teacher not present	No	No	Teacher	5	Summative	Self

Demonstration of selected resources Participants demonstrate the prepared resources. For the MOOC - the prepare recordings or other formats (e.g. infographics). For the project - participants prepare presentations.	90 min	Practice	Online	Asynchronous	Teacher not present	No	Yes	Peer	5	Formative	Peer
Total unit workload	5.25h										

Evaluation and quality assurance

Integrate the learning material available in the MOOC with other appropriate teaching and learning resources to foster entrepreneurial competences and ethical and sustainable thinking. (**10%**), Identify relevant pedagogical approaches to support students to analyse the impacts of ideas, opportunities, actions, created values and ethical implications in the selected real-world environment. (**10%**), Evaluate individual and group strengths and weaknesses of students and staff regarding hybrid and digital teaching and learning about entrepreneurial competences. (**10%**), Evaluate the learning process and students' acquisition of learning outcomes related to entrepreneurial competences. (**80%**), Create interactive learning designs and sessions developing students' entrepreneurial competences, minding students' pre-competence, available resources and pedagogical techniques that enhance students' engagement and motivation. (**10%**)

Evaluation and quality assurance

Pre-reading Reading materials on evaluation and QA in HE.	60 min	Acquisition	Online	Asynchronous	Teacher not present	No	No	No	No		
Quiz Short quiz based on the pre-reading.	60 min	Assessment	Online	Asynchronous	Teacher not present	No	No	Automated	3	Summative	Automated
Self-evaluation Self-evaluation of a learning design, learning resources and the learning process, based on a rubric.	90 min	Assessment	Online	Asynchronous	Teacher not present	No	No	No	20	Formative	Self
Total unit workload	3.5h										

Delivery models of teaching and learning

Use appropriate technology to support sound pedagogical approaches that contribute to the development of students' entrepreneurial and problem-solving skills. (**20%**), Integrate the learning material available in the MOOC with other appropriate teaching and learning resources to foster entrepreneurial competences and ethical and sustainable thinking. (**10%**), Identify relevant pedagogical approaches to support students to analyse the impacts of ideas, opportunities, actions, created values and ethical implications in the selected real-world environment. (**0%**), Evaluate individual and group strengths and weaknesses of students and staff regarding hybrid and digital teaching and learning about entrepreneurial competences. (**10%**)

Delivery models on teaching and learning

Videos on different delivery modes Videos on different modes of delivery.	60 min	Investigation	Online	Asynchronous	Teacher not present	No	No	No	No		
Discussion on good practices Group discussion on good practices, based on delivery modes.	90 min	Discussion	Online	Synchronous	Teacher not present	Yes	Yes	Peer	2	Summative	Peer
Total unit workload	2.5h										

Hybrid teaching and blended learning

Videos on best practices (hybrid teaching and blended learning) Videos related to best practices hybrid and blended delivery.	60 min	Investigation	Online	Asynchronous	Teacher not present	No	No	No	No		
Discussion on hybrid teaching and blended learning	90 min	Discussion	Online	Synchronous	Teacher not present	Yes	Yes	Peer	2	Summative	Peer
Group discussion on hybrid teaching and blended learning, based on the video.											
Total unit workload	2.5h										

Further personal development											
...											
Final self-assessment Entrepreneurial competences and teaching methods	30 min	Assessment	Online	Asynchronous	Teacher not present	No	No	No	0	Summative	Self
Recommendation for further independent work In this submodule, we can include some related open courses or videos, as well as interesting papers. Perhaps it could be divided as a directory, having different "sections" for each of the topics: hybrid learning, digital learning, face to face teaching, etc. (here we could also include a section referencing papers focused on the covid-19 consequences on the digitalization of universities...)	60 min	Investigation	Online	Synchronous	Teacher not present	No	No	No	No		
Total unit workload	1.5h										

Total course workload: 50h

Annex 4. EntreCompEdu / framework for teachers - description

(https://entrecompedu.eu/entrepreneurship-for-everyone/) / part EntreComp and EntreCompEdu history + EntreCompEdu competence areas & competences

Entrepreneurship for everyone: introducing EntreCompEdu, a new professional development framework for teachers to support entrepreneurial education.

In 2016, the European Commission launched EntreComp: The Entrepreneurship Competence Framework, which sets out the competences that everyone needs if they want to become entrepreneurial. For example, the ability to spot opportunities, develop creative ideas, stay focused and work with others. What was missing, however, was a specific framework that teachers could use to map their own progress in teaching entrepreneurial competences.

Hence EntreCompEdu was conceived as a complement to EntreComp in supporting educators so that they could teach these entrepreneurial competences effectively. Based on a review of what is known about good pedagogy, both in general and in the field of entrepreneurship, EntreCompEdu was built around five broad competence areas:

1. **Professional knowledge and understanding of entrepreneurial education**
2. **Planning and organizing entrepreneurial education**
3. **Teaching and training for entrepreneurial education**
4. **Assessment for entrepreneurial education**
5. **Professional learning and development**

The names of these competence areas are likely to be quite familiar with most teachers because they typically reflect the contents of teacher education programmes in the UK and across Europe. This is seen as an advantage so that teachers do not see entrepreneurship as something alien to their everyday practice. These broad areas are broken into smaller, more detailed competencies that teachers need to demonstrate.

The 17 competences within the EntreCompEdu Professional Competence Framework

5 Competence areas and 17 competences

1. Entrepreneurial knowledge and understanding
    - I. Knowing and understanding entrepreneurial education
    - II. Valuing entrepreneurial education for all
    - III. Understanding how students develop entrepreneurial competences.
2. Planning and organizing creative learning environments
    - I. Setting entrepreneurial learning objectives that are ethical and sustainable
    - II. Making connections to support entrepreneurial education
    - III. Creating an empowering entrepreneurial learning environment
3. Teaching and training
    - I. Teaching to inspire and engage students
    - II. Creating value for others
    - III. Teaching through real-world context
    - IV. Encouraging self-awareness and self-confidence to support learning
    - V. Promoting productive working with others
4. Assessment
    - I. Checking and reporting on students' progress in entrepreneurial learning
    - II. Sharing feedback on entrepreneurial learning
    - III. Celebrating progress and achievement
5. Professional Learning and Development
    - I. Evaluating impact of entrepreneurial education
    - II. Research-informed and evidence-based practice
    - III. Building and sustaining entrepreneurial networks

Annex 5. EntreCompEdu / six pedagogical principles (Grigg)

(https://entrecompedu.eu/entrepreneurship-for-everyone/) / Part pedagogical principles

Underpinning EntreCompEdu is a set of six pedagogical principles to guide educators in their practice.

Author: *Dr. Russell Grigg*

- **Think creatively**
- ***Look to the real-world for inspiration***
- ***Make entrepreneurial learning visible***
- ***Promote collaboration with a purpose***
- ***Create something of value for others***
- ***Stimulate reflection, flexible thinking and learning from experience***

1. Think creatively

This principle involves facilitating creative thinking throughout the learning process. In practice, this means encouraging learners to ask, 'What if...?' questions, wonder about possibilities, 'to look twice' and be adaptable to different ideas and solutions. Teaching observational techniques, such as slow looking, can help learners spot opportunities that they might easily miss.

2. Look to the real-world for inspiration

Seeking out real-world opportunities to add value is essential for learners to develop and apply their entrepreneurial competences. Despite the horrendous consequences of coronavirus, the pandemic has sparked a rise in creativity with many weird and wonderful suggestions to help us keep a safe distance from others. These include virtual holidays to remote islands, virtual concerts, hats with foam 'pool noodles' worn by café customers in Germany, and eye-catching graphics to help people move in the right direction. When learners explore authentic problems in their school, immediate locality, or wider world, they are likely to work harder and engage in deeper thinking than when they learn through textbooks.

3. Promote collaboration with a purpose

Learners need opportunities to collaborate with a clear purpose both in and be-yond the classroom. Historically, most of the innovations that eventually find their way in our lives stem not from a single genius figure, but through networks who thrash out possibilities, redesign elements and add modifications. The success of the likes of Apple, YouTube, eBay, and Toyota is based on the creative power of collaboration.

4. Create something of value for others

Being entrepreneurial is about adding value in people's lives. This does not have to be about making money. It could involve lessons in adding social value, such as arranging a schedule to check on the welfare of older ones or setting up an inter-generational project, where skills between students and grandparents are shared online. Or the value might take cultural forms, such as creating a heritage walk in the community or a virtual arts gallery.

5. Stimulate reflection, flexible thinking and learning from experience

Being entrepreneurial also involves ongoing reflecting over what's worked well and needs developing or improving. For example, upon reflection, perhaps the unique value of a product or service needs to be communicated more clearly or through a different medium. Taking a new direction can be fearful for some learners. And so, teachers might offer incremental challenges. Learners who dread making a class presentation might begin with presenting to a small group. Teachers can also model reflection by thinking aloud and being open about their own learning experiences.

6. Make entrepreneurial learning visible

In recent years much has been said by the likes of John Hattie and others about ensuring that learners know what to do and how to do it. In entrepreneurial education, this means making learning goals clear while being open to unexpected responses. It also involves fostering dialogue with and among learners so that they are not playing some form of guess-what's-in-the-head-of-the-teacher game.

REFERENCES

Avalos, B. (2011). Teacher Professional Development in Teaching and in Teacher Education over ten years. Journal of Teaching and Teacher Education, 27, 10–20. https://doi.org/10.1016/j.tate.2010.08.007

Bacigalupo, M., Kampylis P., Punie Y. & Van den Brande, G. (2016). *EntreComp: The Entrepreneurship Competence Framework*, Luxembourg: Publication Office of the European Union; EUR 27939 EN; https://doi.org/10.2791/593884

Barron, M., Cobo, C., Sanchez Ciarrusta, I., Munoz-Najar, A. (2021). What is Hybrid Learning? How can countries get it right? World Bank Blogs, April 27, 2021. Published on Education for Global Development. Retrieved 28.1.2021 from https://blogs.worldbank.org/education/what-hybrid-learning-how-can-countries-get-it-right

Biggs, J. & Tang, C. (2011): Teaching for quality learning at university. What the Student does. 4th Edition. https://cetl.ppu.edu/sites/default/files/publications/-John_Biggs_and_Catherine_Tang-_Teaching_for_Quali-BookFiorg-.pdf

Bergmann, J. & Sams, A. (2012). Flip your classroom: reach every student in every class every day. Eugene, Or: International Society for Technology in Education.

Borko, H., (2007). Professional development and teacher learning: Mapping the terrain. Educational researcher, Volume 33(8): 3–15.

Boyarsky, K. (2021). The Benefits of Hybrid Learning in a Post-COVID World. Retrieved 13.10.2021 from https://resources.owllabs.com/blog/hybrid-learning-benefits

Clarke, D. and Hollingsworth, H. (2002). Elaborating a model of teacher professional growth. Teaching and Teacher Education. 18(8), 947–967. https://doi.org/10.1016/S0742-051X(02)00053-7

Draycott, M. & Rae, D. (2011). Enterprise education in schools and the role of competency frameworks. International Journal of Entrepreneurial Behavior & Research, 17(2): 127–145. https://doi.org/10.1108/13552551111114905

EC (2018). European COUNCIL RECOMMENDATION of 22 May 2018 on key competences for lifelong learning (Text with EEA relevance) (2018/C 189/01). https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H0604(01)

EU. (2021). European Commission. EU Science Hub. Learning and Skills for the Digital Era. Retrieved 21.01.2022 from https://ec.europa.eu/jrc/en/research-topic/learning-and-skills

Ezyschooling. Reference retrieved 26.1.2022 from https://ezyschooling.com/parenting/expert/hybrid-learning.

Garbuio, M., Dong, A., Lin, N., Tschang, T. & Lovallo, D. (2018). Demystifying the Genius of Entrepreneurship: How Design Cognition Can Help Create the Next Generation of Entrepreneurs. Academy of Management Learning & Education, 17(1): 41–61. https://doi.org/10.5465/amle.2016.0040

Gornitzka, Å. & Maassen, P. (2000). Hybrid steering approaches with respect to European higher education. Higher education policy, 13(3), 267–287. https://doi.org/10.1016/S0952-8733(00)00012-X

Oksanen L., Healey-Benson, F. & McCallum E. (2022). Take a Chance on CPD! How One School Put its Faith in the EntreCompEdu CPD Programme and Developed Whole-School Collective Entrepreneurial Education. Kwartalnik Pedagogiczny, 66(4): 138–162.

Horn, M.B. & Staker, H. (2014). Blended: Using Disruptive Innovation to Improve Schools. San Francisco, CA: Jossey-Bass.

Grigg, R. (2021). EntreCompEdu, a professional development framework for entrepreneurial education, Education + Training, 63(7/8): 1058-1072. https://doi.org/10.1108/ET-06-2020-0166

Kraft M. A, Blazar D. & Hogan D. (2018). The Effect of Teacher Coaching on Instruction and Achievement: A Meta-Analysis of the Causal Evidence. Review of Educational Research, 88(4): 547–588. https://doi.org/10.3102/0034654318759268

Krishnamurthy, S. (2020). The future of business education: A commentary in the shadow of the COVID-19 pandemic. *Journal of Business Research*, 117(1): 1–5. https://doi.org/10.1016/j.jbusres.2020.05.034

Lackeus, M., (2013). Developing Entrepreneurial Competencies: An Action-Based Approach and Classification in Education, Division of Management of Organizational Renewal and Entrepreneurship, Department of Technology Management and Economics, Chalmers University of Technology, Gothenburg, Sweden. http://vcplist.com/wp-content/uploads/2013/11/Lackeus-Licentiate-Thesis-2013-Developing-Entrepreneurial-Competencies.pdf

Lackeus, M. (2015), Entrepreneurship in Education. What, Why, When, How. Entrepreneurship360, OECD, Paris.

Lackéus, M. (2020). Comparing the impact of three different experiential approaches to entrepreneurship in education. International Journal of Entrepreneurial Behaviour and Research, 26(5): 937–971. http://dx.doi.org/10.1108/IJEBR-04-2018-0236

Li, Y. & Dervin, F. (2018). Continuing Professional Development of Teachers in Finland. Palgrave Macmillan. 88(4), 547–588.

Liguori, E. & Winkler, C. (2020). From offline to online: Challenges and opportunities for entrepreneurship education following the COVID-19 pandemic. Entrepreneurship Education and Pedagogy, 3(4), 346–351. https://doi.org/10.1177/2515127420916738

Kassean, H., Vanevenhoven, J., Liguori, E. & Winkel, D. E. (2015). Entrepreneurship education: A need for reflection, real-world experience and action. International Journal of Entrepreneurial Behavior and Research, 21(5), 690–708. https://doi.org/10.1108/IJEBR-07-2014-0123

Kraft M. A, Blazar D, Hogan D. (2018). The Effect of Teacher Coaching on Instruction and Achievement: A Meta-Analysis of the Causal Evidence. Review of Educational Research. 88(4). https://doi.org/10.3102/0034654318759268

Mwasalwiba, E. S. (2010). Entrepreneurship education: a review of its objectives, teaching methods, and impact indicators. Education+ Training, 52(1), 20–47. https://doi.org/10.1108/00400911011017663

Nikou, S. & Maslov, I. (2021), An analysis of students' perspectives on e-learning participation – the case of COVID-19 pandemic", International Journal of Information and Learning Technology, 38(3): 299–315. https://doi.org/10.1108/IJILT-12-2020-0220

OECD (2018). The future of education and skills education 2030: The future we want, Resource document. Organisation for Economic Cooperation and Development. Retrieved 21.3.2021 from https://www.oecd.org/education/2030/E2030%2520Position%2520Paper%2520(05.04.2018).pdf

OECD (2020), What Students Learn Matters: Towards a 21st Century Curriculum, OECD Publishing, Paris. https://doi.org/10.1787/d86d4d9a-en

OECD (2021), OECD Digital Education Outlook 2021 Pushing the Frontiers with Artificial Intelligence, Blockchain and Robots: Pushing the Frontiers with Artificial Intelligence, Blockchain and Robots, OECD Publishing, Paris. https://doi.org/10.1787/7fbfff45-en

Oksanen, L. (2020). Lahden tiedeviikko / Lahti Science Week. Yrittäjyyskasvatuksen edistäminen. Retrieved 20-10-2021 from https://www.lahdenyliopistokampus.fi/lahden-tiedeviikon-tallenteet-on-julkaistu/ and https://www.youtube.com/watch?v=OdmEpT3bvkM

Opfer, D. (2016). Conditions and Practices Associated with Teacher Professional Development and Its Impact on Instruction in TALIS 2013, OECD Education Working Papers, No. 138, OECD Publishing, Paris, https://doi.org/10.1787/5jlss4r0lrg5-en

Pekkola, J. (2002). Etätyö Suomessa. Fyysiset, virtuaaliset, sosiaaliset ja henkiset työtilat etätyöympäristöinä. Publications of the Swedish

School of Economics and Business Administration. https://helda.helsinki.fi/bitstream/handle/10227/458/104-951-555-721-6.pdf?sequence=2

Radha, R., Mahalakshmi, K., Kumar, V. S. & Saravanakumar, A. (2020). E-Learning during lockdown of Covid-19 pandemic: a global perspective. *Int. J. Control Automat.* 13, 1088–1099. Retrieved 20.10.2021 from http://sersc.org/journals/index.php/IJCA/article/view/26035

Ratten, V. & Jones, P. (2021). COVID-19 and Entrepreneurship Education: Implications for Advancing Research and Practice. International Journal of Management Education. 19(1). https://doi.org/10.1016/j.ijme.2020.100432

Ruskovaara, E. & Pihkala, T. (2013). Teachers implementing entrepreneurship education: classroom practices. Education+ training, Vol. 55, No. 2, pp 204–216.

Ruskovaara E. & Pihkala T. (2014). Education in Schools: Empirical Evidence on the Teacher's Role. The Journal of Educational Research, 108(3): 236–249. http://dx.doi.org/10.1080/00220671.2013.878301

Ruskovaara, E. (2014). Entrepreneurship Education in Basic and Upper Secondary Education – Measurement and Empirical Evidence. Ph.D. thesis, Lappeenranta University of Technology, Finland. https://urn.fi/URN:ISBN:978-952-265-657-5

Ruskovaara, E., Hämäläinen, M., & Pihkala, T. (2016). Head teachers managing entrepreneurship education - Empirical evidence from general education. Teaching and Teacher Education, 55: 155–164. https://doi.org/10.1016/j.tate.2016.01.004

Sousa, M. J., Carmo, M., Gonçalves, A. C., Cruz, R. & Martins, J.M. (2019). Creating knowledge and entrepreneurial capacity for HE students with digital education methodologies: Differences in the perceptions of students and entrepreneurs. Journal of Business Research, 94: 227–240. https://doi.org/10.1016/j.jbusres.2018.02.005

United Nations. (2020). Policy brief: Education during COVID-19 and beyond. United Nations. https://www.un.org/development/desa/dspd/wp-content/uploads/sites/22/2020/08/sg_policy_brief_covid-19_and_education_august_2020.pdf

VANDER ARK, T. (2012). Flex Schools Personalize, Enhance and Accelerate Learning, Getting Smart. Retrieved 18.5.2021 from https://www.gettingsmart.com/2012/02/09/flex-schools-personalize-enhance-and-accelerate-learning/

Svetec, B., Oksanen, L., Divjak, B. & Horvat, D. (2022). Digital Teaching in Higher Education during the Pandemic: Experiences in Four Countries. U: Vrček, N., Guàrdia, L. & Grd, P. (ur.) Proceedings of the 33rd Central European Conference on Intelligent Information Systems (CECIIS).

https://www.proquest.com/openview/49b5382e6d3ccfd034008dd8ceec3c53/1?pq-origsite=gscholar&cbl=1986354

Divjak, B., Rienties, B., Iniesto, F., Vondra, P. & Žižak, M. (2022). Flipped classrooms in higher education during the COVID-19 pandemic: findings and future research recommendations. International journal of educational technology in higher education, 19(1): 9, 24. https://doi.org/10.1186/s41239-021-00316-4

Divjak, B., Grabar, D., Svetec, B. & Vondra, P. (2022b). Balanced Learning Design Planning: Concept and Tool. Journal of information and organizational sciences, 46(2), 361–375. https://doi.org/10.31341/jios.46.2.6

Divjak, B., Žugec, P. & Pažur Aničić, K. (2022c). E-assessment in mathematics in higher education: a student perspective. International journal of mathematical education in science and technology, online, 2117659, 23. https://doi.org/10.1080/0020739X.2022.2117659

Attribution, acknowledgement, and recognition

This publication is part of the e-DESK project, led by the Centro Internacional Santander Emprendimiento (CISE) and co-funded by the European Union, through the Erasmus+ program. This document was coordinated by Universidade Nova de Lisboa as part of the e-DESK Project.

Authors: This publication has been written and collated by Lappeenranta-Lahti University of Technology on behalf of the e-DESK project with contributions gratefully received from all other partners of the e-DESK Project: Centro Internacional Santander Emprendimiento (CISE), Faculty Organization and Informatics of the University of Zagreb, University of Cantabria and Universidade Nova de Lisboa

Lead authors: Lea Oksanen, (LUT University), Hilkka Laakso (LUT University), Paulo Costa, (Universidade Nova de Lisboa) and Alba González Calleja (CISE)

DOI:

Information: info@edeskeurope.eu, www.edeskeurope.eu

Disclaimer

This methodology was created by the e-Desk – Digital and Entrepreneurial Skills for Teachers project, within the ERASMUS+ programme.

e-DESK Digital & Entrepreneurial Skills for European teachers

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

This methodology was created by the e-Desk – Digital and Entrepreneurial Skills for

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

e-DESK

Digital & Entrepreneurial Skills
for European teachers

TOOLKIT/GUIDE FOR EDUCATORS

CISE CENTRO INTERNACIONAL SANTANDER EMPRENDIMIENTO UCEIF
UC UNIVERSIDAD DE CANTABRIA
Editorial Universidad Cantabria
foi UNIVERSITY OF ZAGREB FACULTY OF ORGANIZATION AND INFORMATICS VARAŽDIN
LUT Lappeenranta University of Technology
NOVA UNIVERSITY LISBON

TOOLKIT/GUIDE FOR EDUCATORS

INTRODUCTION TO THE TOOLKIT

Tool to guide teachers in the implementation of hybrid, blended and online modes of delivery.

As of July 2020, 98.6% of learners worldwide were affected by the pandemic. It is estimate of 1.725 billion students from pre-primary to higher education in 200 countries were affected by lockdowns (United Nations, 2020). The teachers and their teaching practices widely changed from traditional face-to-face to different modes of digital learning and teaching.

The e-DESK programme is targeted for the higher education teachers to skill up entrepreneurship education competences in online teaching methods and practices, to develop their online teaching skills and to enhance the entrepreneurial competences for their learners. The objective of the e-DESK programme is to introduce the future of education trends in an online environment. Participating teachers are introduced to concrete entrepreneurship methods, and online tools that may be applied in their teaching practices to enhance their learners' entrepreneurial skills, competence, and mind-set in a hybrid context.

At this point, it is important to clarify what we mean by modes of delivery, methodologies and methods.

We designate by modes of delivery the pedagogical formats carried out in specific learning environments. For example, online, hybrid, blended and face-to-face.

By methodologies, we will address the activities implemented during a pedagogical session. For example, group work, lectures, presentations, oral reports.

The set of pedagogical approaches, with their own outcomes and aligned forms of assessment, will be designated by methods. For example, Problem Based Learning/Project Based Learning, Team Based Learning or Challenge Based Learning.

This document will focus on the hybrid mode of delivery, presenting approaches, recommendations and helpful resources to implement this pedagogical format. Please note that part of this content can also be useful for other modes of delivery.

Also, this document is meant to be used in a very practical way. You will find cross-links between sections to the different materials such as the

methodology, the MOOC and resources whenever necessary, in order to make it accessible along the entire document.

ABOUT THE PROJECT

The **e-Desk – Digital and Entrepreneurial Skills for Teachers** is a European learning project for higher education teachers implemented in the period 2021-2023 within the ERASMUS+ programme. Its objective was to provide European higher education teachers with the required digital skills and entrepreneurial mind-set in teaching to succeed in the 21st century teaching and teaching environments.

e-Desk combines the expertise of 4 European universities (University of Cantabria - Spain, NOVA University of Lisbon - Portugal, University of Zagreb - Croatia and LUT University of Finland) and the International Entrepreneurship Centre of Santander – Spain (project coordinator) which have expertise in online training, curricula design and entrepreneurship education.

The continuous training of teachers is central to e-Desk, as the enhancement of their digital and entrepreneurship skills, by designing a hybrid methodology, in which face-to-face teaching and digital environments are combined. The goal of e-DESK was to bring education closer to all students, to understand their way of using technology so that education adapts to new uses and takes advantage of the digital environments.

THE METHODOLOGY AND THE MOOC

The entrepreneurial and digital competences for Educators

The main purpose of the **e-Desk methodology**[1] is to generate knowledge by evidence research practices in applying entrepreneurship education to the online digital teaching environment, namely in the **hybrid and blended teaching format**.

The project's goal is to provide tools, methods and means to enhance online teaching practices that are needed as a response to the current educational challenges, enhancing **entrepreneurship and digital teaching and learning processes**, in an online environment.

The development of the e-DESK methodology arises from the results of an initial survey, applied in four European countries, addressing the needs of the

target group: HEI teachers. The initial survey itself is developed in cooperation with all partners of the e-DESK project. Results were published in research paper [8].

As the current experience shows, teachers are no longer simple lecturers that deliver scientific contents in front of their students, in a typical classroom. In fact, not only the teacher, but also the entire academic community, must display another set of skills, which relate, for example, to the ability to adapt to increasingly less homogeneous target audiences.

Solutions for distance learning have developed rapidly, especially during the last couple of years. The imposition of an emergency remote teaching, from the previous pandemic situation, has accelerated the demand to deliver a class virtually.

These new challenges require new competences, aimed at mastering digital tools and methods. The importance of using educational technologies grows and therefore the need to use new forms of pedagogical interaction and learning assessment.

This new digital education requires to know how to apply technological resources, not only as mere tools, but also as a way of effectively achieving learning outcomes.

Regarding this scenario, the **European Framework for the Digital Competence of Educators**[2] was created and suggests six main areas (Professional Engagement, Digital Resources, Teaching and Learning, Assessment, Empowering Learners and Facilitating Learners' Digital Competence), which enclose the competences that can help teachers in approaching digital teaching in an innovative way. This framework represents a guide to support teaching in different learning environments, namely, to contribute to the design of a successful remote or hybrid experience, which is the goal of this project.

Following these requirements, a Massive Open Online Course (MOOC) was created, to help HEI educators develop entrepreneurial and digital skills, as well as providing resources for the implementation of hybrid and blended methodologies:

MOOC: Digital and Entrepreneurial Teachers for a Fast-Changing World.

This MOOC was designed to give the needed competences and tools for educators to successfully manage their teaching activity on a digital environment and the design of an adaptable, transversal, scalable and replicable high-quality hybrid education methodology that places students at the centre of the teaching process.

The MOOC counts with ten modules focused on entrepreneurial and digital competencies, learning design, innovative pedagogical approaches and useful tools and materials to ease the introduction of the technology in your classroom.

GENERAL CONSIDERATIONS

The development of this toolkit comes as a practical guide, resulting from the previous work developed on the context of this project, such as the **e-DESK Methodology** and the **MOOC: Digital and Entrepreneurial Teachers for a Fast-Changing World**.

This project outputs will provide educators with a deep understating on how to implement and/or improve the quality of classes and therefore better prepare students and future generations in the skills required by the society.

Prior to continue to explore this toolkit we strongly suggest you check our previous stated materials to make sure you have a better understating on how to successfully implement a hybrid methodology in your own context.

THE DELIVERY MODES

Brief description

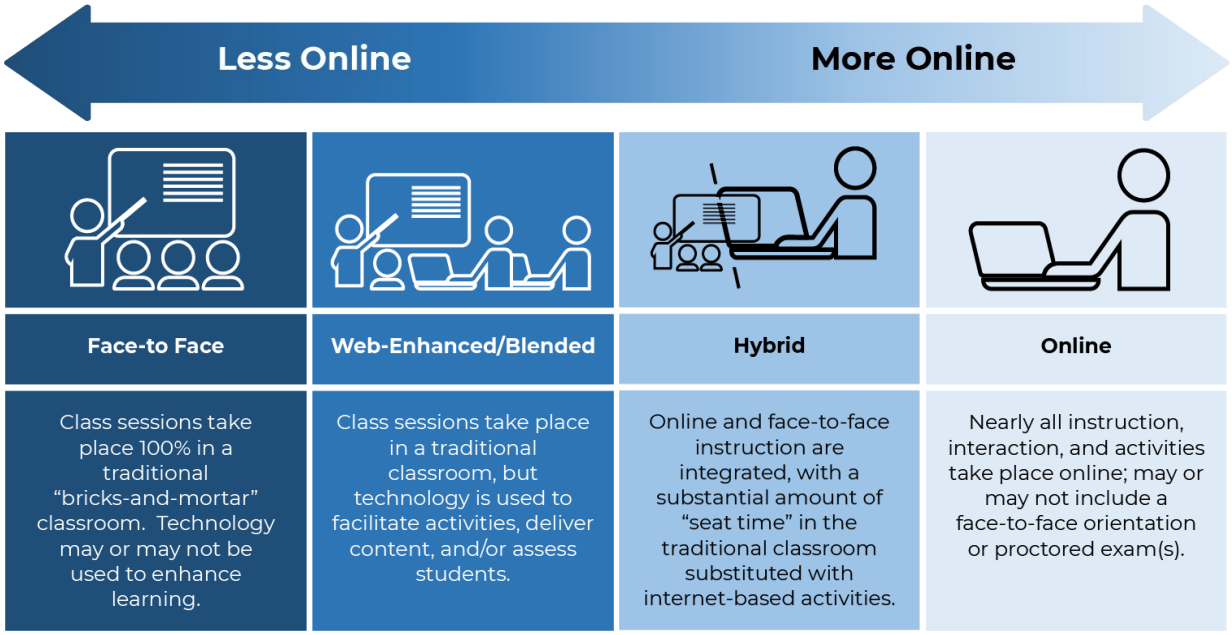
The e-Desk project defines the online delivery mode concept as follows:

Full digital - in full digital learning, the student completes the course entirely online. Full digital does not require the presence of the student on campus.

Blended learning - Blended learning can include many different teaching methods and their applications. The learning environment consists of an online environment and contact teaching.

Hybrid learning - In hybrid teaching, participants are **simultaneously** present in the same classroom either/or remotely over a network connection.

Though blended and hybrid teaching modes are today distinguished from each other, it needs to be noted, that still quite recently they have been used interchangeably in the same context.



Source: An Introduction to Hybrid Teaching, College of DuPage

Hybrid learning – first approach:

- The hybrid approach combines both face-to-face and online teaching to create a unified learning experience[3].
- The teaching delivery is simultaneous distributed between the two formats, and it is important to ensure the attention is given as much as possibly equally in both formats [3][8].
- The hybrid model has fewer physical in-person sessions than a typical face-to-face course, which makes the time spent together between students and their instructor more valuable[3].
- In a hybrid course, students are frequently given content-related assignments to be completed online, and they use their face-to-face time to conduct a deeper approach to the material, by analysing, deconstructing, and collaborating to generate new ideas[3].

Things to take into account

Hybrid is different from blended learning. Hybrid learning is designed to maintain an equilibrium between online and offline learning, while blended learning is designed to give face-to-face students online material to complement their in-class experience.

The hybrid approach does not create a distinction between the digital and on-campus groups and does not merely involve a combination of online and offline learning activities.

Achieving a balance between pedagogy and technology is a critical component of hybrid learning, often requiring a trade-off between the two[4].

Best practices

Regarding the activities:

- In face-to-face classes, the instructor presents lectures and guides class discussions, while students work on online assignments related to the classroom activities. These assignments are subsequently shared on asynchronous discussion forums for online discussions[3].
- The instructor shares lectures online through using PowerPoint or streaming media for students to review. In the classroom, students use these initial online resources to engage in small group activities and discussions[3].
- Students collaborate on small group projects online, share them on discussion forums for review and discussion, and eventually present them during face-to-face classes for final discussion and evaluation[3].

Schedule

- A common approach is for the instructor to conduct face-to-face classes for a few weeks, followed by a week of online instruction[3].
- Alternatively, the initial weeks of the course could involve face-to-face preparation, followed by an extended period (such as a month or longer) of online coursework[3].
- In a night class (after normal working hours) that typically meets in person for three hours per week, each class session may be shortened by 45 minutes. The remaining time is allocated for students to complete online assignments instead of maintaining the full three-hour in-person class time[3].

Few advices from practitioners:

The hybrid format might not have a straightforward implementation, so it is easier to take it step by step.

The **design of a course/class** is essential and it helps to plan in advance and anticipating challenges. The focus should be on the design, using the available resources - **technology will follow**.

It is important to manage the teacher's and students' expectations and establish a proper pedagogical contract before the course starts.

There is also the tendency to overload a hybrid course by simply adding additional online components to the work from the traditional course (**course-and-a-half syndrome**). The teacher has to organize the learning outcomes according to the hybrid format demands. In this context, as said before, reskilling the **teacher's digital competences** can represent an effective exercise. It is productive not to do it alone and resort to collaborative groups or communities of practice.

The following table gathers a set of resources, which are used in today's digital teaching and which can be applied in a hybrid pedagogical session. These can be useful not only for the hybrid format, but also for other **delivery modes**.

These resources have been organized by categories and feature links to websites or video tutorials about each of the listed tools.

RESOURCE BOX

Learning Design tools

BDP	OULDI	ABC

Digital presentation tools

Powerpoint	Prezi	Google Slides

Videoconference resources

Zoom	Teams	Google Meet

Learning Management Systems

Moodle	Blackboard	Canvas

Collaboration platforms

Google Classroom	Sharepoint	Padlet

- **Gamification tools**

Kahoot!	Gimkit	Quiziz

- **Polling tools**

Mentimeter	Poll Everywhere

- **Surveys**

Microsoft Forms	Google Forms

HOW CAN I PROCEED?

Design

What is learning design?

Learning design determines which activities, and in which conditions, teachers and learners need to undertake them, so to enable learners to achieve the intended learning outcomes. It describes the order of learning tasks, resources and support developed by teachers for their students, as well as the student workload, mode of delivery, assessment and feedback.

There are tools that can support learning design. According to the **MOOC (Digital and Entrepreneurial Teachers for a Fast-Changing World)**, it is suggested the **Balanced Learning Design Planning (BDP)**[5] platform, available through the link and free to use.

The **BDP tool** is a research-based, innovative, constructive-alignment oriented and modular solution based on learning outcomes and learner workload as foundations of learner-centered learning approach. This tool was created by the Faculty of Organization and Informatics – University of Zagreb. [9]

To learn more about learning design and to get some practical tips on how to use the **BDP tool**, you can access the **MOOC e-Desk** and visit the corresponding module: **Learning design concept and tool**.

The preparation of learning design starts with the definition of the **learning outcomes**. If the learning outcomes are not defined correctly, the learning design does not have any value and, finally, the validity of assessment is questionable.

How to define learning outcomes?

It is important to distinguish between **general objectives** and **learning outcomes.** The general objectives concern what must be achieved or accomplished at the end of a module, curricular unit or course.

Learning outcomes establish in detail what the student should be able to know and know how to do, in order to successfully complete a certain learning process. It is as if the general objectives unfold into learning outcomes. These should refer not only to the content to be learned, but also to the way in which that content should be used by the student.

Learning outcomes should be established from the student's perspective, using action verbs that appeal to different cognitive levels and that lead to observable and evaluable behaviours.

To support the course planning, we suggest the following sequence of videos.

These videos are a part of the **Pedagogical Training for Faculty course**[6], created by Professor Patrícia Rosado Pinto and NOVA Forma – NOVA University Lisbon, and they explain the different steps of planning a course, by completing a curricular unit file. To present these contents, a fictional course and teacher were created. Note: The videos are in Portuguese and have English subtitles.

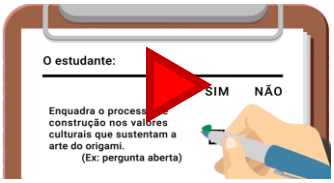
CURRICULAR UNIT FILE: ORIGAMI – HOW TO MAKE A CRANE

1. Introduction

2. Learning Outcomes

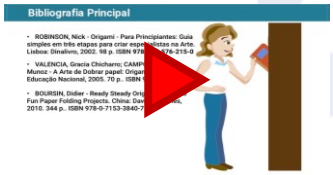
3. Course content

4. Teaching Strategies



5. Assessment Methods

6. Alignment



7. Bibliography

To systematize this planning, we suggest the following table, based on the presented fictional course:

Name of the teacher responsible:	*e.g. António Imagiro*
Institution:	*e.g. NOVA University Lisbon - NOVA School of Social Sciences and Humanities*
Course title:	*e.g. ORIGAMI*
Course level:	*e.g. graduate*
Course duration (total):	*e.g. one semester*
ECTS credits (total):	*e.g. 6 ECTS*
Regular mode of delivery of the entire course:	*e.g. face-to-face*
Learning outcome(s) (to be included in the pilot):	*e.g.* *DESCRIBE the origins of origami.* *IDENTIFY the cultural values underlying the art of origami.* *IMITATE the folding steps, from viewing a demonstration.* *APPLY the folding technique autonomously.*
Topic(s):	*e.g. How to make a crane*
Mode of delivery:	*e.g. hybrid mode*
Duration of the experience:	*e.g. 4 weeks*

Implementation

As a teacher, implementing a well-designed learning experience can be an exciting opportunity to engage and inspire your students. Whether you have designed a learning experience from scratch or adapted an existing one, the mode of delivery plays a crucial role in ensuring its success.

This section aims to support teachers who are implementing a learning experience they have already designed and are using one of these modes of delivery. By following the steps outlined below, you can effectively navigate the challenges and maximize the benefits of hybrid, blended, or fully online learning environments. Let's dive in!

1. Review the learning experience design:

   Take a moment to review the learning experience you've designed. Make sure that it's well-structured, engaging, and appropriate for the delivery mode you've chosen. If you feel like there are any areas that need improvement, adjust as necessary. If you have been using the BDP tool, please refer to the Design Analytics to see the possible areas for improvement.

2. Prepare the necessary materials:

   Depending on the delivery mode, you may need to prepare different materials. For a hybrid delivery mode, you may need to create both online and in-person materials. For a blended delivery mode, you'll need to create a mix of synchronous and asynchronous materials. For a fully online delivery mode, you'll need to create all materials in a digital format. Ensure all the materials are easily accessible and in a well-organized manner.

3. Test the technology:

   Before starting the learning experience, make sure you test the technology you'll be using to deliver it. Ensure all the links, files, and tools you'll be using are functioning correctly.

   This includes testing any video conferencing tools, learning management systems (LMS), and any other online tools you'll be using. Please make sure to share with your students any additional technology-related instructions. They could appreciate to receive it in advance.

4. Communicate with your students:

   Ensure you communicate clearly with your students before the learning experience begins. Let them know what to expect and what they need to do to be successful in the experience.

   Provide them with clear instructions on how to access the materials and the schedule for the learning experience.

5. Start the learning experience:

   Whether you're delivering it in a hybrid, blended, or fully online mode, make sure you're engaging with your students, providing them with opportunities for interaction, and monitoring their progress. Consider using formative assessments and checking for understanding regularly.

6. Monitor and adjust as necessary:

   Throughout the learning experience, make sure you're monitoring your students' progress and adjusting the experience as necessary. If something isn't working, make adjustments to ensure your students are getting the most out of the experience.

Remember that the specific implementation details may vary depending on the context, resources, and constraints. Flexibility, adaptability, and continuous communication with students will be key to successfully implementing the learning experience in a hybrid, blended, or online mode.

FINAL CONSIDERATIONS/ RECOMMENDATIONS

Recommendations

Inclusive environment [7]

Tips to promote a sense of belonging among remote learners and a feeling of unity between those who attend face-to-face and those who participate remotely:

- Use icebreaker activities (asynchronously or synchronously during class sessions via **videoconferencing tools**)
- Establishing a contract with the group to manage the expectations of both face-to-face and remote students.
- Avoid videoconferencing fatigue, cognitive overload, and disconnect with interactive activities.
- Welcome all learners prior to the start of the course (through email for example).
- Acknowledge remote students' presence by looking into the camera while talking to them.

Accessible materials and activities [7]

Create the necessary materials and types of learning activities, considering when and where these course materials will be made available.

- Materials from synchronous sessions should be available (e.g., presentations, articles, resources).
- Apply instructional technologies proven effective for both you and your students, in previous experiences.
- Reuse existing instructional materials and resources to support all learners during a course.
- Record the online sessions and add it to the shared materials.
- Make sure the materials are inclusive and accessible to different groups of students.

Student engagement [7]

Ways to engage equally face-to-face and remote students, within the course content and with each other.

- Plan opportunities for remote students to communicate with face-to face students, using collaborative digital platforms. This should work for synchronous and asynchronous activities.
- Provide equal learning opportunities, with accessible activities, for both remote and face-to-face students.
- Use the proper **digital resources** to support this learning environment.

Students' success in a hybrid course [7]

It is important to support the students, balancing the teacher's presence between the face-to-face and remote learners, managing their expectations.

- Analyse the students' needs and digital skills before the course starts, during class sessions and early on or mid-course to check what is working or not for the hybrid experience.
- Establish pedagogical contracts with the students, explaining what the learning outcomes are, how they are going to be achieved and assessed.

- Host virtual meetings to provide resources and to support both face-to-face and remote students.

Classroom set-up [7]

Requirements for setting-up the physical classroom and the virtual environment to adjust to the planned activities.

- Choose the proper resources to support the activities.
- It is essential to have technical professionals to help setting-up the course.
- Plan in advance the most effective usage of the learning environment.
- Test the technological resources before the course starts.
- Practice and get to know all the resources to be used during the course.
- Arrive early to every synchronous class to set-up and test the classroom technology.

Revision/Assessment

To revise and assess the performance is a key element to identify the strengths and weaknesses of the learning experience designed. This is why it is recommended to have at least an internal assessment/revision when we implement something new. In this case, the recommendation is to get as much feedback as possible from students and peers. For example, it is important to have a time to reflect as a teacher how this experience has been and if it has accomplished one's own expectations and objectives.

However, getting feedback from the students is also key. By asking them about the learning experience the teacher will be able to compare with their own experience and conclusions and see the whole picture. In this case, it is suggested not to focus too much on quantitative questions but include some (not many either) open ended questions where students can freely express and detail their opinion.

Finally, if there is the possibility, it is recommended to get feedback from someone external, preferably another teacher.

The results gotten from the teacher's own analysis, students and even colleagues can be helpful for the design process of future experiences or even if replicating the same learning experience once again. This can be considered as the last step in the improvement circle.

CONCLUSIONS

Designing, implementing, and assessing learning experiences in hybrid, blended, or fully online delivery modes can be a transformative journey for both educators and students. By leveraging the flexibility and potential of technology, educators can create dynamic and engaging learning environments that cater to diverse learning needs.

Throughout this guide, we have explored the key considerations and strategies for designing effective learning experiences, successful implementation, and monitoring progress. It is crucial to remember that successful implementation requires continuous reflection, adaptation, and improvement. By actively seeking feedback from students, reflecting on their experiences, and making necessary adjustments, educators can enhance the quality and impact of their learning experiences.

As education continues to evolve, it is essential to embrace the possibilities offered by hybrid, blended, and fully online delivery modes. These modes provide opportunities for personalized learning, collaboration, and self-directed exploration. By harnessing the power of technology, educators can create vibrant learning communities where students can thrive and achieve their full potential.

Remember, the key to effective learning experiences lies in thoughtful planning, intentional design, followed by innovative teaching and learning strategies, continuous formative assessment, and meaningful feedback. By following the guidelines presented in this guide, educators can navigate the complexities of hybrid, blended, and fully online delivery modes with confidence, creating rich and meaningful educational experiences that empower students to succeed in the digital age.

Embrace the opportunities, adapt to the challenges, and continue to innovate as you design, implement, and assess learning experiences that inspire and empower the next generation of learners. Together, we can shape a future of education that is dynamic, inclusive, and transformative.

REFERENCES

List of links for the Resource Toolbox:

Learning Design tools			
	BDP	*OULDI*	*ABC*
Website	*Balanced Design Planning*	*Open University Learning Design Initiative*	*ABC LD Tool Wheel*
YouTube video	*Tutorial for the BDP LD tool*	-	*Introduction to ABC Learning Design*
Digital presentation tools			
	Powerpoint	*Prezi*	*Google Slides*
Website	*PowerPoint for Windows training*	*Prezi Video tutorials*	*Get started with Google Slides*
YouTube video	*The Beginner's Guide to Microsoft PowerPoint*	*Prezi Tutorial For Beginners*	*How to Use Google Slides - Beginner's Guide*
Videoconference resources			
	Zoom	*Teams*	*Google Meet*
Website	*Getting Started with Zoom*	*Microsoft Teams video training*	*Get started with Google Meet*
YouTube video	*Zoom tutorial - How to use Zoom*	*How to Use Microsoft Teams Effectively*	*Google Meet for beginners - How to use Google Meet*
Learning Management Systems			
	Moodle	*Blackboard*	*Canvas*
Website	*Moodle Quickstart Guide*	*Blackboard – Getting Started*	*Canvas – Getting started*
YouTube video	*Learn Moodle 3.9 Basics*	*Blackboard Learn: For Instructors*	*Canvas Course Setup*
Collaboration platforms			
	Google Classroom	*Sharepoint*	*Padlet*
Website	*Get started with Classroom for teachers*	*Get started with SharePoint*	*How do I create a padlet?*
YouTube video	*How to Use Google Classroom*	*How to use Microsoft SharePoint*	*Padlet – Video Tutorials*
Gamification tools			
	Kahoot!	*Gimkit*	*Quizizz*
Website	*Getting started with Kahoot!*	*Create a kit from scratch*	*Quizizz - Getting started*
YouTube video	*How To Use Kahoot?*	*Gimkit Tutorial for Teachers*	*How to use Quizizz to make quiz and share it*
Polling tools			
	Mentimeter	*Poll Everywhere*	
Website	*Getting started with Mentimeter*	*Getting started with Poll Everywhere*	
YouTube video	*How To Use Mentimeter - Mentimeter Tutorial For Beginners*	*Quick PollEverywhere Tutorial*	
Surveys			
	Microsoft Forms	*Google Forms*	
Website	*Introduction to Microsoft Forms*	*How to use Google Forms*	
YouTube video	*How to use Microsoft Forms*	*Google Forms Tutorial*	

References:

- [1] e-DESK Methodology, November 14, 2021. Lea Oksanen, LUT University, Finland; Hilkka Laakso, LUT University, Finland; Paulo Costa, NOVA University Lisbon, Portugal.
- [2] Punie, Y., editor(s), Redecker, C., European Framework for the Digital Competence of Educators: DigCompEdu, EUR 28775 EN, Publications Office of the European Union, Luxembourg, 2017, doi:10.2760/178382 (print),10.2760/159770 (online), JRC107466.
- [3] An Introduction to Hybrid Teaching, College of DuPage.
- [4] Munday, D. (2022). Hybrid pedagogy and learning design influences in a higher education context. Studies in Technology Enhanced Learning, 2(2), 1-16.
- [5] Balanced Learning Design Planning (BDP) platform. Faculty of Organization and Informatics – University of Zagreb.
- [6] Pedagogical Training for Faculty course. Rosado Pinto, Patricia; Marques, Joana; Caetano, Elsa; Belo Costa, Paulo; NOVA Forma – NOVA University Lisbon.
- [7] Five Tips for Hybrid/HyFlex Teaching with All Learners in Mind, Columbia University, Centre for Teaching and Learning.
- [8] Svetec, B., Oksanen, L., Divjak, B. & Horvat, D. (2022). Digital Teaching in Higher Education during the Pandemic: Experiences in Four Countries. U: Vrček, N., Guàrdia, L. & Grd, P. (ur.). Proceedings of the 33rd Central European Conference on Intelligent Information Systems (CECIIS).
- [9] Divjak, B., Grabar, D., Svetec, B. & Vondra, P. (2022) Balanced Learning Design Planning: Concept and Tool. Journal of information and organizational sciences, 46 (2), 361-375 doi:10.31341/jios.46.2.6.

Attribution, acknowledgement, and recognition

This publication forms part of the eDESK project, led by the Centro Internacional Santander Emprendimiento (CISE) and co-funded by the European Union, through the Erasmus+ program. This document was coordinated by Universidade Nova de Lisboa as part of the eDESK Project.

Authors: This publication has been written and collated by Universidade Nova de Lisboa on behalf of the eDESK project with contributions gratefully received from all other partners of the eDESK Project: Centro Internacional Santander Emprendimiento (CISE), Faculty Organization and Informatics of the University of Zagreb, University of Cantabria and Lappeenranta-Lahti University of Technology

Lead authors: Paulo Belo Costa and Carla Portela (Universidade Nova de Lisboa)

Information: info@edeskeurope.eu, www.edeskeurope.eu

Disclaimer

This toolkit was created by the e-Desk – Digital and Entrepreneurial Skills for Teachers project, within the ERASMUS+ programme.

e-DESK
Digital & Entrepreneurial Skills for European teachers

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

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

e-DESK

Digital & Entrepreneurial Skills
for European teachers

Digital and Multimedia MOOC guide

CISE CENTRO INTERNACIONAL SANTANDER EMPRENDIMIENTO UCEIF
UC UNIVERSIDAD DE CANTABRIA
Editorial Universidad Cantabria
foi UNIVERSITY OF ZAGREB FACULTY OF ORGANIZATION AND INFORMATICS VARAŽDIN
LUT Lappeenranta University of Technology
NOVA UNIVERSITY LISBON

DIGITAL AND MULTIMEDIA MOOC GUIDE

INDEX

Introduction. The e-DESK MOOC

As part of the e-Desk (Digital and Entrepreneurial Skills for European Teachers) project, an intervention co-funded by the European Union through the Erasmus+ program, a MOOC (Massive Open Online Course) was developed as part of the Digital Training.

Taking in mind that the COVID-19 not only forced us to change the way we used to learn and teach; this MOOC was building retaking also different pedagogical methodologies taking in mind this new way of living.

e-DESK is a hybrid university education, promoting these digital and business skills of teachers and students, since the pandemic helped to identify or assess the latent need to develop these skills that society demands so much and that must be put into practice for young people in the European Union, specially on the university field.

This document aims to be a guide on how to develop a MOOC course similar to the one that has been carried out through the MiriadaX platform (with two different editions https://miriadax.net/) during the implementation of the project, at the University of Cantabria Virtual Classroom (closed platform only available for the staff training for teachers for each partner https://moodle.unican.es/), FOI Learning Platform (that it´s still open if you want to attend there our MOOC https://learn.foi.hr/) and also the contents can still be visited on NAU platform (https://www.nau.edu.pt/en/course/digital-and-entrepreneurial-teachers-for-a-fast-changing-world/).

The reader will also find images and examples on how this complete MOOC it´s prepare to be replicated on any LMS platform and still continue offering the same quality materials. Also, we are going to try to show some statistical results within Annex I - BRIEF STATISTICAL ANALYSIS resulting from the first execution of this MOOC in the different platforms mention before. The information was collected not only when this first edition of the course had finished, but also while it was undergoing, and the insights provided have been essential to the improvement of this guide.

OVERVIEW

The e-Desk program includes an online part (in MOOC format) carried out by means of pilot activities at the Universities of Cantabria (UC), Lappeenranta-Lahti University of Technology (LUT), Universidade Nova de Lisboa (UNL) and University of Zagreb (FOI).

In this first implementation, the MOOC has been delivered on two different platforms.

First in University of Cantabria Virtual Classroom (https://moodle.unican.es/login/index.php) , this for the specific training of the teachers for each partner and facing the Staff training phase.

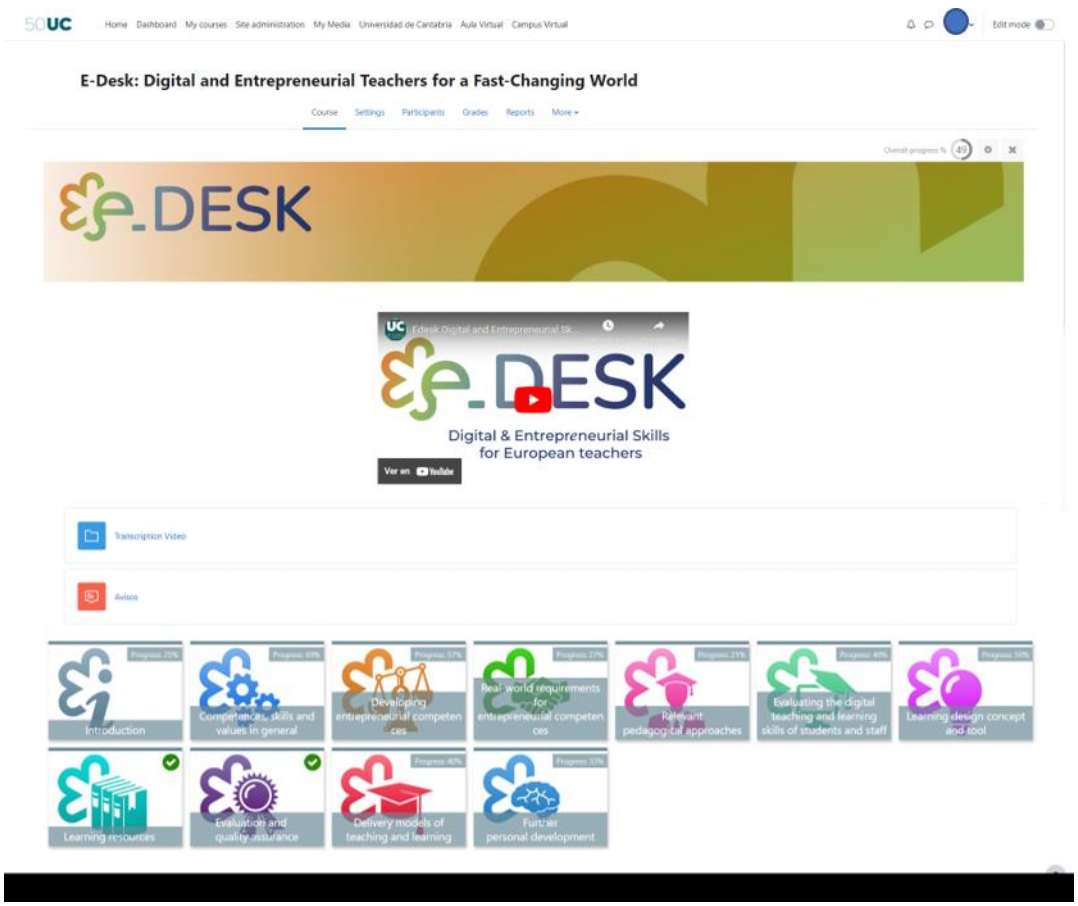


Image 1: MOOC e-Desk on University of Cantabria Virtual Classroom platform (source own elaboration)

This was critic to understand and improve the materials according with this first users experience. The Virtual Classroom of the University of Cantabria is a private platform and it was decided to use it in the first place because this space uses Moodle, like MiriadaX and other associated virtual training spaces, therefore it allows the creation and construction of a course on this platform., test it in a more controlled space with enough permissions to transform the experience, and then port it to any other platform in an easier way.

This helped us to improve the materials and make some changes like distributing the materials differently, cutting some videos according to the explained concept and theme. Improve some peer-to-peer activities and verify the fluency of the test as the users mentioned. With this feedback, the MOOC and materials were improved and that allows to create a course backup flexible and available to add in any other Moodle platform.

The second part of this first phase was to import and implement our Mooc in MiriadaX platform. Miriadax (https://miriadax.net/) is a Spanish-speaking platform that offers MOOC-type courses, it has more than 6.5 million users, more than 3,500 teachers and more than 900 published courses. (UNAD, 2022).

This platform was created in 2012 as an agreement between Telefónica (the largest telecommunications company in Spain) and Universia (Educational Foundation of Banco Santander), although now it belongs only to Telefónica, through its subsidiary Telefónica Education Digital (TED). As mention before, now this platform works with Moodle (a personalized an improve version of it) but in the past the platform was developed internally and includes features similar to other platforms such as Coursera, edX or Future Learn; Content pages, integrated videos, evaluation activities, forums, frequently asked questions, questionnaires, etc. Using Moodle MiriadaX allows to use different and enrich activities such H5P, Workshops, etc.

Today, MiriadaX is the leading MOOC platform in the Spanish speaking world. It has 85 university partners and hundreds of courses in Spanish, Portuguese and English. Up until 2018, the platform was only available in Spanish, but it is now also available in English and Portuguese.

Image 2: MOOC eDesk on MiriadaX platform (source own elaboration)

In this platform this MOOC had two different editions. Once this first phase on MiriadaX finish, the consortium decided to open the MOOC in two other different platforms with the help and support of our partners from NOVA and FOI.

In the case of FOI, the implementation of the MOOC was quick, because they also use Moodle as Virtual Classroom platform, so the steps to replicate the MOOC where:

- Apply a Backup of the MOOC course on the UC platform.
- Once the backup finishes the file was downloaded (on the specific file format for Moodle: mbz).

- The file was sent to FOI staff and uploaded to their platform. The only specifications to consider are have the following plugins installed on Moodle:
    - **TILES FORMAT** [1]: That allows to create a specific look alike grid and also allows to show the progress for each tile and for the course in general.
    - **H5P**[2]: H5P allows to create interactive and very complete activities to increase participants engagement. If this tool is running on Moodle old versions installing it as a plugin it is necessary. For Moodle versions 3.9 or newer H5P is part of the core.

Once the course was uploaded and checked, FOI staff allows automatic enrollment for users that only have to register on the platform. In this case is easy to see that the MOOC maintain the same properties as in the other Moodle platforms.

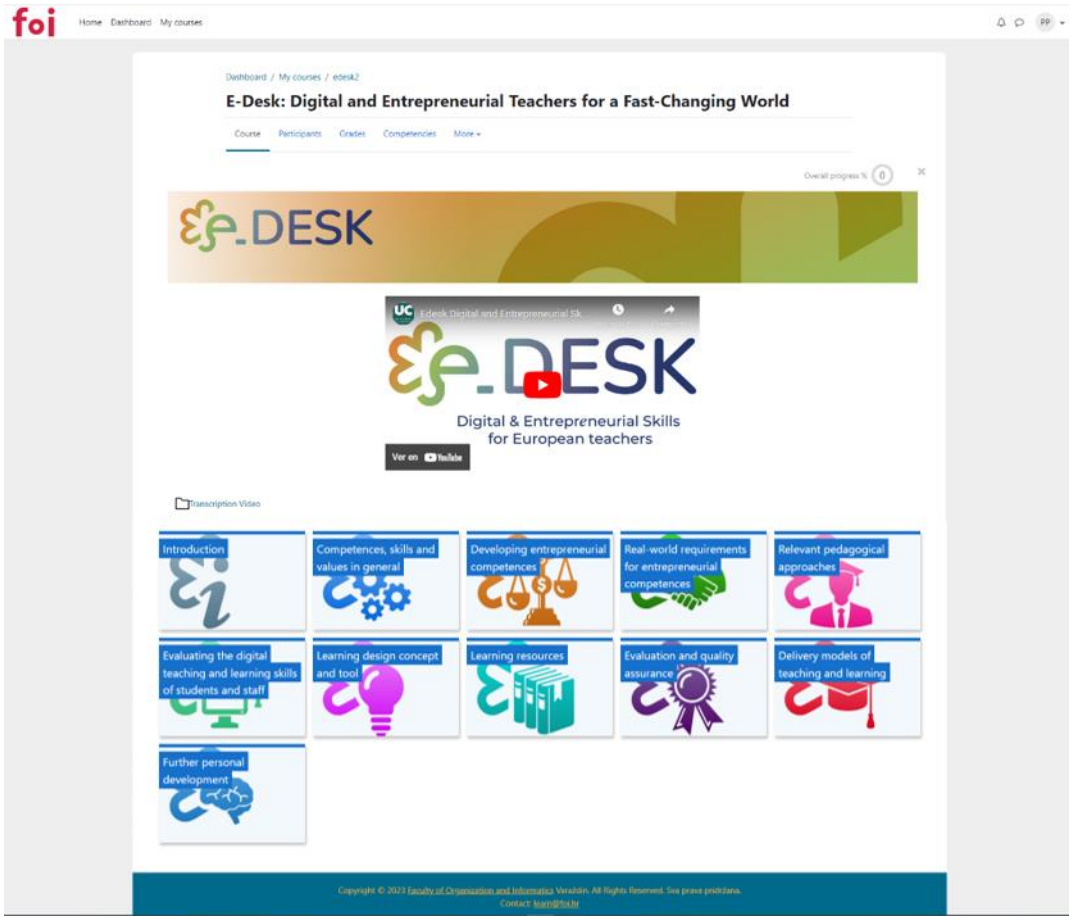


Image 3: MOOC eDesk on FOI platform (source own elaboration)

[1] More information available on: https://moodle.org/plugins/format_tiles
[2] More information available on: https://h5p.org/

For the NAU platform (https://www.nau.edu.pt/en/) the process was different. This platform is available on Portuguese and English.

NAU is an online project, pioneering at Portuguese national level, to support education and training, aimed at large audiences.

The NAU platform is a service developed and managed by the FCCN Unit of the Foundation for Science and Technology (FCT) that allows the creation of courses in MOOC format (Massive Open Online Course), that is, courses open and accessible to all, produced by recognized and relevant entities in society, with the participation of thousands of people.

This platform is part of the transversal actions of the Portugal INCoDe.2030 initiative by promoting digital development, digital inclusion and literacy, education and qualification of the active population. INCoDe.2030 finds in NAU a tool that contributes to greater access to knowledge and to the development of skills, making the population more qualified.

The funding for the NAU project comes from the European Regional Development Fund of the European Union and the COMPETE 2020 Community Operational Program, within the framework of the Portugal 2020 Framework, with project number 02 / SAMA2020 / 2016.[3]

NAU is not Moodle, so this was the first example available to reflect the flexibility and capacity of replicate the MOOC and the contents.

The course was migrated to this platform, transposing only the options that were not available, specifically the per to per activities, which were recreated as a forum to maintain the part of interaction between the participants that was raised in said activities.

Regarding the visual part, the format with which the platform allows you to work was maintained, although it is not in a grid format, it is a fairly clear theme format that allows participants to see the progress and save access points to resume it from where the student finished on their last entry to the course.

The rest of the activities and the essence of the MOOC remain intact and its scope has been increased by being part of this platform.

[3] More information available on: https://www.nau.edu.pt/en/about/

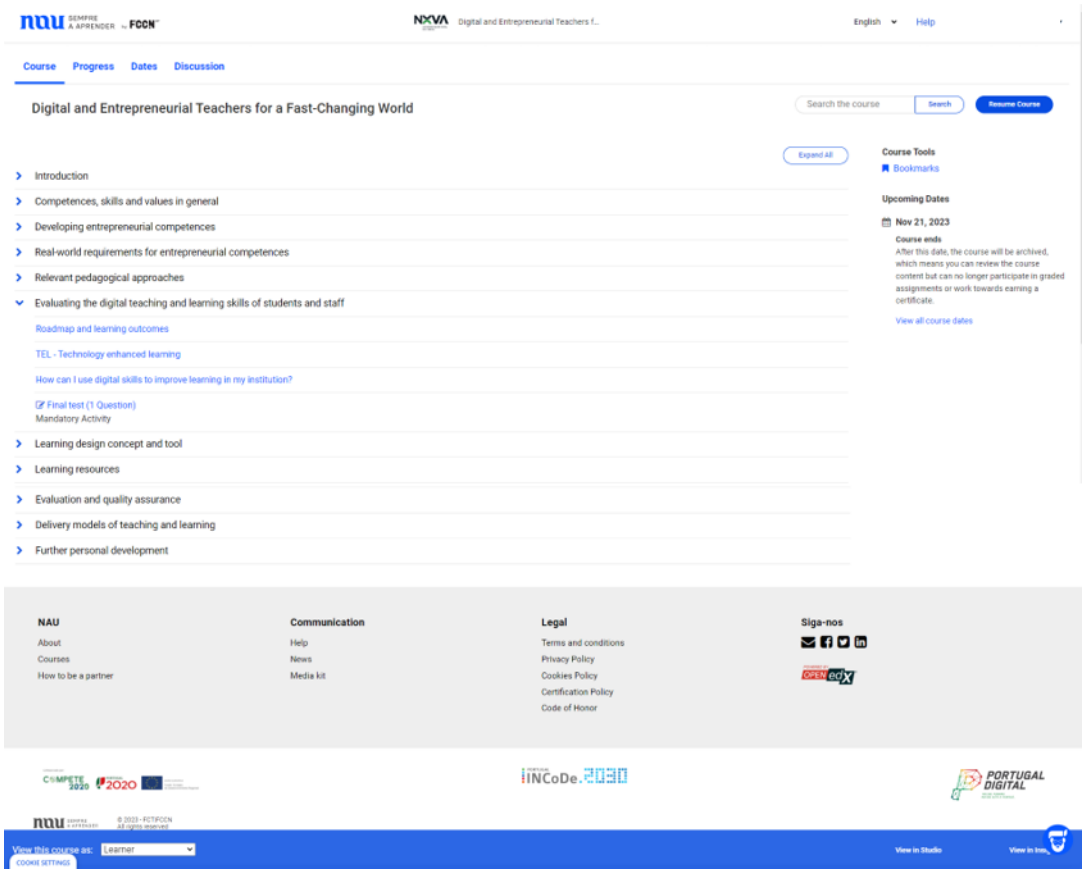


Image 4: MOOC eDesk on NAU platform (source own elaboration)

Once this first phase is concluded, the contents of the MOOC have been made alternatively available for consultation and/or reutilization on the e-Desk project webpage following the same structure described below. https://edeskeurope.eu/e-desk-mooc/

Also, the MOOC it´s still available on FOI and NAU platforms.

The proposed MOOC course for the e Desk project consists of 10 modules with content, plus an introductory module 0.

The MOOC in its entirety is designed to be carried out autonomously and involves between 20 and 30 total hours of work. It is important to clarify that all modules have been fully available to students from the first to the last day of the MOOC. The only requirement to be able to complete the MOOC it´s to complete the activities mark as mandatory, in this case the different test available at the end of each module.

These total hours consider not only reading the information contained in the modules and watching the video pills, but also the complementary readings and videos proposed, carrying out the evaluation activities (test) and participating in the forums.

For show the main structure of the MOOC we are going to use the Moodle platform images as an example of how to implement this course.

STRUCTURE OF THE MOOC

As mention before, this MOOC was designed to be flexible and replicable for other institutions / organizations and this part of the Digital Guides how the order and the materials used to create this MOOC.

The platform could change but each institution needs to maintain the essence of this MOOC and follow the steps recommended in this document.

MOOC Entry Page

As we mention the platform could change but we recommend to have an entry page where the participants could find the basic information before the enrollment step.

For this we recommend to add essential information of the MOOC like:

- Title of the MOOC
- Brief description
- Duration: Could be the total or divide by hours for materials and for the effort.
- Dates: For enrollment, course duration
- Languages available
- Introduction video for the entire MOOC
- Learning Outcomes
- Format
- Prerequisites (if needed)
- Assessment and certification
- Course Map
- Course TEAM
- Organizations Involved
- Type of license

You can see an example of this MOOC entry page on NAU platform:

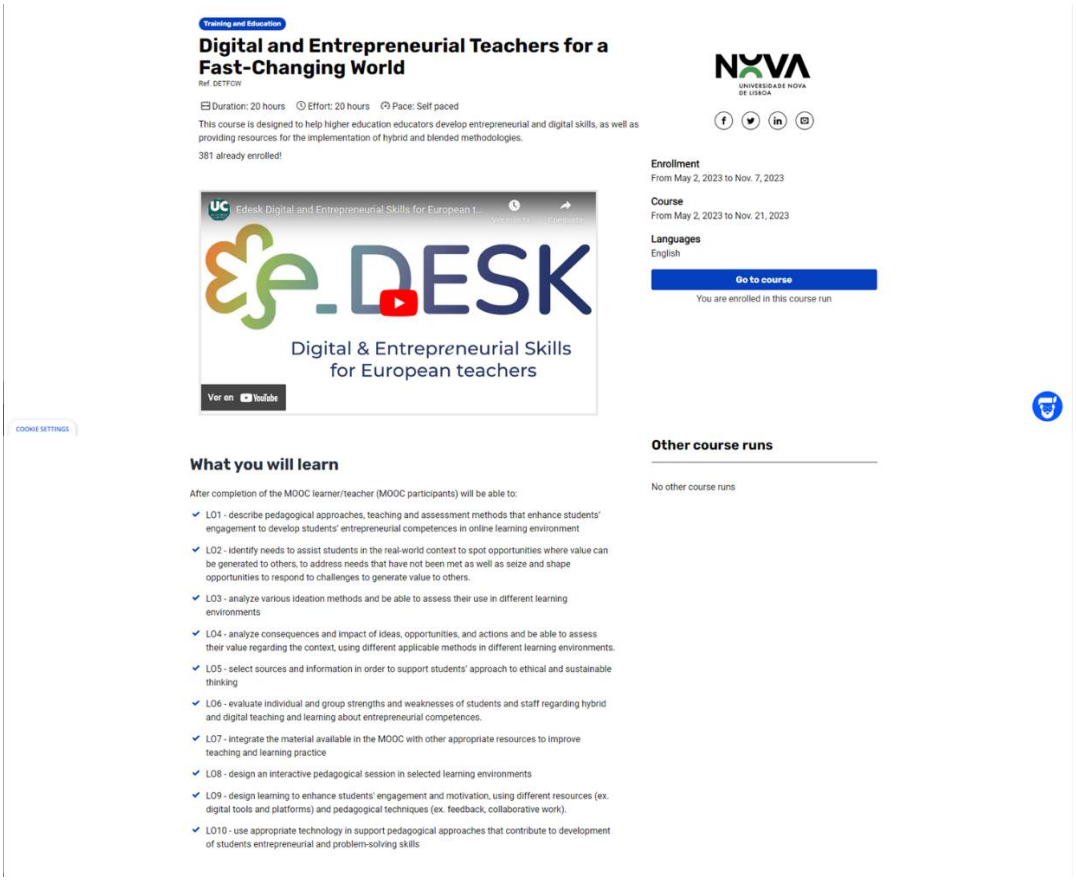


Image 5: MOOC eDesk on NAU platform Entry Page example (source own elaboration)

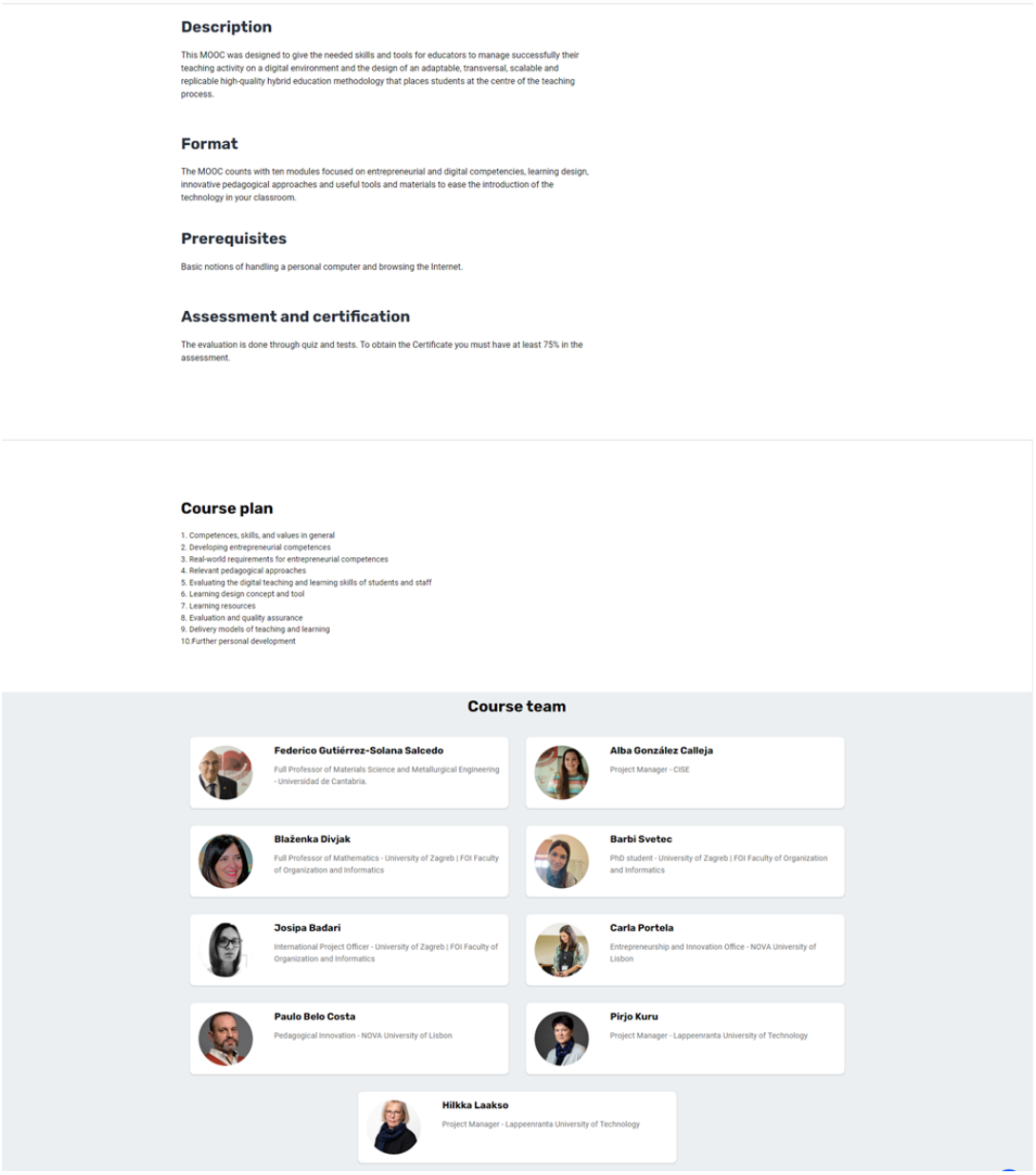


Image 6: MOOC eDesk on NAU platform Entry page second part entry page (source own elaboration)

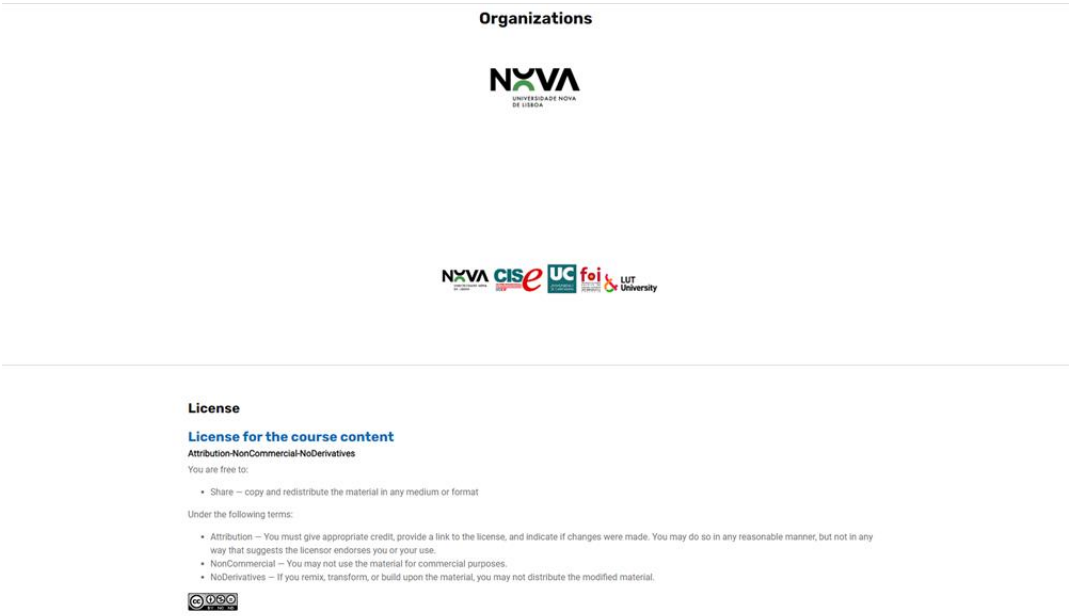


Image 7: MOOC eDesk on NAU platform Entry page third part entry page (source own elaboration)

The structure of the MOOC modules is as follows:

Header of the MOOC and Video introduction:

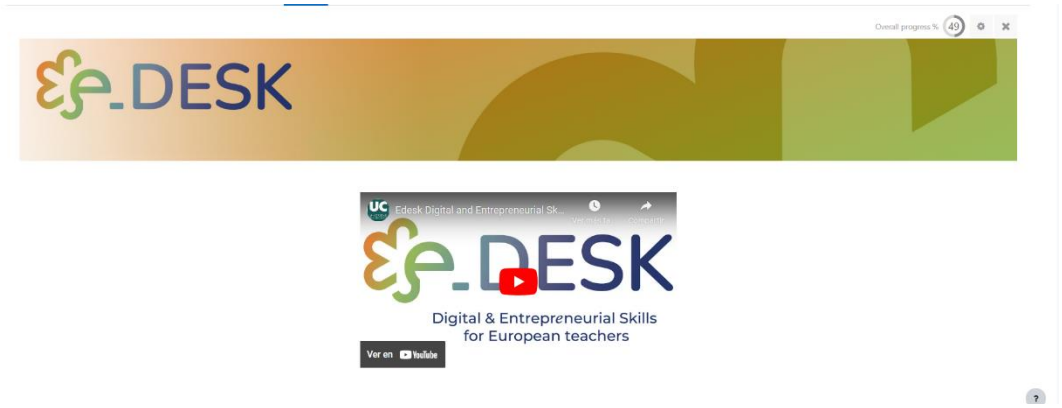


Image 8: Header and video introduction. (source own elaboration)

This part of the course contains:

- An image with the project logo as a header of the course
- Video presentation of the MOOC: https://youtu.be/n56q_WQbHOc
- Transcription of the video.
- News forum

Introduction

- Video “Welcome to the course” https://youtu.be/ECaXV87L9Hk
- Course Roadmap:
    - Explaining the road to follow with the modules available.
- Passing Criteria
- Glossary of basic concepts
- News forum
- Initial Self Assessment
- Survey “Your expectations about the MOOC”
- Forum for more Technical help
- Transcription of the video

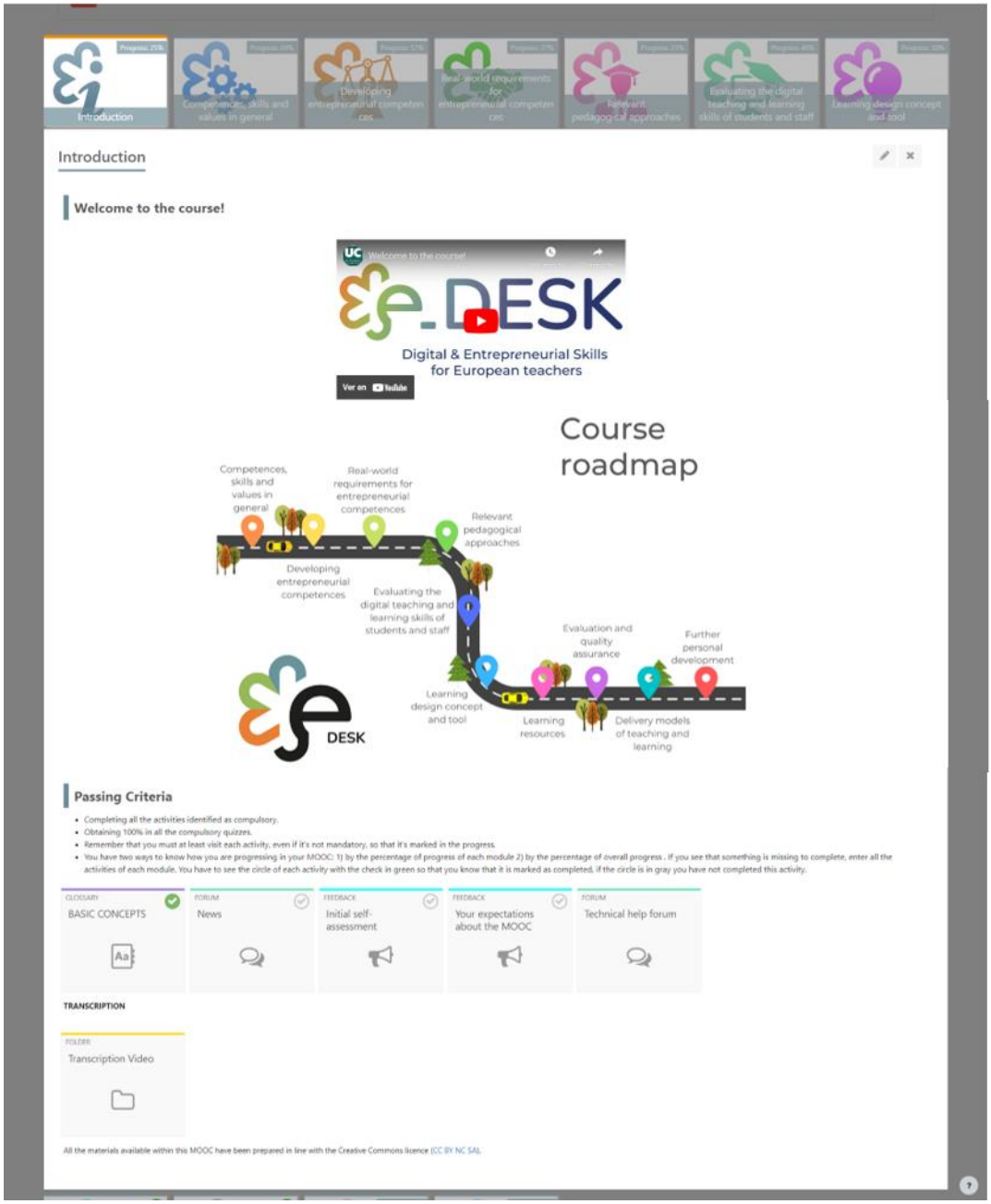


Image 9: Introduction Module Structure (source own elaboration)

Competences, skills and values in general

- Competences, skills and values in general video introduction: https://youtu.be/rx-m7-rrGD4
- Roadmap
- Learning Outcomes
- Entrepreneurial Competences
    - Your Tasks
    - PDF: Entrepreneurial education
    - URL: Video Entrepreneurial education
    - H5P: QUIZ Formative assessment based on the pre-reading and video
    - VIDEOS Best practices on entrepreneurial education
    - FORUM: Discussion based on the pre-reading, videos and own experience
- Pedagogical approaches, teaching and assessment
    - Your Tasks
    - Test your pre-knowledge
        - H5P: QUIZ Pre-quiz
    - Broaden your knowledge
        - VIDEO: Learning outcomes (part 1)
        - VIDEO: Learning outcomes (part 2)
        - VIDEO: Learning theories (part 1)
        - VIDEO: Learning theories (part 2)
    - Test & discuss
        - H5P: QUIZ Quiz
        - FORUM: Discussion on learning outcomes and constructive alignment
    - Transcriptions
        - Transcriptions of the videos on the module
    - QUIZ: Final test Competences, skills and values in general

Image 10: Competences, skills and values in general video introduction Module Structure (source own elaboration)

Developing entrepreneurial competences

- Developing entrepreneurial competences introduction video: https://youtu.be/aNweyUVijYA
- Roadmap
- Learning Outcomes
- Your task
- What is EntreComp Framework?
  - European Entrepreneurship Competence Framework: https://youtu.be/UwZPcJky0Ko
  - 2.1 Entrepreneurial education: https://youtu.be/smj6SNstA_o
  - EntreComp Europe resource website (materials translted into various languages)
- What is EntreCompEdu?
  - PDF: EntreCompEdu
- EntreCompEdu's six pedagogical principles
  - PDF: Six Pedagogical principles
- EntreCompEdu Entrepreneurial Teaching Competence Table
  - PDF: Entrepreneurial Competence Levels in teaching
- Interactive EntreComp Entrepreneurial Competences Framework Flower
  - URL: Interactive EntreComp Entrepreneurial Competences Framework Flower
- Discussion Forum - Entrepreneurial competences in teaching and learning
  - FORUM: Entrepreneurial competences in teaching and learning
- Transcription
  - Transcription of the videos of the module
- Final test Developing entrepreneurial competences

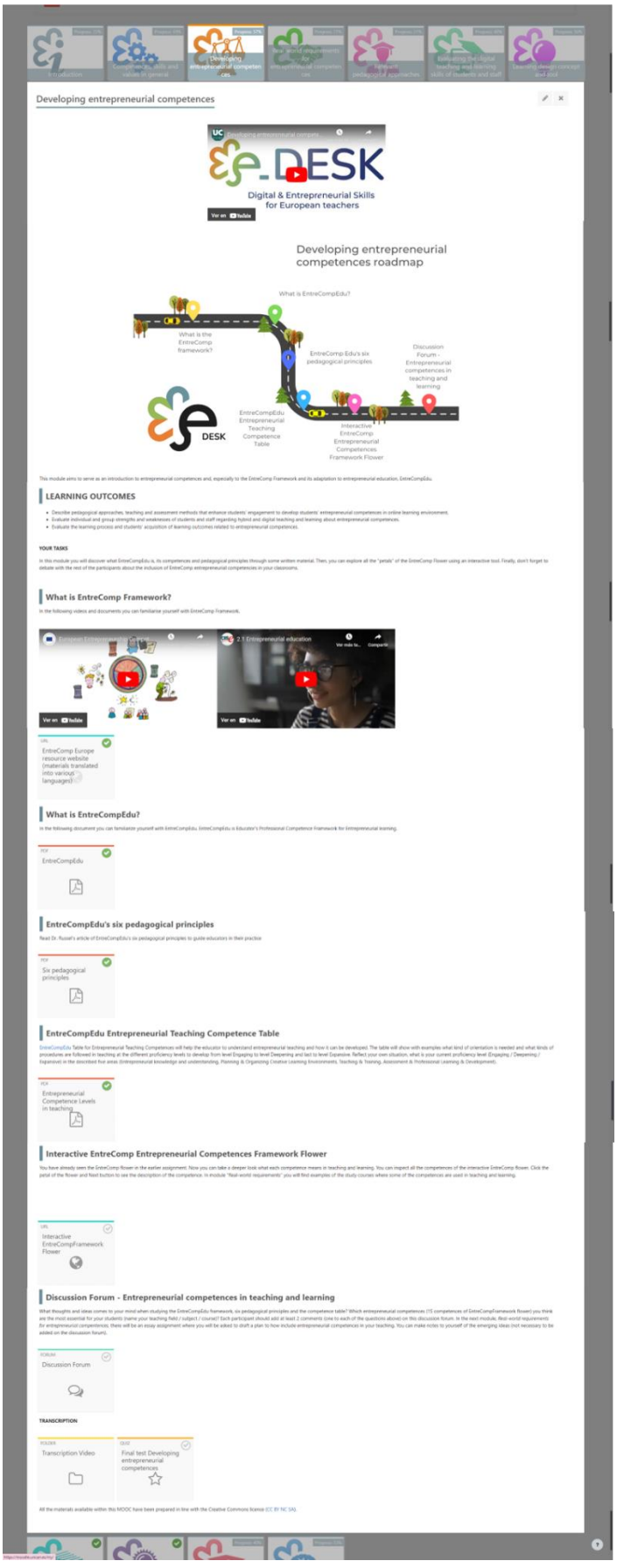


Image 11: Developing entrepreneurial competences Module Structure (source own elaboration)

Real-world requirements for entrepreneurial competences

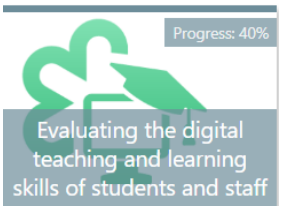
- Real-world requirements for entrepreneurial competences introduction video: https://youtu.be/dMGmyUbMSfk
- Roadmap
- Learning Outcmes
- Your Tasks
- OECD Learning Compass 2030 - The future of learning
  - VIDEO. OECD Future of Education and Skills 2030: OECD Learning Compass 2030: https://youtu.be/M3u1AL_aZjI
  - OECD Learning Compass 2030 - The future of learning
- Changing world - changing work
  - VIDEOS - WEB Changing world - changing work
- Future skills
  - PDF: Real-world requirements in teaching and learning
  - PDF: Key findings Future Skills repot
- Developing students' entrepreneurial competences / CASE examples
  - PDF: Learning Chemistry creatively / CASE LUT
  - PDF: Studying volunteer work in action / CASE LAB
  - PDF: Lahti Venture Program / CASE LUT, LAB, University of Helsinki.
  - VIDEO: Lahti Venture Program – Company´s greetings: https://youtu.be/vQOl9VSQzko
- Studying Bachelor of Social Services degree on-line / CASE LAB
  - PDF: Bachelor of Social Services Degree online
- Essay - plan a course/module/lesson which develops entrepreneurial competences and real-world skills
  - PDF: Essay – plan teaching entity which develops entrepreneurial competences and real-world skills
- Transcriptions
  - Transcription of the videos from this module
- Final test: Real-world requirements for entrepreneurial competences

Image 12: Real-world requirements for entrepreneurial competences Module Structure (source own elaboration)

Relevant pedagogical approaches

- Relevant pedagogical approaches introduction video: https://youtu.be/dTyNk5OxtSI?si=ctIqQONP0jyKDV7D
- Roadmap
- Learning outcomes
- Your Tasks
- Introduction to innovative pedagogies
    - H5P: QUIZ Introductory quiz (branching)
- Flipped classroom
    - PDF: Flipped classroom – Reading material
    - VIDEO: flipped classroom part 1: https://youtu.be/yc_1mk-x630
    - VIDEO: flipped classroom part 2: https://youtu.be/XL2kw6LdUxo
    - VIDEO: flipped classroom good practice example part 1 (OPTIONAL): https://youtu.be/OahW5Pmdx7Q
    - VIDEO: flipped classroom good practice example part 2 (OPTIONAL): https://youtu.be/Fv7GX6-bsIE
    - PDF: Flipped Classroom in the pandemic – infographics
- Problem-based and inquiry-based learning
    - PDF: Problem-based and inquiry-based learning – reading material
    - VIDEO: inquiry-based learning part 1: https://youtu.be/X_cfduu7OIw
    - VIDEO: inquiry-based learning part 2: https://youtu.be/ZGn5k6PtArM
- Project-based learning
    - PDF: Project-based learning
    - VIDEO: Project-based learning part 1: https://youtu.be/IdZgOFXcV90
    - VIDEO: Project-based learning part 2: https://youtu.be/JM3TID1I-Lk
- Work-based learning
    - PDF: Work-based learning – reading material
    - VIDEO: Work-based learning – good practice example part 1 (OPTIONAL): https://youtu.be/T4M33KpxOWM
    - VIDEO: Work-based learning – good practice example part 2 (OPTIONAL): https://youtu.be/frR8CiwmQo4
    - VIDEO: Work-based learning – good practice example part 3 (OPTIONAL): https://youtu.be/HuZrc-i8j9A
    - VIDEO: Work-based learning – good practice example part 4 (OPTIONAL): https://youtu.be/HkGJrje24Us
- Discussion & exchange of experiences
    - FORUM: Discussion on innovative pedagogical approaches
- Transcriptions
    - Transcription of the videos in this module
- Final test Relevant pedagogical approaches

Image 13: Relevant pedagogical approaches Module Structure (source own elaboration)



Evaluating the digital teaching and learning skills of students and staff

- Evaluating the digital teaching and learning skills of students and staff introduction video: https://youtu.be/_EicWZA2tPo
- Roadmap
- Learning Outcomes
- Your Tasks
- TEL - TECHNOLOGY ENHANCED LEARNING
    - Why are we talking about TEL?
        - VIDEO: Technology enhance learning: https://youtu.be/JfP9N03NfoA
    - Digital Competences and Skills
        - VIDEO: Digital Competences: https://youtu.be/p4CcdVUiW1k
        - WEB: Assessment – Evaluating Digital Skills
        - ASSIGNMENT: Digital Skills – ASSESSMENT RESULTS
        - FILE: Digital Skills – ASSESSMENT RESULTS
        - CHAT: Comments on Digital Skills Assessment Results
- How can I use digital skills to improve learning in my institution?
- VIDEO: Re-inventing Education for the Digital Age | David Middelbeck | TEDxMünster: https://youtu.be/ArI6albrkuY
- FORUM: Improve learning at Institutional level
- Transcriptions
- Final test Evaluating the digital teaching and learning skills of students and staff

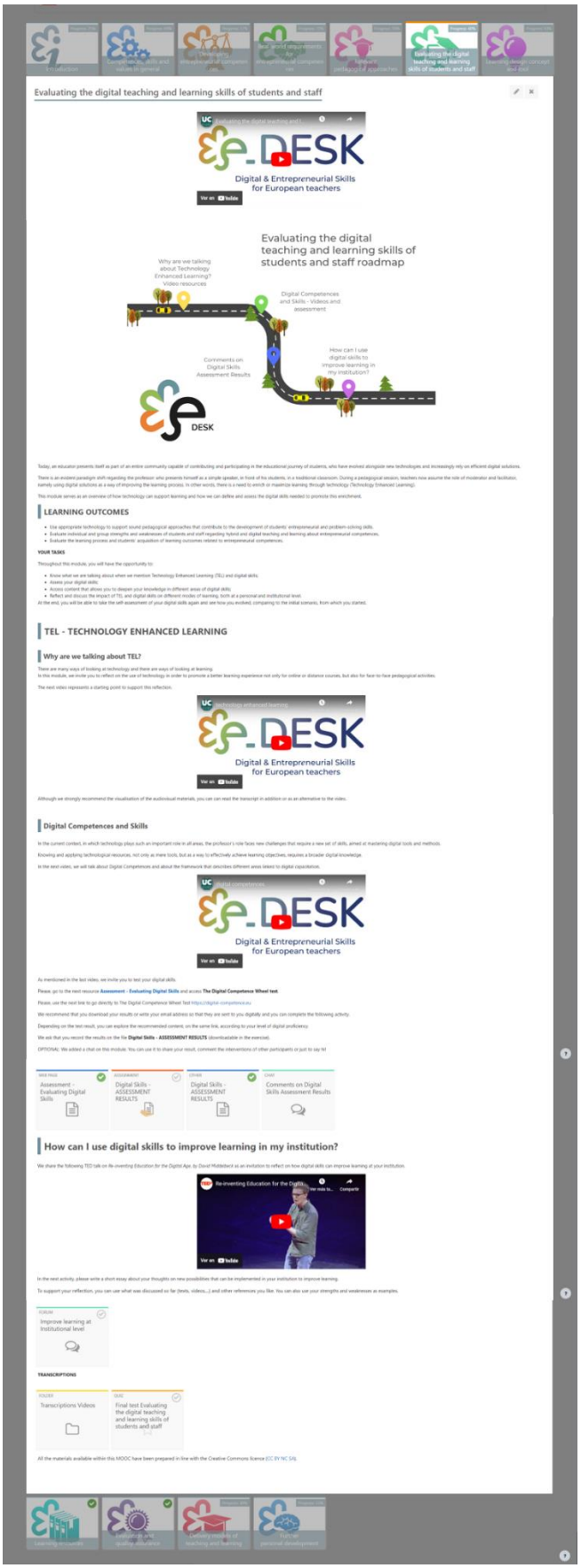


Image 14: Evaluating the digital teaching and learning skills of students and staff Module Structure (source own elaboration)

Learning design concept and tool

- Learning design concept and tool introduction video: https://youtu.be/2CrevICVF2I
- Roadmap
- Learning outcomes
- Your tasks
- Introduction to learning design
    - VIDEO: Learning Design (part 1): https://youtu.be/XDmokduytoY
    - VIDEO: Learning Design (part 2): https://youtu.be/5j-Xgdnuhj0
    - H5P: Quiz Learning Design
- Learning design & the BDP tool
    - LINK: BDP Learning tool
    - VIDEO: intro tutorial for the BDP tool prepared for the E + RAPIDE project part 1: https://youtu.be/DvxHIDl343E
    - VIDEO: intro tutorial for the BDP tool prepared for the E + RAPIDE project part 2: https://youtu.be/-a8EbI6jLrM
    - VIDEO: Tutorial for the BDP LD tool (part 1): https://youtu.be/vkndRX8H6Uw
    - VIDEO: Tutorial for the BDP LD tool (part 2): https://youtu.be/7B3Ai0Se_i0
- Practice & peer-assessment
    - WORKSHOP: Workshop on Learning Design
- Transcriptions
    - Transcription of the videos in this module
- Final test Learning Design concept and tool

Image 15: Learning design concept and tool Module Structure (source own elaboration)

Learning resources

- Learning resources introduction video: https://youtu.be/hRf3SYyyhp8
- Roadmap
- Learning outcomes
- Your tasks
- FORUM: What do you know about ethical and sustainable thinking?
- VIDEO: Entrepreneurship is about ethical and sustainable thinking: https://youtu.be/Hg_tEWqB--s
- H5P: The originality control and plagiarism: concepts and tools
- H5P: Learning Resources
- FORUM: Tell us your checklist
- Transcription
    - Transcription of the videos in this module

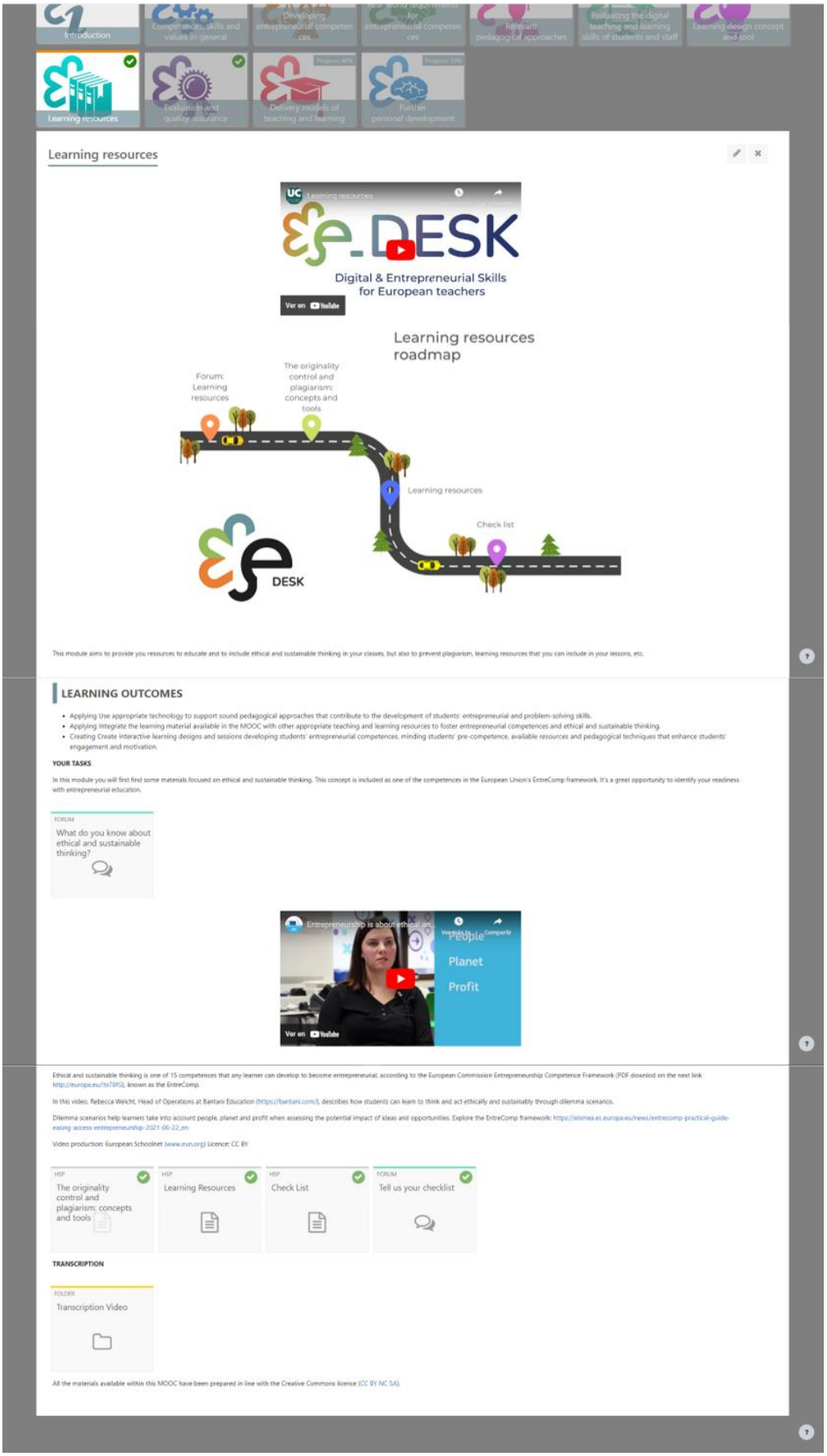


Image 16: Learning resources Module Structure (source own elaboration)

Evaluation and quality assurance

- Evaluation and quality assurance introduction video: https://youtu.be/u7vbdoh2J14
- Roadmap
- Learning Outcomes
- Your tasks
- PDF: An Overview of Authorization and Quality Assurance of Higher Education
- LINK: 5 – Steps Evaluation: the importance of Quality Assurance in the Assessment Process
- LINK: Quality assurance in higher education
- Quality Assurance in Higher Education in Europe
    - LINK: European Quality Assurance Register for Higher Education
    - LINK: European Association for Quality Assurance in Higher Education
    - PDF: Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG): (OPTIONAL)
- Transcription
    - Transcription of the videos in this module

Image 17: Evaluation and quality assurance Module Structure (source own elaboration)

Delivery models of teaching and learning

- Delivery models of teaching and learning introduction video: https://youtu.be/fH_hRgkzp9o
- Roadmap
- Learning outcomes
- Your Tasks
- VIDEO: CISE Delivery modes for teaching and learning: https://youtu.be/2bUbogVvoZk?si=HLDm03sFuU1SWKO9
- Delivery models of teaching and learning
- FORUM: Discussion on institutional approaches to delivery modes
- VIDEOS: Best practices
- FORUM: Your experience with delivery modes
- Transcription
    - Transcription of the videos in this modeule
- Final test Delivery models of teaching and learning

Image 18: Delivery models of teaching and learning Module Structure (source own elaboration)

Further personal development

- Further personal development introduction video: https://youtu.be/eFEZDS0tjZY?si=VaR461va_Ho1Lj9O
- Roadmap
- H5P: Further personal development
- SURVEY: Final Self-assessment
- SURVEY: Have your expectations been met?
- Extra Resources Learning outcomes videos (OPTIONAL)
- Transcriptions
    - Transcription of the videos in this module

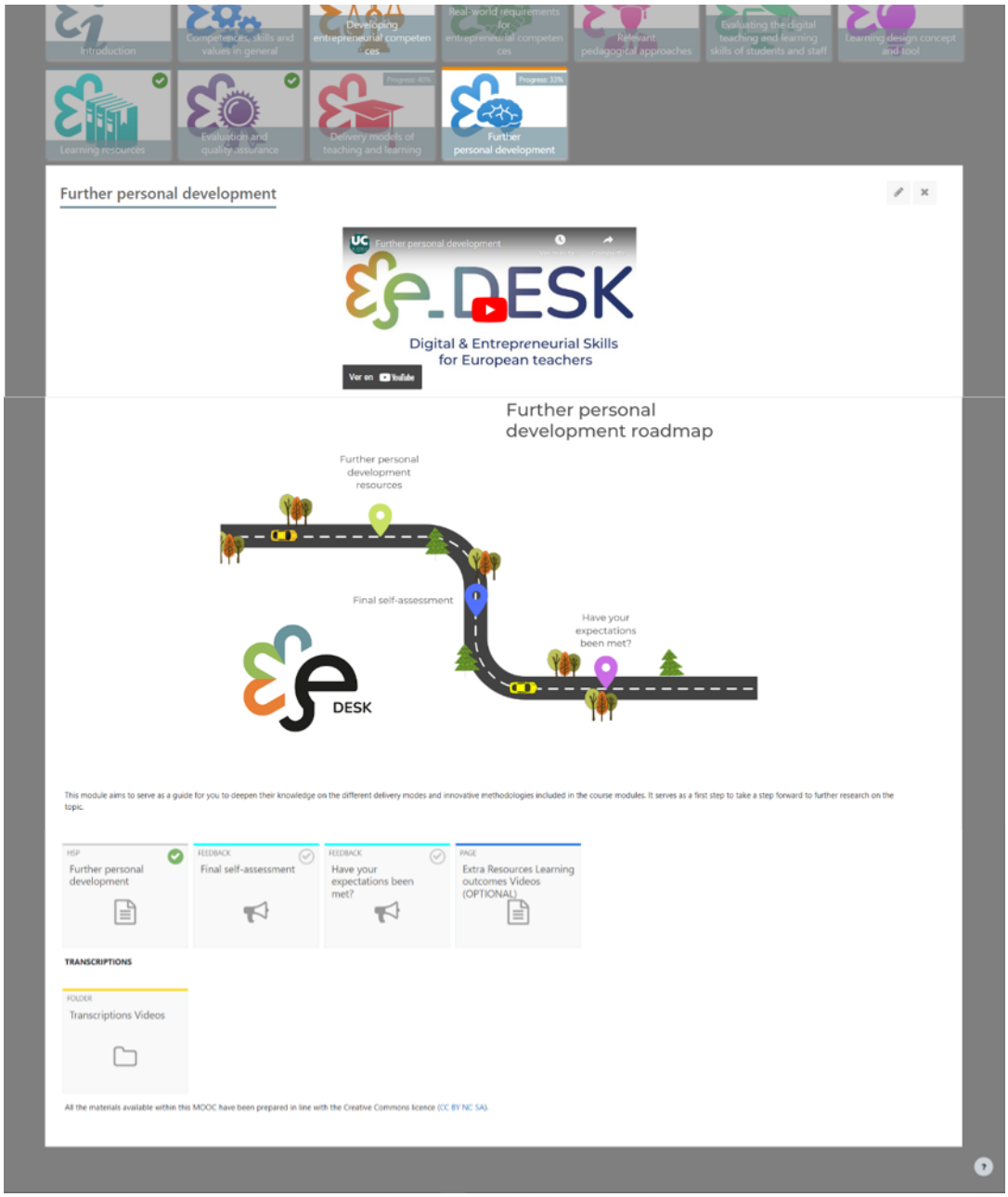


Image 19: Further personal development Module Structure (source own elaboration)

The e-DESK Methodology guided the implementation of the MOOC course "Digital and Entrepreneurial Teachers for a Fast-Changing World" for HEI teachers, designed by the project. It gave a frame on how to create MOOC modules, selecting modules in hold and represent the modules logically in the MOOC. The methodology guarantees that MOOC users will get a wide and thorough understanding of digital and entrepreneurial skills teachers need in today's world.

All e-DESK deliverables are an Open Educative Resource, free to use under a Creative Commons License, for individuals that want to develop their skills or, on an institutional level, to implement digital and entrepreneurial teaching in education. The e-DESK methodology aims to serve as a reference for educational institutions and educators all over Europe for designing, adapting, implementing and/or measuring hybrid educational programs and teaching methods.

This license it´s indicated not only on the entry page of the MOOC in each platform, also at the end of each module, on the videos and reading materials produce by the consortium. In the other hand each partner used this type of license as a guide to select other external videos (external to the consortium) that use this same type of Creative Common license.

Multimedia Material

For the development of the course, once the consortium plan and organize the content according with the methodology and creates the content the next step was to create the MOOC on the Moodle Platform, for that each partner developed a series of modules according with expertise and resources available.

As mentioned in the proposal of this project itself, all these materials were developed during the Covid-19 Pandemic, so seeking to organize and create valuable and useful materials, as well as a fairly uniform appearance, a recommendation guide was created. for recording videos to share with the partners, since each of them had to create, record and send the material due to the impossibility of traveling to the group of production experts, who carried out a task of unifying the style that are the final videos shown in the MOOC.

Next, we share this basic guide develop for the UC team as Annex I in this document.

Then the structure for the MOOC was decided and the materials developed as follow:

Using the project logos and templates developed by the partner in charge of the communication design so the header image follows this materials and advice on how to use it:

Image 20: Header Image for the MOOC (source consortium communication partner elaboration)

Once the team in charge of multimedia development, production and implementation received and / or record the materials for the videos, procced to create a base for the same with a short intro:

That contains the name and logo of the project, and the music selected for the it (not more that 10 seconds:

Image 21: Introduction of the eDesk videos (source self elaboration)

For the main video each partner presents their vison about the MOOC, the main goals for each module and present each partner institution.

For each of the modules it was important to have a video with a brief description and the goals one of them cover. For this it was important to present a common structure for the participants, that´s why we select a person that appear in all the introduction videos for the modules and follow the same tone and vibe for it.

Image 22: e Desk main character for present each of the modules in the introduction videos (source self-elaboration)

Another thing to have in mind is that all the videos produced by the consortium follow the same structure:

- Short intro
- Main title
- Name of the person and the institution to which it belongs
- Close with consortium partners logo and indicating Creative Commons type of license.

Image 23: e Desk intro for each video (source self-elaboration)

Image 24: e Desk example of main title (source self-elaboration)

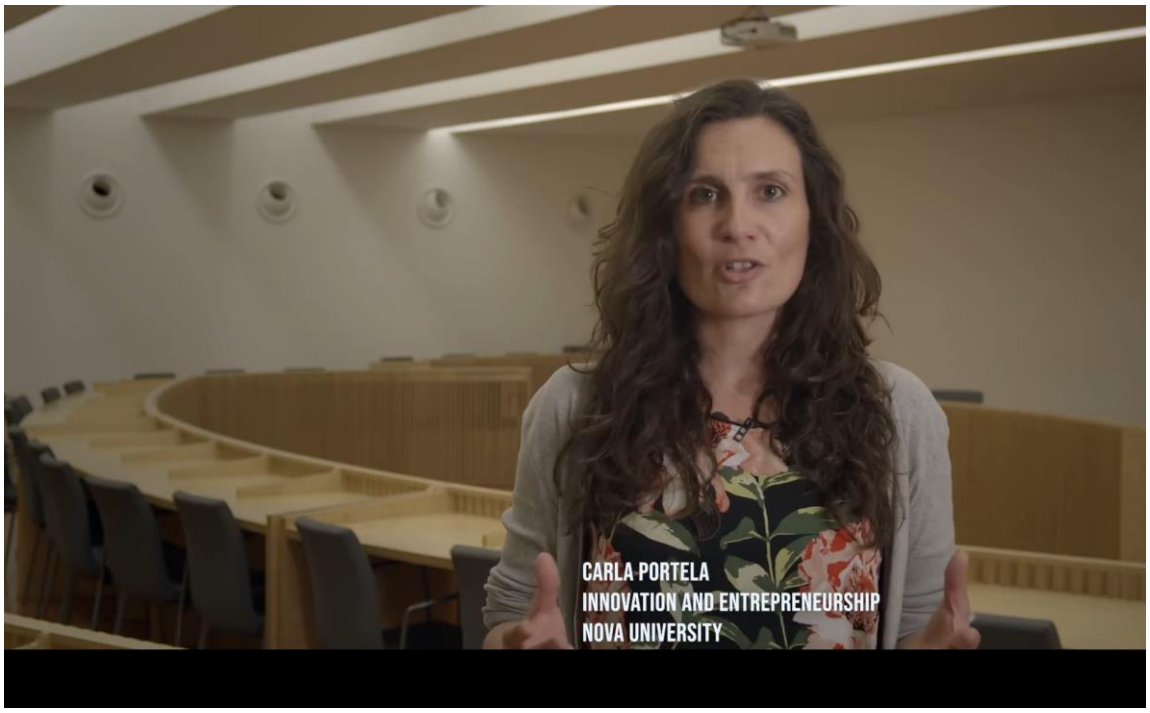


Image 25: e Desk example of Name of the person and the institution to which it belongs (source self-elaboration)

Image 26: e Desk example of the closed for the videos with partner logos and Creative Commons type of license (source self-elaboration)

For each Modules the structure was the same:

- Title
- Introduction video
- Roadmap
- Learning outcomes
- Tasks
- Subtopics
- Material for each subtopic
- Transcription of the videos
- Final Test (If needed)

Image 27: e Desk example of a title and intro video for a Module (source self-elaboration)

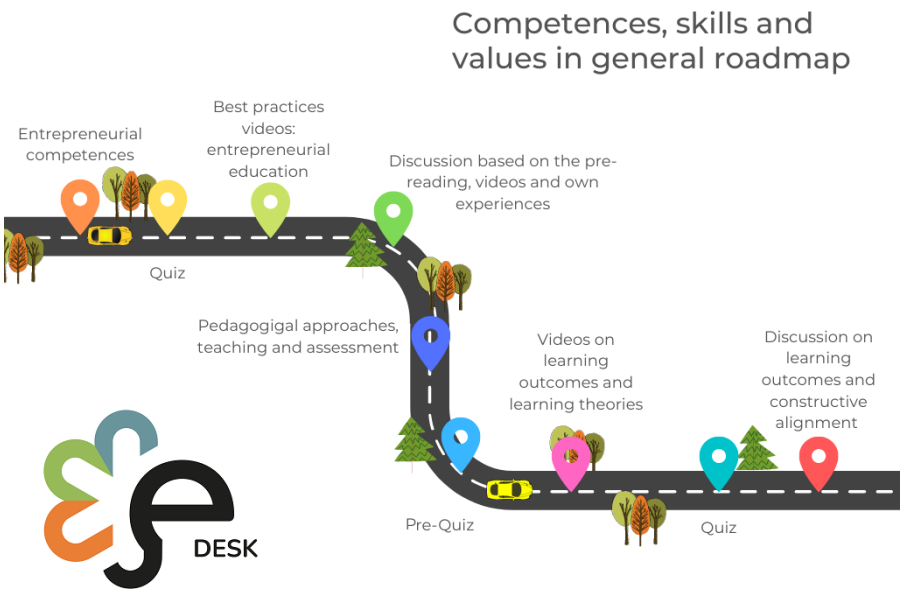


Image 28: e Desk example of a roadmap (all modules use the same structure for this) (source self-elaboration)

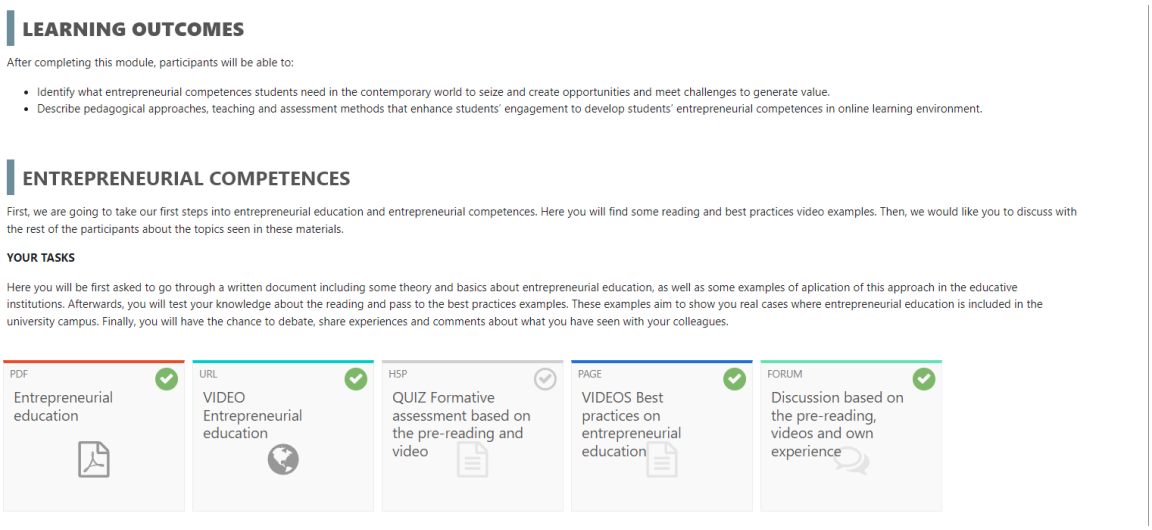
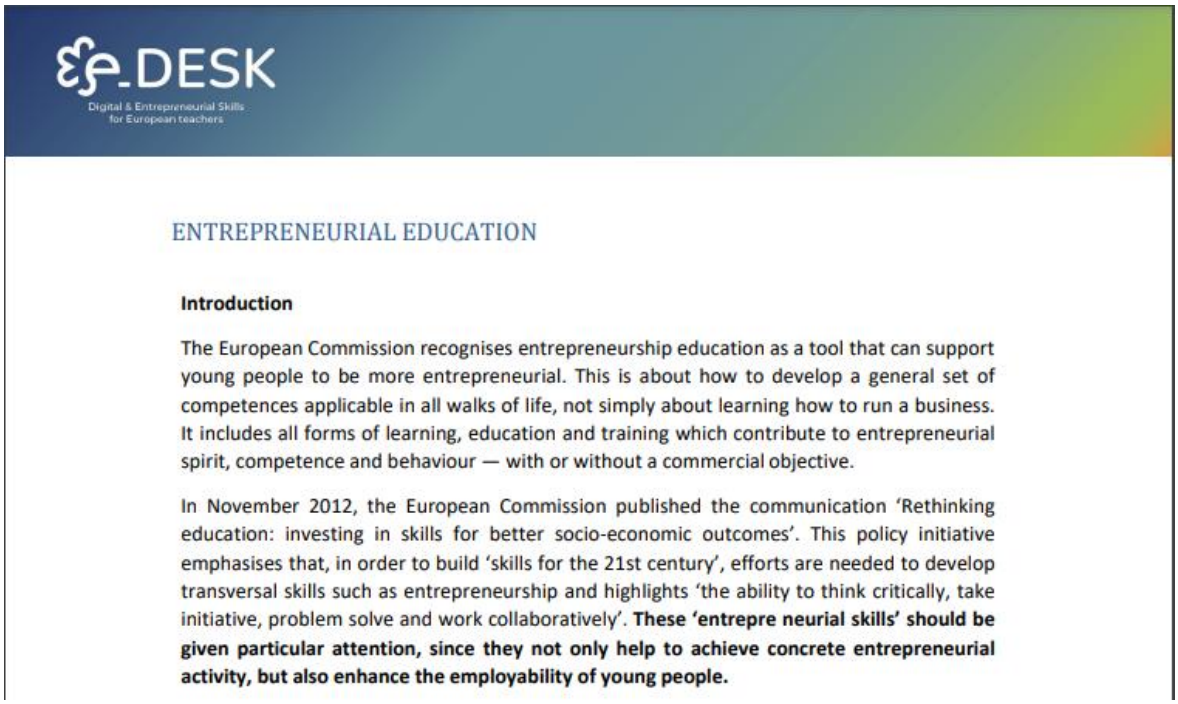


Image 29: e Desk example of Learning outcomes, tasks, subtopic and activities / materials (source self-elaboration)

Image 30: e Desk example of transcriptions, final test and Creative Commons type of license.

Also, the reading materials was created using the same template following the project image design:



ANNEXES

Annex 1. BASIC GUIDE TO RECORD VIDEOS

INTRODUCTION

In the last years, the use of audio-visual resources has increased to enrich and improve pedagogic methodologies, especially those applied to hybrid and online teaching.

Video resources are by far the most used, either in synchronous format through video calls, as well as asynchronous with videos recorded and uploaded in the different virtual learning environments (VLE).

This document intends to be a practical guide to recording those videos created specifically for online teaching, aiming to be more than just a recording of a traditional teaching session. This guide describes the steps to follow and the factors to take into account to record this type of videos.

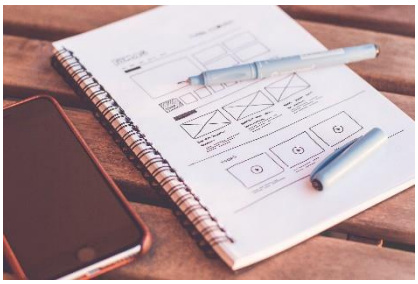
FIRST STEPS

PLANNING

This is the most important step since it allows us to define what type of video we want to make, the topic and duration. The suggested process would be:

1. Choosing the topic.
2. Preparing a script about what is going to be recorded.
3. Selection of multimedia resources: images, audio, documents, etc.
4. Selection of recording material: type of camera, computer, microphone, etc.
5. Stablishing the location (where the recording will take place).
6. Lightning: natural, artificial, placement to avoid shadows, etc.
7. Participants: whether it is a first-person self-recorded video or there will be more professionals involved.
8. Timing: starting with the script, it is important to define specific times, and try to make the video as short as possible: it is better to have several brief videos than a very long one.

GUIDELINES FOR VIDEO RECORDING



Choosing the main topic

It is important to be clear about what topic we want to make the recording of our video. For this, we recommend to make a small outline where we define the main topic and the subsections that we could address in said video. In addition to defining the resources (other videos, images or files) necessary for the explanation of each one, and its logical sequence.

Recording material

When we produce a video, the content (*what I want to say and how I am going to say it*) should undoubtedly prevail. Once this point is established, it is important to choose the appropriate material means to fulfil our objective. Below, we describe the most common scenarios and some minimum specifications to record videos for teaching.

a) *Professional video camera.* In this aspect we are talking about a professional video camera that could cover the following formats 4K60, 2.7K, 1440p, 1080p 960p and 720p. Within the means of recording, it is important to bear in mind that despite the fact that the camera is the resource in which we have to incise the most in terms of quality, factors such as the sound quality it has, as well as the options of lighting settings that it offers us also come into play. For this reason, it is important to take into account some basic questions when choosing the equipment, such as:

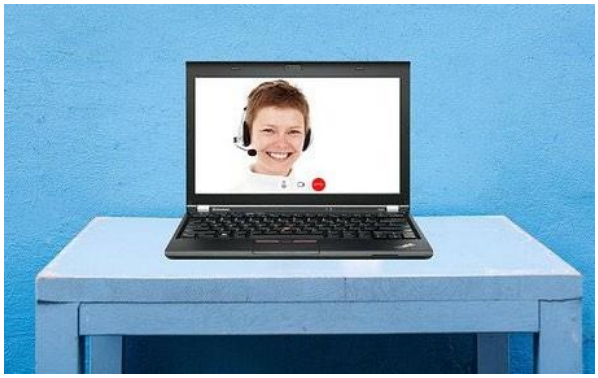
a. **Camera focus:** That is, if it has programmable autofocus or manual focus options to offer a better image of the person in the video.

b. **Lighting:** If the recording is done in a physical space with good lighting or we have other devices such as lamps or lighting rings, previously equipped with good light.

c. **Audio:** It will always be better if we record the audio with professional equipment that gives it high quality, such as a *lavalier* microphone; or with the noise reduction option, which will allow better voice quality and reduce surrounding noise.

b) Mobile or Tablet: As in the previous section, it is important to take into account that in addition to the equipment there are factors that determine the quality of the video or photography made with these devices, such as lighting. The lenses and sensor should at least have 64 mpx.

c) Computer using a webcam: 1080px minimum.



Measurements

XAVC HD, HDV 1080p (1920 x 1080px - 50Mbps).

Quality:

- As much as possible, both in image and audio (according to the measures indicated above for both video and audio).
- Video in HD at least.
- The ISO well adjusted, to avoid noise and other problems.
- Preferably, use a microphone to guarantee good quality audio.
- Avoid in the image: gradient backgrounds, pixelated or noisy images, backlights...
- Avoid in the sound: environmental noise, transit areas with a lot of traffic, windy exteriors, works...

Format

- Speaker explaining to the camera, without staring at it.
- Interview: a person next to the camera without being seen acts as an interviewer, asks the questions and the speaker answers. In this case, in the final video, the voice of the one who asks the questions does not appear, since it is cut in the edition. Other way could be, two independent recordings looking at the camera and their subsequent assembly through a video editing program.


Example of interviews.

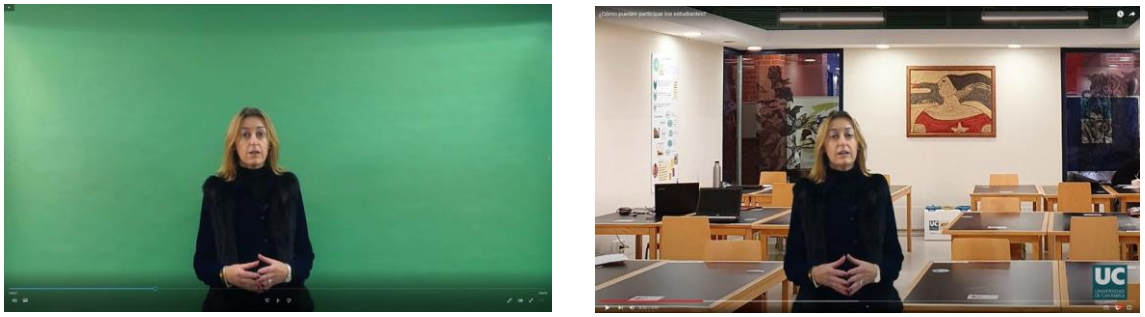
Composition

Main subject in 1/3 of the screen space, not in the center, always on the right or left, to be able to include in the remaining space the requiered resources: pictures, graphics, another video feed, etc. The presenter must appear from the torso upwards, whether standing or sitting.

Composition example.

Background

- Office, outdoor space, university or office corridors... Always guaranteeing good quality in audio and lighting. Not very crowded areas are a better option to avoid interruptions, noise, etc.
- The use of Chroma key backgrounds is also acceptable.



Chroma example.

Lighting

Preferably natural light. In case of shortage of it, support with extra artificial light, such as spotlights: not aimed directly, projecting the light, trying to make it natural and soft.

Maximum Duration: 6 minutes.

TIPS

- Make a storyboard or script with the structure, before recording.
- Look at the same point, in the case of the interviewer (if the talking head is on the left, it should look to the right and vice versa).
- Emphasize.
- Use, as far as possible, signs of expression, such as moving your hands, to give dynamism to the video (without forcing them).
- In moments of error, the speaker must maintain a calm posture, remain silent and continue looking at the camera and return to the explanation. This allows for better editing, with cuts that are more natural.
- If the speaker is shy or has problems being recorded (not uncommon) using the "fake interview" format usually helps: provides somebody to talk to, that can reassure him or her, and makes the situation more natural than "staring to the black eye of a camera".
- When the exposition is very long to comment on the speech, make segmented recordings.
- Try to make the videos as natural as possible.
- Focus the objective of the videos on the understanding of concepts of greater difficulty and complexity, and relevant to the topic addressed.
- As we have already mentioned in the previous section, a maximum duration of 6 minutes is recommended, although if the duration were to be a little longer (for example 10 minutes) it could only be justified by its relevance to the topic and the consistency it provides to the video for such a long duration. In the case of longer videos, they will be divided into capsules of a maximum of 10 minutes, making the cuts by concepts or topics addressed within it.
- In the same way, it is recommended to be clear about what concept or concepts will be addressed in the video to try to reduce its duration as much as possible, and provide said data for a cleaner edition. If further detail is needed and it would make the videos too long, it can be supplied in text format together with the videos.
- As a didactic recommendation, a small recount of concepts is proposed at the beginning of the video for its subsequent development within it.
- It is important to provide extra material that is relevant, necessary and enriching for the videos, such as questions integrated into it.

VIDEO STRUCTURE

Cover/Intro

With information regarding:

- The title of the course (with the logos).
- The module title.
- The title of the activity.

Usually it is a good idea to have a single video production person or service make all the intros for all the videos of the same course, to provide uniformity across all of them. Or at least have very good coordination and understanding among all the parts involved.

Video play beginning

With the name of the expert and the organization to which he/she belongs.

Video play

With the logos below in reduced size, appearing at all times throughout the video.

Use of visual resources

Screen-readable text that, for example, appears with the question in the case of interview format. Also images, graphics, animations, etc.

Logos and license types

Finally, at the end, the logos and the Creative Commons license are included.

Attribution, acknowledgement, and recognition

This publication is part of the e-DESK project, led by the Centro Internacional Santander Emprendimiento (CISE) and co-funded by the European Union, through the Erasmus+ program. This document was coordinated by Universidade Nova de Lisboa as part of the e-DESK Project.

***Authors**: This publication has been written and collated by University of Cantabria on behalf of the e-DESK project with contributions gratefully received from all other partners of the e-DESK Project: Centro Internacional Santander Emprendimiento (CISE), Faculty Organization and Informatics of the University of Zagreb, Lappeenranta-Lahti University of Technology and Universidade Nova de Lisboa*

***Lead authors:** Ivan Sarmiento (University of Cantabria), Priscila Parra (University of Cantabria)*

DOI:

***Information:** info@edeskeurope.eu, www.edeskeurope.eu*

Disclaimer

This methodology was created by the e-Desk – Digital and Entrepreneurial Skills for Teachers project, within the ERASMUS+ programme.

e-DESK
Digital & Entrepreneurial Skills for European teachers

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

ogy was created by the e-Desk – Digital and Entrepreneurial Skills for Teachers project, within the ERASMUS+ programme.

Report on need-based survey and findings

Table of Contents

Report on need-based survey and findings (IO1/A3.1)

e-Desk background and introduction

The Project 'Digital and Entrepreneurial Skills for European Teachers in the COVID-19 World', abbreviated e-DESK, aims at designing, testing, and disseminating an innovative hybrid teaching methodology to provide educators from European HE institutions with the necessary tools and skills to face the challenges presented by the pandemic in terms of teaching and education.

The restrictions all over Europe meant a sudden change to a much more (and in some cases even complete) digital learning environment, many times not only lacking the material resources, but the competences to do so effectively. OECD (2020) states that the shift to online teaching and learning raised important challenges for organizing examinations and ensuring the possibility for students to progress in their studies.

Even when the confinement was finished, many HE institutions turned into a mixed system where educators had to deal with half of their students at the classroom and the other half at home. Many teachers, however, lack relevant training (Unesco, 2020). This shows the great need of support of the teachers to develop digital competences and safeguard the inclusive nature of learning opportunities, as COVID19 has shown also great inequity among students. Thousands of youth learners in Europe found themselves confined during months and with their academic lives affected, not only lacking digital resources (especially those coming from less wealthy families), but also with educators overloaded and needing skills and guidance for delivering the lessons in this new context.

Some institutions were more prepared than others because they were already implementing pedagogical research in e-learning, considered to be a key part of future curricula. To identify key success factors common of hybrid educational programs that focus on covering the current gap created by COVID-19, research on best practices was needed for finding and assessing the current methodologies being applied in the most relevant educational institutions.

e-DESK identification of best practices and methodology'

The e-DESK team will identify best practices regarding multi-stakeholder and multi-disciplinary entrepreneurial education and hybrid teaching approaches with the best characteristics of online education and the interactivity from face-to-face classrooms. In addition, it will elaborate the conception and development of the best methodology for hybrid teaching methods gained by previous experience and evidence-based research.

LUT University leads this analysis due to its expertise in conducting international research on educational entrepreneurship education, its research on methodologies and practices, also including expertise in designing teaching methods in innovative teaching methodologies learning environments and in a real-world context. All project

partners gave their own expertise in the elaboration of the survey as well as provided LUT with valuable input.

First, a need-based analysis survey was conducted among teachers, educators, professors among the university network involved, to determine gaps in hybrid teaching models as well as entrepreneurship education (EE) methods and practices within.

The survey examined the existing blended-learning models, instructional methods, key success factors as well as entrepreneurship education programs focused on skills, university-business cooperation, multi-stakeholder involvement, evaluation system, innovative (business) recognition and certification in use before and during the pandemic through a multitude of questions (questionnaire annexed in this report). The findings will provide valuable data for elaborating a best practice guide and the conception of an innovative hybrid teaching and learning methodology.

The theoretical background of the survey & methodology design

European Entrepreneurship Competence Framework (EntreComp, 2021) and European Digital Competence Framework (DigiComp, 2021) developed by the European Commission and later based on EntreComp developed EntreCompEdu Teachers Framework (EntreCompEdu, 2021), form the backbone of e-DESK methodology design, which through the findings of the good practices, challenges, and successes of the respondents, revealed by the need-based survey analysis, can be used to build up concrete tools and guidelines that will assist teachers in their demanding work of planning and implementation of entrepreneurial methods and practices in an online environment.

DigiComp offers the key building blocks to a shared vision on what digital skills are and how to develop them across Europe. EntreComp is bringing greater understanding and meaning to entrepreneurial competence and highlights the value, opportunity and innovation that flows from entrepreneurial competence. EntreCompEdu teachers' framework gives teachers even more detailed information and function models related to entrepreneurial Teaching.

The theoretical background together with evidence-based research will also assist in transferring the findings in the rich data collected by the survey from teachers, professors and other education staff into a methodology and learning outcomes for higher education institutions in Europe.

Best practices

There are several European projects and best practices that can be utilized in e-DESK planning and implementation. Projects and practises are from different fields so they will offer a broad insight. First, the best practices within the partner universities will be used for designing the methodology for e-DESK. Discussions of digital teaching methods, tools and materials with project partners have provided valuable input to the project: for instance, the BDP (2021) Course Planning Tool developed by University of Zagreb will offer a design platform for defining the learning outcomes and course module planning of the e-DESK MOOC. Also partner universities' information packages

and practices of digital teaching support can be utilized. In the Annex 3. picture of LUT's digital teaching support centre's website.

Some of the partners have been already within BLUES project which is also combining entrepreneurial teaching in digital environment. BLUES MOOC was aimed to students but it will give valuable information in designing e-DESK methodology and MOOC. BLUES is to thank for the previous results gained first by evidence and second by the comparative knowledge compiled to BLUES Methodology. Blues produced guide documents by Rocha and Ceballos (2019) and Sarmiento et al. (2019). There is also available material from partner universities' digital teaching projects like Shnai's (2018) publication of digital learning design. Shnai's team has been within many digital teaching projects.

There are several projects related to entrepreneurship education which can be also utilized. Most of their material is implemented to digital environment. EntreCompEdu MOOC (2021) for teachers has ended recently and gives fresh insights. UNIPS (2019) project of enhancing university teachers' pedagogical expertise (including entrepreneurial teaching skills) is still running and giving aid to teachers in their course design. ENTREASSESS (2021) is also a project assisting teachers in entrepreneurial teaching. HEInnovation (2021) project and it's continuing project THEI2.0 (2021) are providing higher education institutions decision-makers and teachers support for the th development by giving wide range of information (including digitalization and entrepreneurship education).

Projects like the above mentioned can deepen our understanding of the educators' challenges and opportunities available in the pursuing their own teaching and learning practices both in digital environment and needs to include entrepreneurial teaching to be part of it.

Survey construction in teamwork

The starting point for the compilation of the questionnaire was the existing digital teaching and learning strategy of LUT University, as it was natural to tap into the most familiar environment and expertise of the project members. After internal discussions inside the LUT e-DESK team and including the knowledge and interest of LUT digital teaching and learning team, the first drafts of questions were compiled, followed by an e-DESK partner meeting to discuss, and complement to the questionnaire draft. After several rounds of discussions, the final version to be published was completed with all the partners' contribution. The development process was fruitful with cumulating knowledge and understanding of the versatile field of entrepreneurial and digital teaching and learning, as well as polishing and sharpening the questionnaire iteratively and in open and cooperative way.

The at first rather quantitative set of questions was amended with qualitative questions, many of which were in an open text form, thus giving an opportunity for the respondents to highlight and stress issues important to them in their (often changing) teaching practices.

The questionnaire was created using the Google Forms questionnaire tool which enabled online access from any device and easy feeding of data. From Google Forms the responses were gathered in an Excel file. The data was modified to a suitable format. For instance, Likert question responses were coded as numbers ('Strongly disagree = 1, Disagree = 2, Not agree or disagree = 3, Agree = 4 and Strongly agree = 5'). This handling enables counting mean and median values with statistics software SPSS. The coded Excel data was handled with SPSS and the findings (frequencies, percentages, mean values, etc.) were saved for further analysis. The open text answers were handled separately, and same kind of replies were categorized under certain themes (for instance, challenges in assessment / challenges in interaction). LUT University along with the rest of the team used the findings in the Methodology design. The findings were also edited to a graphical format (pies, histograms etc.) and introduced to the whole project team to be analysed together and to be used as a base to find ideas to e-DESK MOOC course planning.

The e-DESK application stated the questionnaire to be translated in all the partner languages (i.e., Spanish, Portuguese, Croatian and Finnish), but in the end, a unison decision was made to have the translated versions in Spanish only, as in many universities, the students represent several nationalities and therefore, teaching is conducted in English. The questionnaire link was distributed to all partner universities, and the survey was open at the same time on Google Forms, from late August to 21st, September 2021.

Survey results handling process and aim

This report comprises e-DESK need-based preliminary questionnaire data which is analysed and will be combined to the methodology. The questionnaire itself can be found annexed at the end of this document. The most relevant questions related to e-DESK methodology design have been gathered and analysed below. The data is presented here both in visual form (charts & pies, etc.), as well as with more detailed clarifications when relevant.

In this analysis we focus on identifying common challenges in hybrid teaching and online learning environment, as well as finding best practices that deserve to be distributed to a wide public. The emphasis is not so much on the differences in how teaching practices have changed during the pandemic per country, in the four e-DESK partner organisations. Neither do we address structural issues that have an impact on how well teaching and learning can take place in lockdown circumstances from the point of view of well-being at work, teachers and students feeling isolated and lacking social networks, etc.

However, the use of entrepreneurship education methods as well as improved entrepreneurial skills, enable the teachers engage the learners in meaningful creation of value to others, and thus indirectly affect the well-being of learners in a long run. Gaining better skills in digital teaching and learning may also empower the teachers in their everyday pedagogical practice.

Questionnaire period:

September 2021 (before methodology design)

Target group:

Higher education teachers and other teaching related staff at participant organizations/affiliates in Spain, Portugal, Finland, and Croatia.

Aim of the questionnaire:

To identify the strengths, weaknesses, and gaps of HEI in digital and hybrid teaching models, as well as entrepreneurship education methods and practices to be assessed and developed in the e-DESK methodology and course design. In other words: to understand the pains and needs of teachers; what is working and what is not working.

Questionnaire delivery:

The questionnaire platform was created by CISE using the Google Forms questionnaire tool which enables online access from any device and easy feeding of data. The link to the questionnaire was circulated among the staff members in the project partners' organizations and gained a total of 167 responses. On the next page there is the distribution of respondents per country and other respondent's background information data.

Analysis of the survey data (themes 1-11)

1. Background questions

Country

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Croatia	31	18,6	18,6	18,6
	Finland	27	16,2	16,2	34,7
	Portugal	73	43,7	43,7	78,4
	Spain	36	21,6	21,6	100,0
	Total	167	100,0	100,0	

Questionnaire had 167 respondents in total. Portugal scored the biggest number of respondents (43,7 %), while other countries Croatia / Finland / Spain had 16-22 % of the respondents.

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	85	50,9	50,9	50,9
	Male	79	47,3	47,3	98,2
	Other	1	,6	,6	98,8
	Prefer not to say	2	1,2	1,2	100,0
	Total	167	100,0	100,0	

Respondents' gender male / female percentage was divided quite evenly.

Age

Respondents' age ranged from 25 to 69 years old. Average age was around 48 years.

Teaching years

Respondents teaching years range was from 1 year to 45 years. Average amount was around 17 years. This question was seen relevant as the number of teaching years

may have an impact both on the familiarity and experience to digital teaching as well as to entrepreneurship education.

Permanent position / work contract type / university type

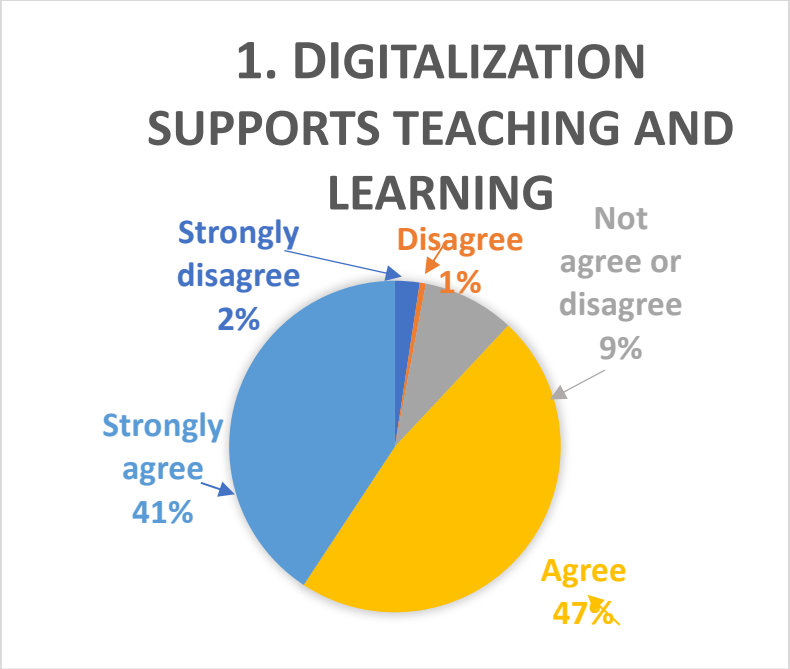
75 % of the respondents had a permanent job position in their institution or organization. Over 93 % of the respondents were working with full time work contract. 99 % of the respondents were working in public university.

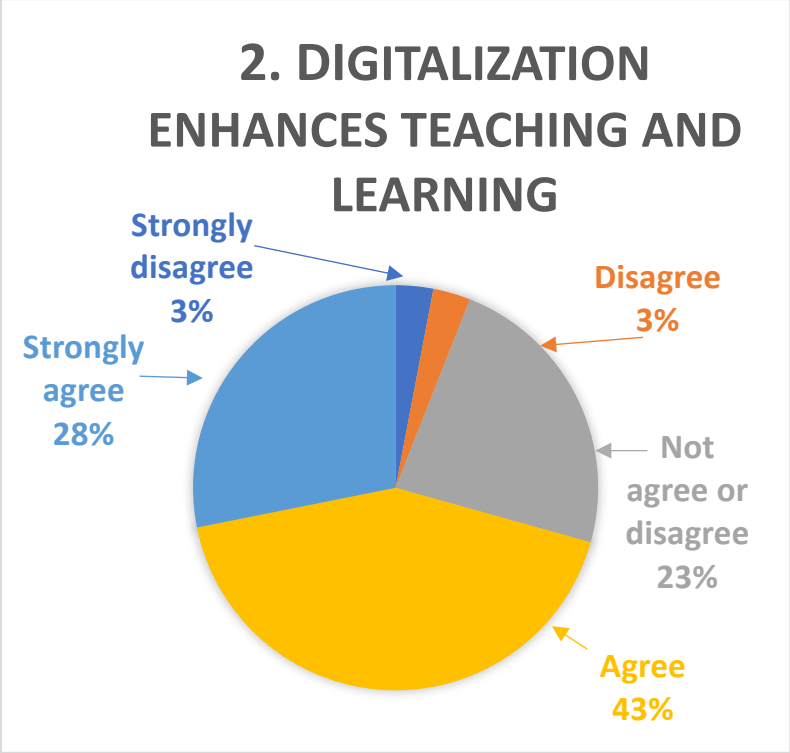
Teaching field

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Arts and Humanities	22	13,2	13,2	13,2
	Business	3	1,8	1,8	15,0
	Communication Sciences	1	,6	,6	15,6
	Engineering and Architecture	39	23,4	23,4	38,9
	General subjects	1	,6	,6	39,5
	Geography and Spatial Planning	1	,6	,6	40,1
	Geography Course (Social ? Sciences?... Humanities ?...)	1	,6	,6	40,7
	Health Sciences	13	7,8	7,8	48,5
	Humanities	18	10,8	10,8	59,3
	Mathematics	1	,6	,6	59,9
	Science	18	10,8	10,8	70,7
	Science and HE technology and pedagogy	1	,6	,6	71,3
	Sciences	9	5,4	5,4	76,6
	Social and Legal Sciences	36	21,6	21,6	98,2
	Social sciences	1	,6	,6	98,8
	Technical sciences, Traffic technology and transport	1	,6	,6	99,4
	training	1	,6	,6	100,0
	Total	167	100,0	100,0	

Respondents represented several fields of teaching. In this sample of responses, given to the nature of the universities involved, ‘Engineering and architecture’ (39 %) and ‘Social & Legal sciences’ (36 %) formed the biggest groups.

2. Attitude towards digitalization in teaching and learning





Majority (88%) of respondents agree or strongly agree that digitalization supports teaching and learning. A bit less but still a good majority (71 %) agree or strongly agree that digitalization enhances teaching and learning. The findings indicate a need to develop the digital teaching skills of the professors/teaching staff to support and enhance teaching and learning even better. Also, OECD (2018, 2021) has highlighted

in its recommendations for improving teachers' teaching skills that along with IT -skills digital teaching methods and modes of practices should be strengthened.

Even though the respondents mainly had a positive attitude towards digitalization, open text question (question 70.) of the faced challenges gave a slightly more detailed picture of the sudden, forced transfer to the digital mode and its effects.

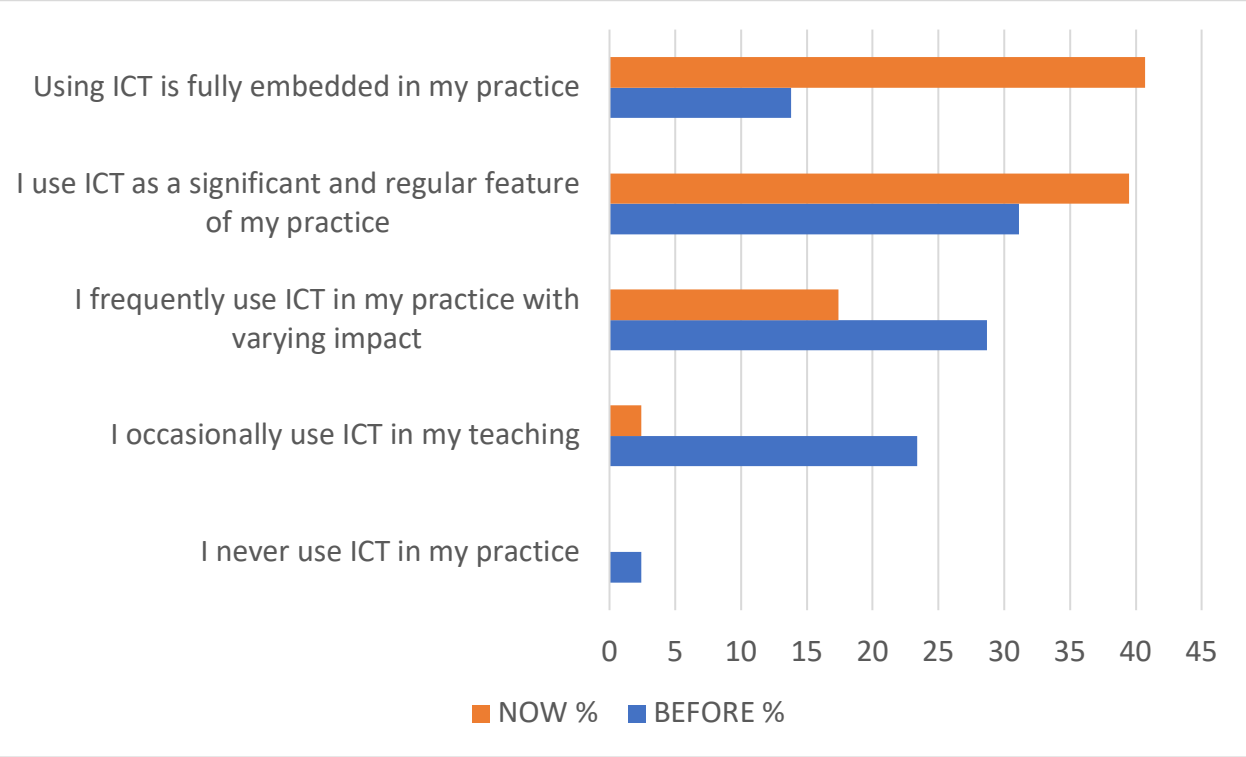
For example, the following challenges were mentioned

- Having not enough knowledge and experience of the digital teaching
- Learning new tools and techniques so that you were able to use them in digital teaching required a lot of time
- Having technical problems in digital teaching

3. Level of ICT usage in teaching

Question 3. To what extent do you use digital technology for your lessons before the pandemic?

Question 4. To what extent do you use digital technology for your lessons before the pandemic now?



Respondents' use of digital technology has increased remarkably during the pandemic. It is possible to witness an increase especially in the number of respondents using ICT fully embedded in their practice (increase from 18 % to 41 %). However, there were country-specific differences in the responses. In some countries the extent of us was still quite low even with the increase after the pandemic start, so there is a need to promote the use of digital technology.

In open text question reply comments there were quite many remarks that respondents some how see that on-line teaching is something less or quality is poorer than in face-to-face teaching. Hodges et al. (2020) are pointing out that research shows also opposite results and if teachers were able to plan their on-line courses better the courses will be much more meaningful learning experiences than on-line courses arranged in crisis situations. So, in e-Desk there is a good reason to develop teachers' abilities and guide them towards more ICT usage in teaching and better on-line course planning.

4. Used delivery modes and digital teaching modes

8-11 (Used delivery modes before pandemic):

	8. What delivery modes have you used in your teaching practices **[In person instruction]** (1=never, 2=rarely, 3= Occasionally, 4=frequently, 5=always)	9. What delivery modes have you used in your teaching practices before the pandemic? **[Fully online instruction]** 1=never, 2=rarely, 3= Occasionally, 4=frequently, 5=always)	10. What delivery modes have you used in your teaching practices before **[Blended learning]** 1=never, 2=rarely, 3= Occasionally, 4=frequently, 5=always)	11. What delivery modes have you used in your teaching practices before the pandemic? **[Hybrid learning]** 1=never, 2=rarely, 3= Occasionally, 4=frequently, 5=always)
Mean	**4,42**	**1,90**	**2,42**	**1,94**

12-15 (Used digital teaching modes now):

	12. Which digital teaching modes do you use now? **[In-person instruction]** (1=never, 2=rarely, 3= Occasionally, 4=frequently, 5=always)	13. Which digital teaching modes do you use now? **[Fully online instruction]** 1=never, 2=rarely, 3= Occasionally, 4=frequently, 5=always)	14. Which digital teaching modes do you use now? **[Blended learning]** 1=never, 2=rarely, 3= Occasionally, 4=frequently, 5=always)	15. Which digital teaching modes do you use now? **[Hybrid learning]** 1=never, 2=rarely, 3= Occasionally, 4=frequently, 5=always)
Mean	**3,41**	**3,32**	**3,20**	**3,02**

The responses to the questions comparing the delivery modes in use before and after the pandemic show that there is a vast increase in the use of digital teaching modes. However, digital teaching is still at quite a low level as is seen in the mean values, which are not rising much above 3,00. This seems to indicate that the respondents still have things to learn to make the use of digital teaching modes regular and fluent.

e-DESK will especially concentrate to hybrid learning. Selection of this teaching mode is supported by the responses to the open text question 70 addressing “Faced challenges”. The respondents described that hybrid teaching had been the most challenging format of teaching and support there is needed.

5. Used teaching methods in digital teaching

Questions 16-24

	16. What teaching methods have you used in digital teaching? **[Problem based learning (PBL)]** 1=never, 2=rarely, 3=occas. 4=freque., 5=always)	17. What teaching methods have you used in digital teaching? **[Work based learning (WBL)]** 1=never, 2=rarely, 3=occas. 4=freque. 5=always)	18. What teaching methods have you used in digital teaching? **[Flipped classroom]** 1=never, 2=rarely, 3=occas. 4=freque., 5=always)	19. What teaching methods have you used in digital teaching? **[Project-based learning]** 1=never, 2=rarely, 3=occas. 4=freque., 5=always)	20. What teaching methods have you used in digital teaching? **[Collaborative and peer learning]** 1=never, 2=rarely, 3=occas. 4=freque., 5=always)	21. What teaching methods have you used in digital teaching? [**Learning based on cooperative models** *(such a social economy or cooperative values)*] 1=never, 2=rarely, 3=occas. 4=freque., 5=always)	22. What teaching methods have you used in digital teaching? **[Questions and answers]** 1=never, 2=rarely, 3=occas. 4=freque., 5=always)	23. What teaching methods have you used in digital teaching? **[Inquiry based learning]** 1=never, 2=rarely, 3=occas. 4=freque., 5=always)	24. What teaching methods have you used in digital teaching? **[Other]** 1=never, 2=rarely, 3=occas. 4=freque., 5=always)
Mean	**3,14**	**3,05**	**2,74**	**3,02**	**3,10**	**1,88**	**3,57**	**2,87**	**1,94**

occas. = occasionally, freque. = frequently

The responses show that at least the above-mentioned digital teaching methods have not yet been in a very active use in the teachers' everyday toolkit. Mean values stay below or near 3,00 in most of the methods. That indicates that there remains much to do when training and familiarizing teachers to use different digital teaching methods. To improve this, for instance, collaborative and peer learning assignments for teachers will be used in e-DESK to introduce them to that kind of teaching method.

In the e-DESK MOOC example videos of course implementations could be shown for example some cases of problem-based and project-based learning. Sousa et al. (2018) see project-based learning and problem-based learning as good methods when combining entrepreneurial teaching to digital teaching.

6. Assessment in digital teaching and learning

Questions 26-37

26. I tried to replicate assessment approaches I used before (1=strongly disagree, 2=disagree, 3=not agree or disagree, 4=agree, 5=strongly agree)	27. I had to rethink the assessment program and introduced considerable changes (1=strongly disagree, 2=disagree, 3=not agree or disagree, 4=agree, 5=strongly agree)	28. I adopted the assessment approaches that I used before to online environment (1=strongly disagree, 2=disagree, 3=not agree or disagree, 4=agree, 5=strongly agree)	29. I utilized examination data bases (1=strongly disagree, 2=disagree, 3=not agree or disagree, 4=agree, 5=strongly agree)	30. I applied more problem-solving exercises (1=strongly disagree, 2=disagree, 3=not agree or disagree, 4=agree, 5=strongly agree)	31. I introduced peer assessment (1=strongly disagree, 2=disagree, 3=not agree or disagree, 4=agree, 5=strongly agree)	32. I introduced group reflection (1=strongly disagree, 2=disagree, 3=not agree or disagree, 4=agree, 5=strongly agree)	33. I adopted new assessment approaches using digital technology, [Other] (1=strongly disagree, 2=disagree, 3=not agree or disagree, 4=agree, 5=strongly agree)	35. I use continuous, formative digital methods for assessment of students in the course (1=strongly disagree, 2=disagree, 3=not agree or disagree, 4=agree, 5=strongly agree)	36. I use digital methods to evaluate the course (quality assure) (1=strongly disagree, 2=disagree, 3=not agree or disagree, 4=agree, 5=strongly agree)	37. I utilize students' self-assessment approaches in a digital learning environment (1=strongly disagree, 2=disagree, 3=not agree or disagree, 4=agree, 5=strongly agree)
Mean 3,38	3,62	3,39	2,51	3,25	2,54	2,77	1,77	3,53	3,37	3,05

Responses to assessment questions demonstrate that finding efficient and productive ways of assessment has been a bit challenging with the transfer to digital teaching. New methods in assessment have not been used very widely. Problem-solving exercises had the highest mean value as a used assessment method but still, it rises only to level 3,25. Peer assessment and group reflection seem to be seldom used. This brings up a need to widen and strengthen the teachers' ability to use new assessment methods in digital teaching.

Besides challenges in general, the open text question (question 70.) "Faced challenges" also addresses challenges in assessment. Teachers had difficulties to assess activity in digital courses. Besides that, they found it hard to find fair and equal ways to assess the learning process and outcomes of the students.

New needs and faced challenges in on-line teaching and learning assessment has been recognized also in the research world. JISC (2020) provides plans for assessment in an online environment for the future. It's essential to create authentic, accessible, automated, continuous, and secure assessment for online environment. For example, one way towards secure and fair assessment is adding writing style comparing tools to ensure that right person has written the assignment.

7. Interaction in digital teaching and learning

58-62

58. I interact with students more during the pandemic than before (1=strongly disagree, 2=disagree, 3=not agree or disagree, 4=agree, 5=strongly agree)	59. I interact more with my peers (other teachers) during the pandemic than before (1=strongly disagree, 2=disagree, 3=not agree or disagree, 4=agree, 5=strongly agree)	60. I interact internationally more during the pandemic than before (1=strongly disagree, 2=disagree, 3=not agree or disagree, 4=agree, 5=strongly agree)	61. I noticed students interact more with their peers than before (1=strongly disagree, 2=disagree, 3=not agree or disagree, 4=agree, 5=strongly agree)	62. I noticed students interact more with available digital teaching material (1=strongly disagree, 2=disagree, 3=not agree or disagree, 4=agree, 5=strongly agree)
Mean 2,63	2,34	2,62	2,53	3,23

The mean values in each question give evidence that the interaction between the respondents and their students, peers and international contacts has not increased during the pandemic. Neither does the students' interaction with digital material seem very convincing. This finding draws attention to the notion that digital teaching may also have a negative impact to interaction. To turn the experience more positive, it is essential to develop the interaction of the teachers to their students in a digital teaching environment generally, and specifically in situations / periods when teaching digitally is the main form or, indeed, only option of teaching.

Responses to the open text question (question 70) "Faced challenges" strongly support the above- mentioned decrease in interaction. Many teachers point out that interaction in digital teaching was challenging. With cameras off and sound muted, it was hard to know if the students were attending the lecture or even listening. Motivating students and getting feedback from them proved challenging.

8. Organization's support and digital resources

Question 40-53 (Organization's support):

40. My organization needs to offer more support to improve online teaching (1=strongly disagree, 2=disagree, 3=not agree or disagree, 4=agree, 5=strongly agree)	41. My organization offers effective support for digital teaching (1=strongly disagree, 2=disagree, 3=not agree or disagree, 4=agree, 5=strongly agree)	42. My organization offers effective support for digital teaching [Differentiated]	43. My organization offers effective support for digital teaching [Personal]	44. My organization offers effective support for digital teaching [Just in time]	45. My organization offers effective support for digital teaching [Multimodal]	46. My organization offers effective support for digital teaching [Tutoring])	47. My organization offers effective support for digital teaching [Training]	48. My organization offers effective support for digital teaching [Coaching]	49. My organization offers effective support for digital teaching [Manuals]	50. My organization offers effective support for digital teaching [Guiding tutorials]	51. My organization offers effective support for digital teaching [Videos]	52. My organization offers effective support for digital teaching [Webinars]	53. My organization offers effective support for digital teaching [MOOC]
Mean 3,59	3,34	% Dont know 46,1	21,6	30,5	61,1	39,5	39,5	47,9	17,4	17,4	20,4	29,3	44,9
		% No 21,6	24,6	22,8	16,8	22,2	22,2	26,3	13,2	11,4	18,0	18,6	31,7
		% Yes 32,3	53,9	46,7	22,2	38,3	38,3	25,7	69,5	71,3	61,7	52,1	23,4

Responses on organization support show that there has been support and it has been most individual support, manuals, and videos. Figures in response option: "I don't know" (if support is offered in my organization) are quite high. However, it is possible that there is support available, but the respondent has not seen it important to seek it.

Question 54. (Desired support format):

54. When you need ICT support in your teaching practices how would you like support to be provided?

Short courses	Videos	Manuals	Workshops	Tutorials	FAQ	Buddy	Chat	Other
81	102	79	76	81	50	37	57	7
1			1	1				

This question concentrates on the desired form of support. It seems that the respondents are not so keen to seek personal assistance and are in many cases quite satisfied with being able to at a convenient time check and self-study videos, tutorials, short courses, manuals, as well as attend common workshops on a specific topic as these forms of ICT support have gained higher scores than for instance peer support. This seems to confirm that when planning the e-DESK MOOC, videos are a good way to share information and should be kept in mind.

Question 56. Available digital resources in your organisation

56.

What kinds of digital resources do you have at your disposal in your own organization?

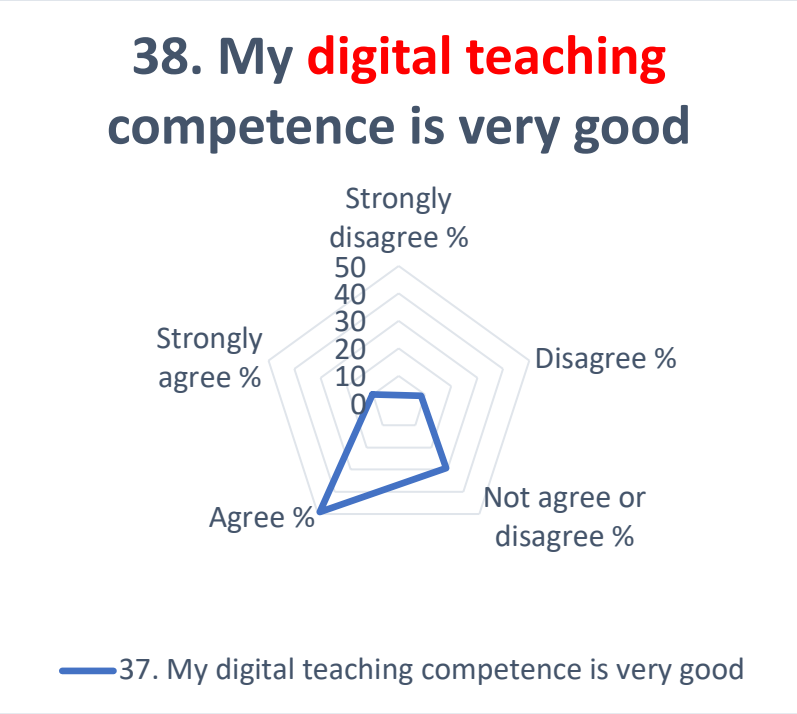
LMS (Moodle...)	Online platform (Zoom...)	Polling Tools (PollEverywhere...)	Add-on software to include questions in Moodle videos	Tools for editing (e.g. Adobe Creative Cloud...)	Game questionnaire (Kahoot...)	Brainstorming (Jamboard...)	Online platform (Perusall...)
151	162	57	49	58	49	34	31

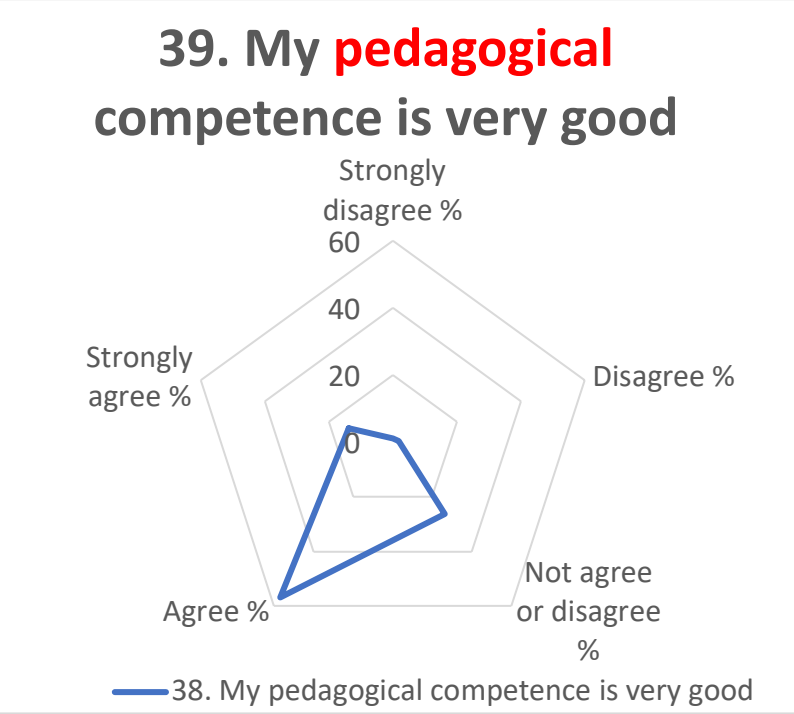
The findings indicate that respondents quite often have some Learning Management System (like Moodle) or Online platform (such as Zoom platform) in their use. Other tools and software mentioned in the question are not so commonly used. Biggs and Tang (2011) rise up the importance of ability to use different tools like videos, games and polls and variate normal lecture teaching with them.

In the design of e-DESK methodology and in the planning of the e-DESK MOOC the familiarity of the platforms will be considered. It seems to be beneficial also to introduce available open access digital resources and tools to the teachers.

One of the open access tools is Learning Design Tool. This course design tool is developed by our project partner University of Zagreb, and it helps in the course design generally and specially in designing digital teaching or parts of it. This tool will be used in e-Desk MOOC course design assignment for teachers. It is also used in planning the e-Desk MOOC.

9. Digital teaching competence and pedagogical competence



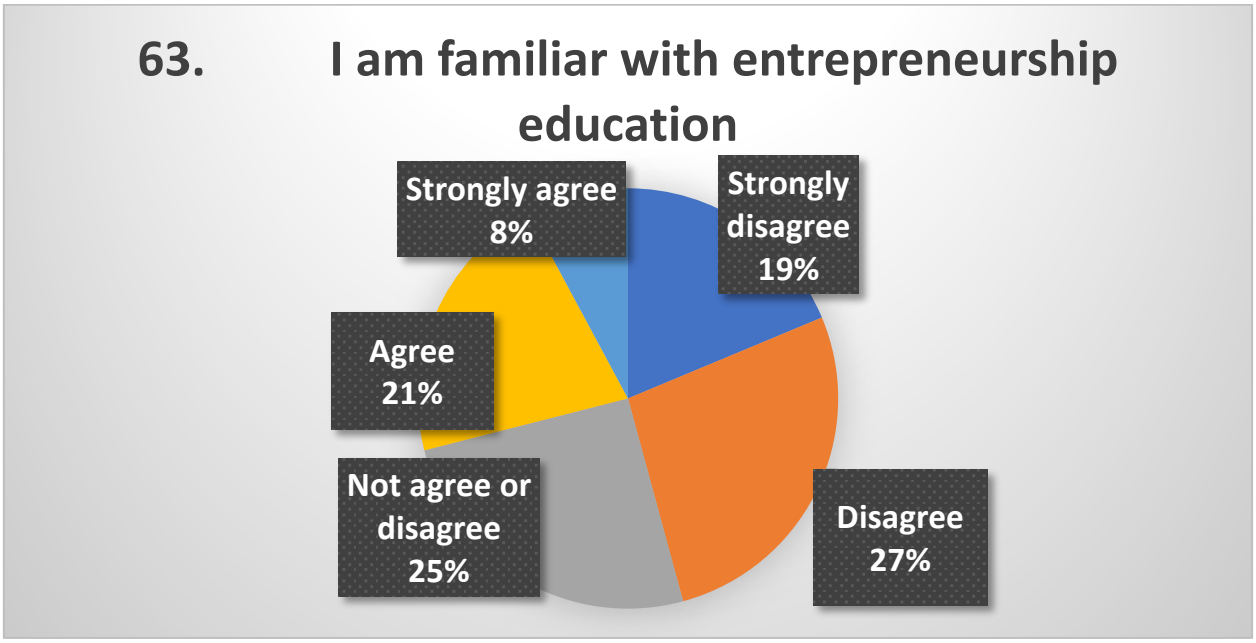


Respondents' self-assessment of their digital teaching competence level is good (50 %) or very good (10 %). This result was a bit surprising in the face of the later Questions 9–25 concerning use of digital teaching and delivery modes, that indicates quite a limited use and experience. It may be that respondents found it hard to

understand this question, so perhaps digital teaching competence could have been defined in a clearer way. Because of this uncertainty, the responses to questions 9-25 have gained more weight than Questions 38 and 39 in the planning of the e-DESK MOOC.

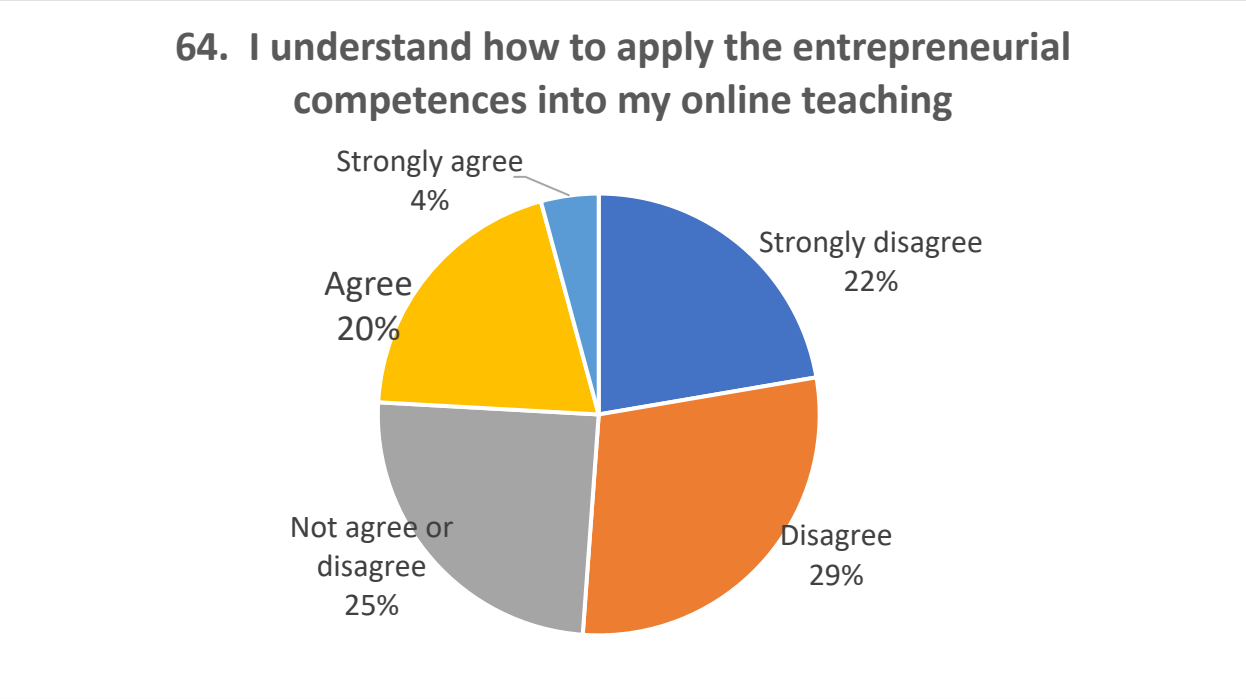
Respondents' self-assessment of their pedagogical competence is very high (almost 60 % agree and over 10 percentage strongly agree). Respondents seems to be confident of their own pedagogical skills. It is a good base for learning novel hybrid methods of teaching in a more digital teaching environment.

10. Entrepreneurial competences in digital teaching and learning



Many respondents do not seem to be very familiar with entrepreneurial education (disagree or strongly disagree 46 % and not agree or disagree 25 %). That is quite an alarming result, as entrepreneurial education has been part of national curricula for decades. Still, only below 30 % agrees or strongly agrees that entrepreneurial education is familiar to them. This shows an acute need to improve teachers' awareness of entrepreneurial education.

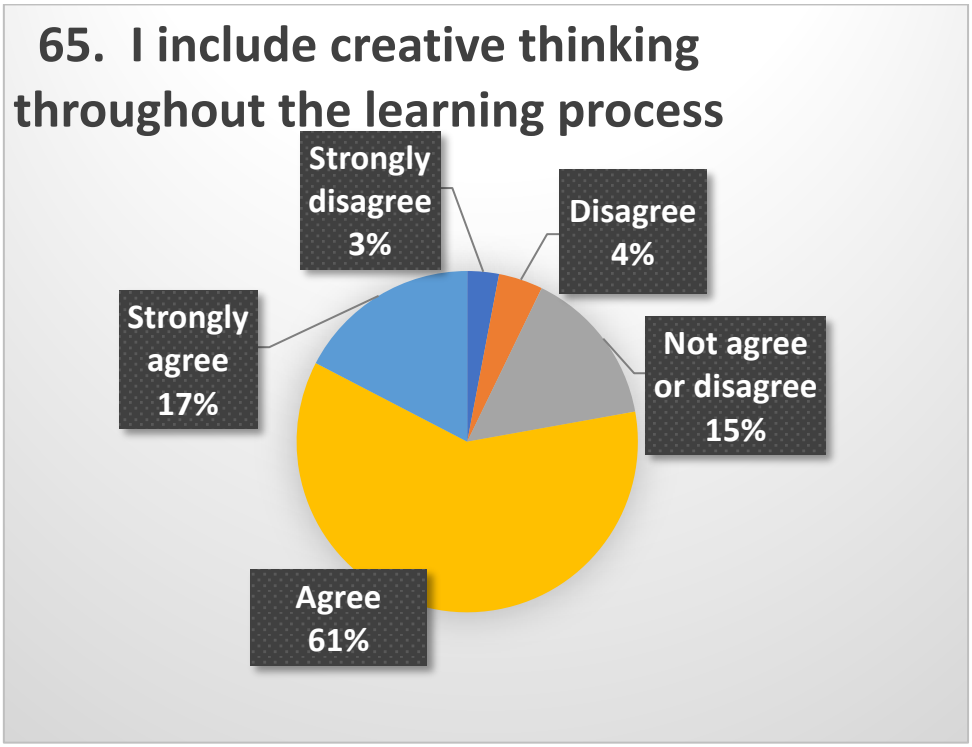
Entrepreneurial education is providing skills, methods and mindsets that are needed today and in the future. They improve students' employability and give transferable skills to meet the challenges in the world (EC, 2018). That sets a need for teachers to use entrepreneurial education (Bacigalupo et al., 2016).



Only 24 % of respondents agree or strongly agree that they understand how to apply entrepreneurial competences in their online teaching. This is a very low rate. In addition to awareness of entrepreneurial education, teachers need information and examples how to apply entrepreneurial competences into their online teaching. This is something that needs to be considered in e-DESK methodology design as well as in defining the learning outcomes for the MOOC. In e-DESK MOOC applying real-world requirements in teaching will be taken as a special field to develop in teachers entrepreneurial teaching competences.

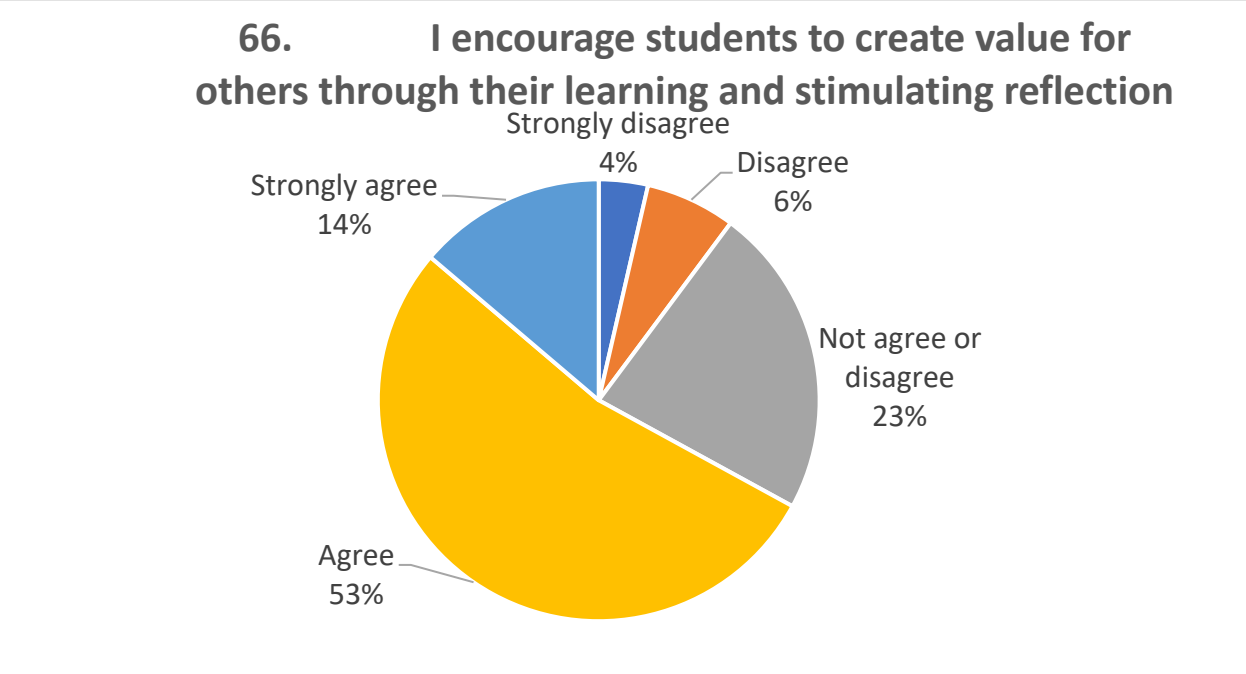
Ratten and Jones (2020) see entrepreneurial thinking very important in teaching and they consider it even more important in COVID-19 or any other crisis season because entrepreneurial thinking lies on the purpose to find solutions, tackle difficulties and challenges. So, being able to embed entrepreneurial thinking in an online teaching environment is an efficient way of providing learners tools to survive and prosper in difficult times.

Grigg (2021) describes setting real-world requirements to teaching as a great way to give learners entrepreneurial competences. When learners are given real existing problems to solve it may end up to great ideas and solutions.



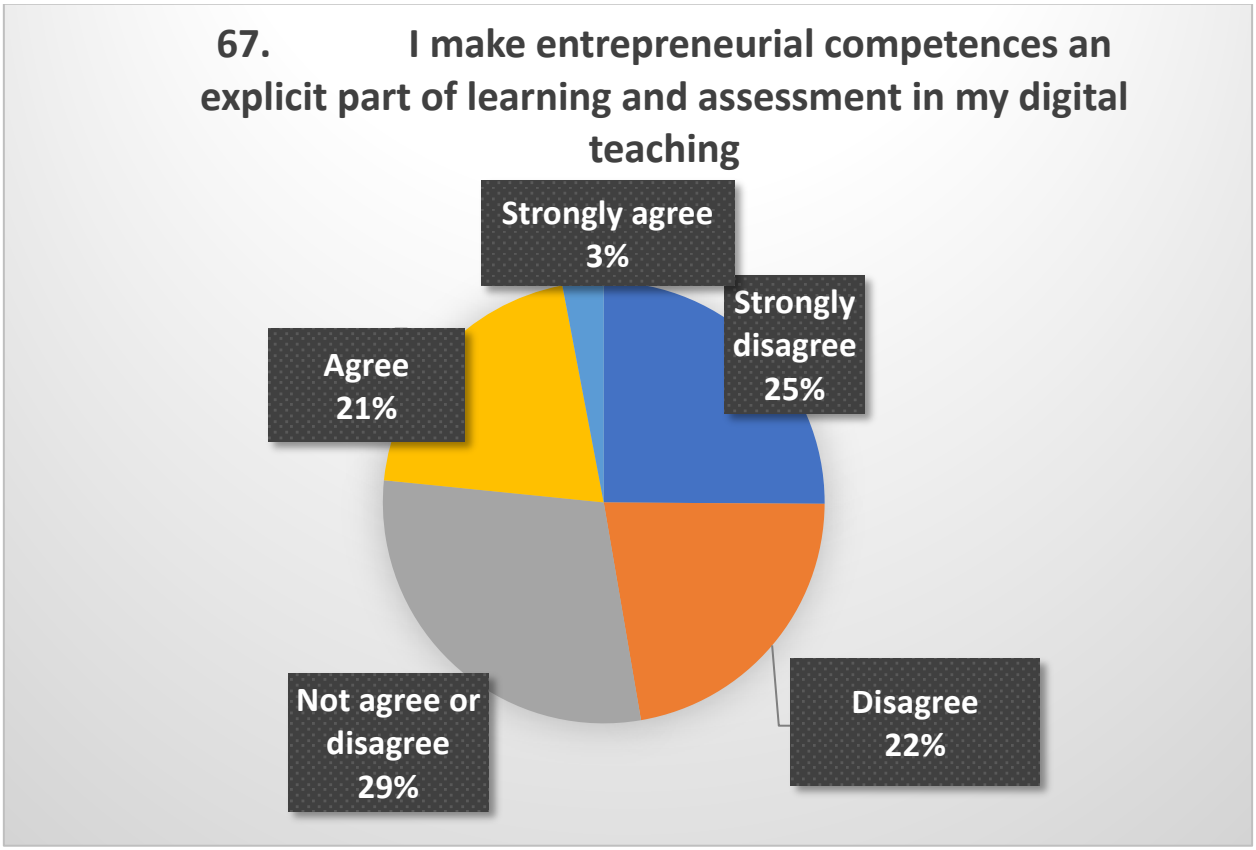
Respondents estimate that they are well or very well (in total of 78 %) able to include creative thinking throughout the learning process. In designing the e-DESK methodology as well as planning of the learning design, it is advisable via examples show how to use creative thinking in a way that promotes entrepreneurial competences.

EntreComp (2021) defines creativity followingly: “Creativity is the act of turning new and imaginative ideas into reality. Creativity is characterised by the ability to perceive the world around us in new and different ways in order to make connections among apparently unrelated phenomena and to generate innovative solutions. Creativity is the ability to produce new solutions without using a logical process but establishing distant relationships among facts. Therefore, it is not a logical process.”



Many of the respondents recognize in themselves an ability to encourage students to create value for others well or very well (67 %). However, as this is one of the key competences in EntreComp Framework and one that EU emphasises in its entrepreneurship strategies, it could be stressed in the e-DESK methodology to even more strengthen the teachers' ability to encourage students to thinking which highlights the significance of value creation and reflection.

EntreComp (2021c) explains the benefits of the value creation. Value creation is not only limited to education and courses. This way of thinking will promote your ability to create value in different environments like in work, hobbies, and organizations. Garbuio et al. (2018) see that entrepreneurial education encourages learners to see around differently and create desired futures.



The responses seem to indicate that only 24 % of the teachers agree or strongly agree of making entrepreneurial competences as an explicit part of learning and assessment in their digital teaching. This finding supports the idea that there is a demand to provide them with information how entrepreneurial competences can form a solid base also in digital teaching.

One essential issue in using entrepreneurial competences in teaching and learning is to approach the teaching subject in a way that it offers learners possibilities to acquire practical competencies by learning by doing and gain experiences in real world settings (Liguori & Winkler, 2020).

Entrepreneurial competences developing assessment is for example reflection of the course assignment. Reflection what's worked well and needs developing or improving. Creating open-minded attitude towards trial and error and learning from mistakes (Grigg, 2020).

11. Open text questions

	Question 68. Describe how digitalization changed your teaching practices?
	Workload, stress (increased)
	Digital teaching (increased)
	Finding alternative ways for teaching (increased, like online labs)
	Preparing digital learning materials (increased)
	Learning new teaching tools and methods (increased)
	Learning new assessment methods (increased)
	Feeling of control (decreased)
	Job satisfaction (decreased / in some cases increased – finding new ways)
	Interaction / communication teacher-student (decreased/increased)
	Interaction / communication student-student (decreased/increased)
	Interaction / communication teacher-teacher (decreased/increased)

	Question 69. Describe your successful experiences in digital teaching (during the pandemic)?
	Managed to complete courses enough well during the pandemic
	Managed to create even better courses than before
	Learned to use new tools
	Students' better participation, activity, and grades
	Students were more open to ask questions online
	Tools promoted project and teamwork
	Tools promoted international work
	More communication - teacher with students and students in their group
	Students liked recorded lectures (possibility to replay)
	Found new ways to teach
	Feeling that teaching is more dynamic
	Feeling that teaching is better planned and concentrating to essential issues

The many positive experiences teachers had according to the open text answers for Question 69. are described in the text box above. There were naturally also negative feelings, which will be listed in question 70. Challenges.

Respondents described the change to digital teaching contained both good and bad experiences. The restrictions brought up by the pandemic had forced many respondents to learn how to use new digital tools and methods. For some teachers this was an interesting challenge to learn something new and some found it very frustrating, while some had a neutral attitude towards the increased use of digital tools and methods. Previous experience in digital teaching had made the way easier for some respondents.

This contrast comes out in all open text questions. Some teachers have a very negative feeling of digital teaching and do not want to continue it. Others wish to continue the good, learned practices also in the future while some are already taking digital teaching widely into use even there is no forced need to do that.

Respondents' insights of the benefits, challenges and negative effects vary a lot. Some find digital teaching is challenging, less interactive, impersonal, and not controlled.

They think that it reduces students' participation and learning results. Contrarily, other teachers feel that digital teaching is dynamic, more accessible, increasing participation, communication and learning results. They had found new methods for their teaching, such as problem-solving and case studies.

	Question 70: Describe the challenges you are facing during digital teaching?
	Students' participation / activity in lectures (decreased, lost students, lower grades)
	Students' motivation (decreased, hard to keep up)
	Teacher's feeling of control and focus (decreased)
	Interaction / communication teacher-student (decreased)
	Interaction / communication student-student (decreased)
	Feedback from students (decreased)
	Hybrid teaching (parallel tools handling, attention, concentration)
	Technical problems (both teachers and students)
	Learning new teaching tools and methods (difficult, previous knowledge low)
	Workload (too much, tight timetable to adjust to pandemic)
	Lack of support from the organization
	Facing student's negative feelings in the new situation
	Assessment (adapting not easy, finding suitable methods, fairness in assessment)
	Ethical challenges (secure exams, cheating, plagiarism)

Students participation, activity, motivation and lack of interaction were listed as the most common challenges in digital teaching. Nikou and Maslov (2021) have also stated in their article of students e-learning participation during the Covid-19 that motivating and engaging learners to participate in online learning lessons is challenging.

BMC Health (2021) article of Covid-19 impacts in higher education institution staff reveals similar effects and challenges as described in questionnaire open questions 68. and 70. Decreased communication, adjustment of schedules and extra work load were reported in the study as main functional problems.

	Question 71: What actions or activities have been used/introduced during the pandemic that you would continue to apply in the post-pandemic period?
	Online lectures / courses
	Hybrid / blended teaching
	Zoom, Moodle, other Learning management systems
	Videos
	Discussion / interaction (discussion forums, chats, communication platforms etc.)
	Quizzes, polls, surveys
	Instructing / guiding / consulting / tutoring / mentoring online
	Group work / team work online
	Online visitors / seminars
	Online exams
	Online assesment

Above mentioned remarks of possible future activities were found in the comments of many respondents. It would seem that most of the respondents had found at least something good from their teaching experiences during the pandemic and wanted to continue their learned practices.

Conclusions

The data collected via the survey from European teachers was rich and manyfold, describing the transfer from mainly face-to-face teaching in classrooms to, in some cases, full digital learning environment almost overnight. The number of respondents (n=167) was not very large, but still, it gives a good insight in the current and previous state of digital teaching and learning in the four European countries, i.e., before and during the pandemic.

Previous experience of digital education and suitable methods naturally helped. Still, changing all the courses from classroom mode to online was not easy even for the most fluent of teachers. There were many challenges starting from technical issues, internet connections, helpdesk support, ranging to student interaction, exhausting workload, lacking suitable education material, uncertainty of own presentation skills, assessment difficulties in cases where cameras were off and sound muted.

What came out clearly was the need for deepening the teachers' own skills in embedding entrepreneur education in teaching and learning as well as need for improving the teachers' own digital skills, both in a hybrid education mode and blended learning mode. This is where e-DESK methodology together with MOOC course design can make a difference for the future. Improving their own entrepreneurial competencies will make it possible for the teachers to convey the importance of an entrepreneurial mindset in their students, thus giving the students significantly better competencies in their future careers, as active members of society, better qualified to create value for others. When increasing their own digital teaching skills and being able to apply the appropriate methods of delivery fluently irrespective of the learning environment, teachers can focus on the content of their teaching and give their best performance. e-DESK methodology is described in a separate report. Together with this survey analysis report and a step-to-step guide to the course methodology it forms the base for the e-DESK learning design.

Annex 1. e-DESK Questionnaire questions & question reply options

e-DESK Questionnaire

PROFILE

Gender
Age
Teaching experience (years)
Permanent (yes/no)
Full time/ Part time
Public / private university
Teaching field

Selectable teaching fields:

Arts and Humanities
Business
Communication Sciences
Engineering and Architecture
General subjects
Geography and Spatial Planning
Geography Course (Social ? Sciences?... Humanities ?...)
Health Sciences
Humanities
Mathematics
Science
Science and HE technology and pedagogy
Sciences
Social and Legal Sciences
Social sciences
Technical sciences, Traffic technology and transport
training

Section 2: Your digitalization in teaching experience

ATTITUDE TOWARDS DIGITALIZATION IN TEACHING AND LEARNING

1. ***Digitalization supports teaching and learning.***
   Please state your agreement.
   (Likert 1-5)
   strongly disagree (1)
   disagree (2)
   not agree or disagree (3)
   agree (4)
   strongly agree (5)

2. **Digitalization enhances teaching and learning.**
   Please state your agreement.

   (Likert 1-5)
   strongly disagree, disagree, not agree or disagree, agree, strongly agree

USAGE OF DIGITAL TECHNOLOGY IN TEACHING AND LEARNING

3. ***To what extent did you use digital technology for your lessons before the pandemic?***
   ***Please state your agreement*.**
   (Likert 1-5)

   I never used ICT in my practice (1)
   I occasionally used ICT in my teaching (2)
   I frequently used ICT in my practice with varying impact (3)
   I use ICT as a significant and regular feature of my practice (4)
   Using ICT is fully embedded in my practice (5)

4. ***To what extent are you using digital technology for your lessons now? Please state your agreement.***
   (Likert 1-5)

   I never used ICT in my practice (1)
   I occasionally used ICT in my teaching (2)
   I frequently used ICT in my practice with varying impact (3)
   I use ICT as a significant and regular feature of my practice (4)
   Using ICT is fully embedded in my practice (5)

AVAILABILITY AND USAGE OF DIGITAL TECHNOLOGY IN MY INSTITUTION

5. ***Digital technology was successfully integrated in my institution before the pandemic. Please state your agreement.***
   (Likert 1-5)
   strongly disagree, disagree, not agree or disagree, agree, strongly agree

6. ***Digital technology is now well integrated in my institution. Please state your agreement.***

   (Likert 1-5)
   strongly disagree, disagree, not agree or disagree, agree, strongly agree

7. ***The pandemic has had a positive effect on the use of digital technology in my institution. Please state your agreement***.

   (Likert 1-5)
   strongly disagree, disagree, not agree or disagree, agree, strongly agree

DIFFERENT TEACHING METHODS AND MODES

The descriptions:

Fully online (Full Digi) = the student completes the course entirely online. Does not require attendance on campus

Blended learning = Blended learning can include many different synchronous and asynchronous teaching methods. The learning environment consists of a mix of online environments and face to face/in person teaching.

Hybrid learning = In hybrid teaching, participants are simultaneously present in the same classroom or remotely over a network connection

Face to face/in person instruction = Traditional teaching in a classroom or other physical environment, where the student participates in lectures, practice groups, seminars, exams, discussions, for example.

What delivery modes have you used in your teaching practices before the pandemic? Please state your frequency level.
(Likert 1-5)
Never = 1, Rarely = 2, Occasionally = 3, Frequently = 4, Always = 5

	Never	Rarely	Occasionally	Frequently	Always

8. In person instruction					
9. Fully online instruct.					
10. Blended learning					
11. Hybrid learning					

Which digital teaching modes do you use now?
Please state your frequency level.
(Likert 1-5)
Never = 1, Rarely = 2, Occasionally = 3, Frequently = 4, Always = 5

	Never	Rarely	Occasionally	Frequently	Always
12. In person instruction					
13. Fully online instruct.					
14. Blended learning					
15. Hybrid learning					

What teaching methods have you used in digital teaching?
Please state your frequency level.

(Likert 1-5)
Never = 1, Rarely = 2, Occasionally = 3, Frequently = 4, Always = 5

	Never	Rarely	Occasionally	Frequently	Always
16. Problem based learning (PBL)					
17. Work based learning (WBL)					
18. Flipped classroom					
19. Project-based learning					

20. Collaborative and peer learning					
21. Learning based on cooperative models (such a social economy or cooperative values)					
22. Questions and answers					
23. Inquiry based learning					
24. Other					

25. If other or anything else, please explain what? Open answer

ASSESSMENT

Formative evaluation is used to modify or improve products, programmes, or activities, and is based on feedback obtained during students' planning and development, whereas *summative* evaluation is at the conclusion of an activity or plan, to determine its effectiveness. (Bloom et al., (1971)

Further the evaluation may be divided for the purpose of evaluation (formative or summative), type of evaluation objectives (cognitive, affective, behavioral, impact), level of evaluation (reaction, learning, behavior, organizational impact), type of instructional objectives (declarative knowledge, procedural learning, attitudes), type of instructional delivery (classroom-based, technology-based, mixed), and size and type of participant groups (individual, small group, whole group) Eseryel (2002, 96).

Students' *self-assessment* approaches may be categorized into *assessment of learning*, *assessment for learning,* and *assessment as learning* Draycott et al. (2011)

I adopted new assessment approaches using digital technology, please indicate your agreement.

(Likert 1-5)
strongly disagree (1), disagree (2), neither agree or disagree (3), agree (4), strongly agree (5)

	Strongly disagree	Disagree	Not agree or disagree	Agree	Strongly agree
26. I tried to replicate assessment approaches I used before					
27. I had to rethink the assessment program and introduced considerable changes					
28. I adopted the assessment approaches that I used before to online environmen t					
29. I utilized examination data bases					
30. I applied more problem-solving exercises					

31. I introduced peer assessment					
32. I introduced group reflection					
33. Other					

34. If other or anything else, please explain what? Open answer

	Strongly disagree	Disagree	Not agree or disagree	Agree	Strongly agree
35. I tried to replicate assessment approaches I used before					
36. I had to rethink the assessment program and introduced considera					

ble changes					

37. I had to rethink the assessment program and introduced considerable changes					

ONE'S OWN SELF-ASSESSMENT ON DIGITAL COMPETENCE

38. My digital teaching competence is very good

(Likert 1-5)
Strongly disagree, disagree, not agree or disagree, agree, strongly agree

39. My pedagogical competence is very good
(Likert 1-5)
Strongly disagree, disagree, not agree or disagree, agree, strongly agree

DIGITAL TEACHING SUPPORT

40. My organization needs to offer more support to improve online teaching
(Likert 1-5)
Strongly disagree, disagree, not agree or disagree, agree, strongly agree

41. My organization offers effective support for digital teaching
(Likert 1-5)
Strongly disagree, disagree, not agree or disagree, agree, strongly agree

My organization offers effective support for digital teaching. Select option (yes / no / I don't know) for each support form

	Yes	No	I don't know
42. Differentiated			
43. Personal			

44. Just in time			
45. Multimodal			
46. Tutoring			
47. Training			
48. Couching			
49. Manuals			
50. Guiding tutorials			
51. Videos			
52. Webinars			
53. MOOC			

54. When you need ICT support in your teaching practices how would you like support to be provided
MULTIPLE choice (you can choose more than one preference):

	Selection
Videos	
Manuals	
Chat service	
Short courses	
Workshops	
Tutorials	
FAQ	
Buddy	
Other	

55. If other or anything else, please explain what? Open answer

AVAILABLE DIGITAL RESOURCES

56. What kinds of digital resources do you have at your disposal in your own organization? *MULTIPLE choice (you can choose more than one option):*

Digital resource	***Example***	***Features/purpose***	***Selection***
Learning Management System	Moodle	*Multiple Choice Test (Quizz), Documents Submission (Online Assessment) and Discussion Forums*	
Online platforms for classes/sessions	Zoom, Teams, BigBlueButton	*Sharing video, audio, screen, chat, interactive whiteboard, built-in quizzes, group creation (breakout rooms), attendance and usage reports*	
Online platforms for classes / assignments preparation by students	Perusall	*Reading and uploading files online (text, audio and video), annotations, discussion and collaboration in chat, review of group readings*	
Online resources for group brainstorming and collaborative work	Jamboard	*Creation of multiple interactive whiteboards where several groups can work simultaneously: insertion of images, texts, post-its, symbols, and others*	
Gamification platforms for multiple choice questions in game/competition format	Kahoot!	*Quizzes, individual or group competition*	
Polling tools for varied polls / quizzes throughout the session	PollEverywhere	*Polls, quizzes, individual or group competition*	
Add-on software to include questions in Moodle videos, even if	H5P	*Inserting questions in videos and creating different forms of*	

they are uploaded on Youtube		*interactive presentation*	
Tools for editing video, audio, images, interactive documents	Adobe Creative Cloud	*Video editing/creation: Premiere, After Effects, Media Encoder* *Audio editing: Audition* *Image editing: Photoshop, Illustrator* *Documents: InDesign*	
Other			

57. If Other, please describe. *Open answer*

COMMUNICATION / INTERACTION

Communication and interaction are an important part of learning. Have you experienced differences in communication methods you use in teaching interaction situations during the pandemic? What kind of changes have you encountered, please indicate the level of your agreement?

Likert (1-5)
strongly agree, agree, neither agree or disagree, disagree, and strongly disagree

	Strongly disagree	Disagree	Not agree or disagree	Agree	Strongly agree
58. I interact with students more during the pandemic than before.					
59. I interact more with my peers (other teachers) during the pandemic than before					
60. I interact internationally more during the pandemic than before.					
61. I noticed students interact more with their peers than before					
62. I noticed students interact more with available digital					

teaching material					

ENTREPRENEURIAL TEACHING

(INSTRUCTIONAL TEXT FOR QUESTIONNAIRE REPLICANTS)

ENTREPRENEURIAL TEACHING IN DIGITAL ENVIRONMENT

Entrepreneurship education aims to develop the learner's entrepreneurial knowledge and skills and an enterprising attitude to success in life. Entrepreneurship education utilizes a variety of learning environments, tools, and cooperation outside the educational institution. Teaching emphasises social and professional life skills, entrepreneurial abilities, enterprising capacities for taking initiatives, group working skills, accountability, innovation and creativity, and self-awareness as well as self-efficacy.

	Strongly disagree	Disagree	Not agree or disagree	Agree	Strongly agree
63. I am familiar with Entrepreneurship education					
64. I understand how to apply the entrepreneurial competences into my online teaching					
65. I make entrepreneurial competences an explicit part of learning and assessment in my digital teaching					

66. **I include creative thinking throughout the learning process.**					
67. I encourage students to create value for others through their learning and stimulating reflection					

OPEN ENDED QUESTIONS

68. Describe how digitalization changed your teaching practices?

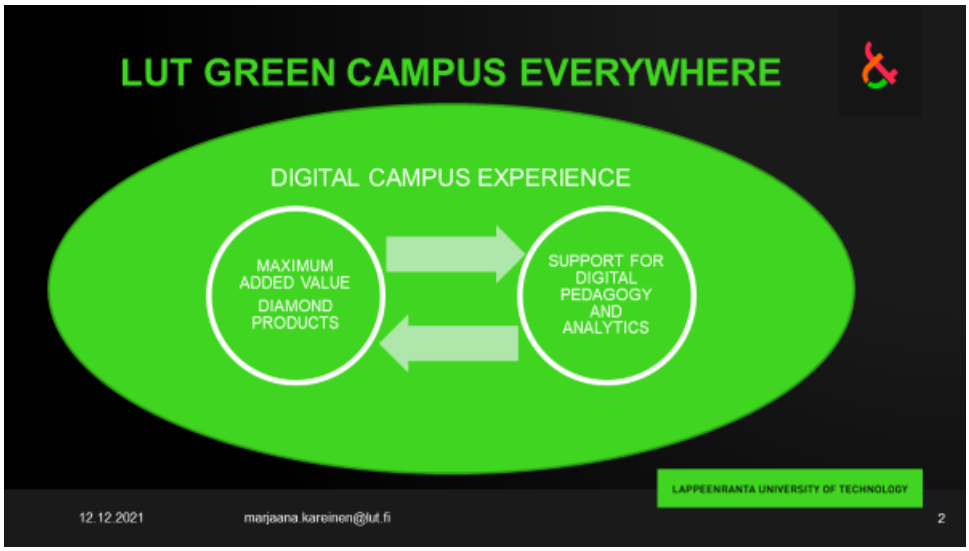
Open answer

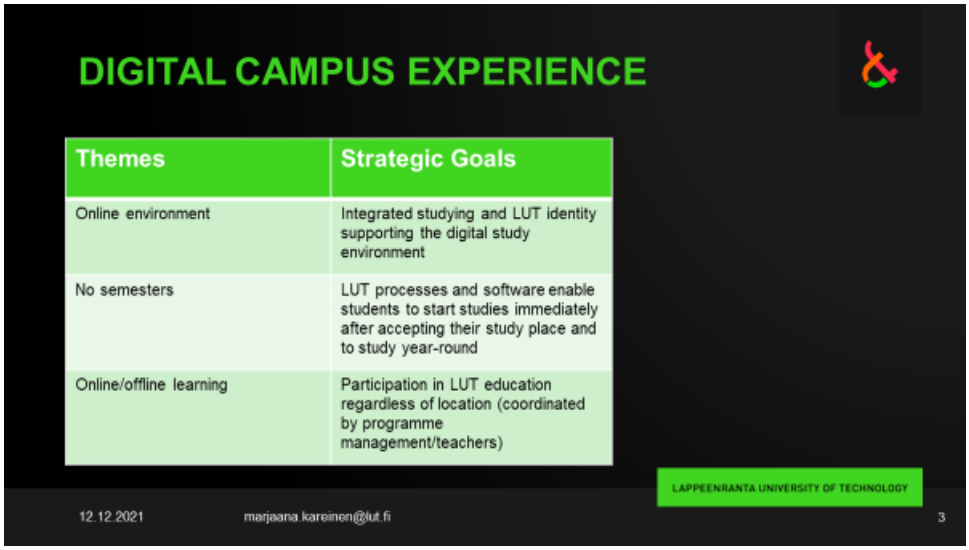
69. Describe your successful experiences in digital teaching (during the pandemic)?
Open answer

70. Describe the challenges you are facing during digital teaching?
Open answer

71. What actions or activities have been used/introduced during the pandemic that you would continue to apply in the post-pandemic period?
Open answer

Annex 2. LUT Digital Strategy of Education 2025





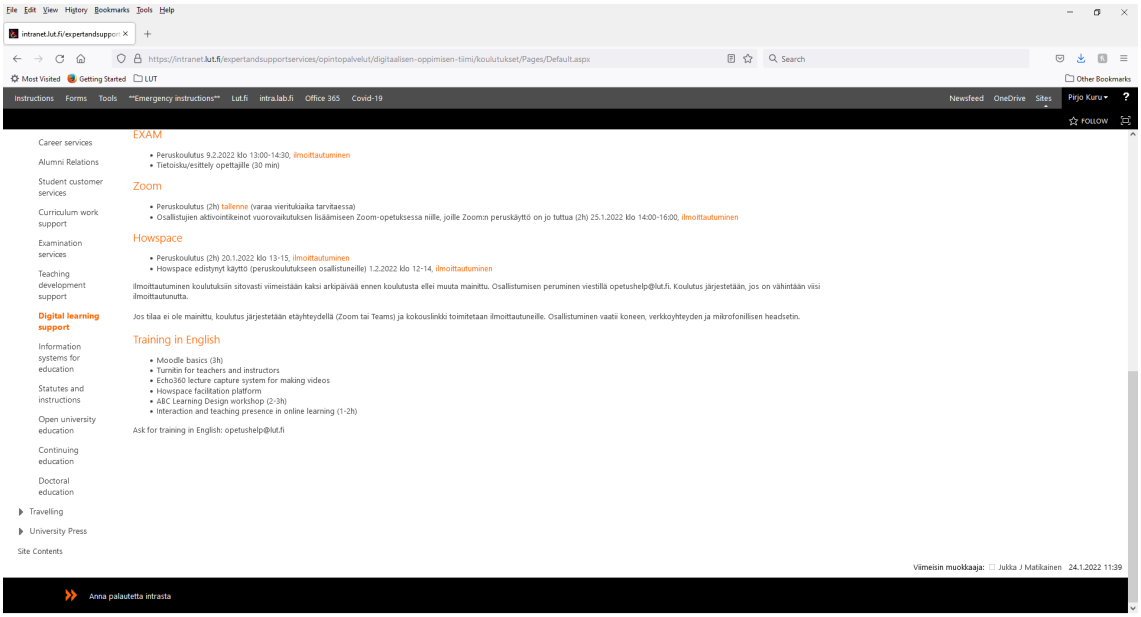
MAXIMUM ADDED VALUE WITH "DIAMOND PRODUCTS"

Theme	Strategic Goals
Online courses	Good quality digitalised "Diamond Products" to assist in scaling the education
Modules	"Diamond Products" used to the maximum in various types of study packages (degrees, add-ons)
Together	Digital realisation together with strategic partners (national and international partners, LUT Group)

DIGITAL PEDAGOGY AND ANALYTICS

Theme	Strategic Goal
Pedagogical support	Quality of "Diamond Products" assured with digital and pedagogical precision support
Analytics	LUT has a unified analytics tool to guarantee the quality and development of teaching

Annex 3. LUT / Digital Teaching help centre website



References

1. Bacigalupo, M., Kampylis P., Punie Y. & Van den Brande, G. (2016). *EntreComp: The Entrepreneurship Competence Framework*, Luxembourg: Publication Office of the European Union; EUR 27939 EN; DOI:10.2791/593884

2. Biggs, J. & Tang, C. (2011). Teaching for Quality Learning at University – What the Student Does? Fourth Edition. McGraw-Hill Society for Research into Higher Education and Open University Press. https://cetl.ppu.edu/sites/default/files/publications/-John_Biggs_and_Catherine_Tang-_Teaching_for_Quali-BookFiorg-.pdf

3. BMC Health (2021). Impacts of COVID-19 and social isolation on academic staff and students at universities: a cross-sectional study. https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-11040-z

4. EC (2018). European COUNCIL RECOMMENDATION of 22 May 2018 on key competences for lifelong learning (Text with EEA relevance) (2018/C 189/01).

5. EntreComp (2021). European Comission. The European Entrepreneurship Competence Framework (EntreComp). https://ec.europa.eu/social/main.jsp?catId=1317&langId=en (referenced 22.01.2021)

6. EntreCompEdu (2021). EntreCompEdu. Entrepreneurship for everyone https://entrecompedu.eu/entrepreneurship-for-everyone/ (referenced 22.01.2021)

7. DigiComp (2021). Digital Competence Framework for Educators (DigiCompEdu). https://ec.europa.eu/jrc/en/digcompedu. (referenced 22.01.2021)

8. Garbuio, M., Dong, A., Lin, N., Tschang, T., & Lovallo, D. (2018). Demystifying the Genius of Entrepreneurship: How Design Cognition Can Help Create the Next Generation of Entrepreneurs. Academy of Management Learning & Education, 17(1), 41–61. https://doi.org/10.5465/amle.2016.004

9. Unesco. Global education monitoring report, 2021/2: Non-state actors in education: Who chooses? Who loses? (GEM Report 2021/2). Corporate author: Global Education Monitoring Report Team. ISBN: 978-92-3-100493-3. https://en.unesco.org/gem-report/

10. Grigg, R. (2021), "EntreCompEdu, a professional development framework for entrepreneurial education", Education + Training, Vol. 63 No. 7/8, pp. 1058-1072. https://doi.org/10.1108/ET-06-2020-0166

11. Hodges, C., Moore S., Lockee B., Trust T. and Bond, A (2020). The Difference Between Emergency Remote Teaching and Online Learning. EDUCAUSE REVIEW. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

12. JISC (2020). The future of assessment: five principles, five targets for 2025. https://repository.jisc.ac.uk/7733/1/the-future-of-assessment-report.pdf

13. Liguori, E. & Winkler, C. (2020). From offline to online: Challenges and opportunities for entrepreneurship education following the COVID-19 pandemic. Entrepreneurship Education and Pedagogy, 3(4), 346-351. https://doi.org/10.1177/2515127420916738.

14. Nikou, S. and Maslov, I. (2021), "An analysis of students' perspectives on e-learning participation – the case of COVID-19 pandemic", International Journal of Information and Learning Technology, Vol. 38 No. 3, pp. 299-315. https://doi.org/10.1108/IJILT-12-2020-0220

15. OECD (2018). The future of education and skills education 2030: The future we want, Resource document. Organisation for Economic Cooperation and Development. from https://www.oecd.org/education/2030/E2030%2520Position%2520Paper%2520(05.04.2018).pdf. Retrieved March 21, 2021

16. OECD (2020), What Students Learn Matters: Towards a 21st Century Curriculum, OECD Publishing, Paris, DOI: 10.1787/d86d4d9a-en

17. OECD (2021), OECD Digital Education Outlook 2021 Pushing the Frontiers with Artificial Intelligence, Blockchain and Robots: Pushing the Frontiers with Artificial Intelligence, Blockchain and Robots, OECD Publishing, Paris, https://doi.org/10.1787/7fbfff45-en

18. Ratten V. & Jones P. (2021). Covid-19 and entrepreneurship education: Implications for advancing research and practice. *International Journal of Management Education,* 21, (1), 100432. doi: 10.1016/j.ijme.2020.100432

19. SOUSA, M.J., CARMO, M., GONÇALVES, A. C., CRUZ, R., MARTINS, J.M. (2018). Creating knowledge and entrepreneurial capacity for HE students with digital education methodologies: Differences in the perceptions of students and entrepreneurs, Journal of Business Research, ISSN 0148-2963, https://doi.org/10.1016/j.jbusres.2018.02.005 (http://www.sciencedirect.com/science/article/pii/ S014829631830081X)

References / Good practices

1. BDP. 2021. Blanced Design Planning. https://learning-design.eu/en/index

2. ENTREASSESS. 2021. EntrePractical Entrepreneurial Assessment Tool for Europe. http://entreassess.com/

3. EntreCompEdu MOOC. 2021. Professional Skills Framework and MOOC, https://entrecompedu.eu/

4. HEInnovate. 2021. https://www.heinnovate.eu/en

5. LUT Digital Strategy of Education 2025 (Annex 2)

6. Rocha, I. & Ceballos, J.C. (2019). What, Why & How. Your Road to Entrepreneurship. Digital and Face-to-Face Programme Guide produced as part of the BLUES project ". Downloadable on Blues website: http://eblues.eu/downloads/

7. Sarmiento, I., Parra, P. & Martinez, S. (2019). "BLUES Multimedia Digital Training". Guide produced as part of the BLUES project. Downloadable on Blues website: http://eblues.eu/downloads/

8. Shnai, I. 2018. Digital Learning Design: From Ideation via TRIZ to Implementation. In: Koziołek S., Chechurin L., Collan M. (eds) Advances and Impacts of the Theory of Inventive Problem Solving. Springer, Cham. https://doi.org/10.1007/978-3-319-96532-1_1.

9. THEI2.0. 2021. Towards HEInnovate2.0: From assessment to action http://www.thei2.eu/

10. UNIPS. 2019. Murtonen, M., Laato, S., Lipponen, E., Salmento, H., Vilppu, H., Maikkola, M., Vaskuri, P., Mäkinen M., Naukkarinen, J., Virkki-Hatakka, T., Pajarre, E., Selänne, S. & Skaniakos, T. Creating a national digital learning environment for enhancing university teachers' pedagogical expertise – The case UNIPS - LUT Research Portal Converis - LUT University https://research.lut.fi/converis/portal/detail/Publication/12912560?auxfun=&lang=en_GB

Disclaimer

Although every effort has been made to provide complete and accurate information, eDESK and its consortium partners make no warranties, express or implied, or representations as to the accuracy of content in this document. Neither eDESK, nor any organization or person acting on its behalf can be held liable or responsible for any error or omissions in the information contained in this publication or for any use that may be made of the information contained in this publication. Online links provided were up-to-date in June 2023. Neither eDESK, nor any organization or person acting on its behalf can be held liable or responsible for any damage resulting from the use of the links, or for the accuracy, legality or content of the websites. The work presented on this document has received funding from the Erasmus+ program of the European Union (Gran agreement N. 2020-1-ES01-KA226-HE-096244.). The European Commission's support for the eDESK project does not constitute an endorsement of the contents, which reflect only the views of the project partners. Therefore, neither the European Commission nor any parties acting on behalf of the European Commission can be held responsible for the use that might be made of this publication.

This document was produced by the eDESK – Digital and Entrepreneurial Skills for Teachers project, within the ERASMUS+ programme.

eDESK
Digital & Entrepreneurial Skills for European teachers

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