

# Piloting Case Studies of Technology-Enhanced Innovative Pedagogies in Four European Higher Education Institutions

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**Abstract:** This study investigates the implementation and effects of innovative pedagogical practices in higher education across four European countries: Croatia, Finland, Portugal, and Spain. The research centres on 40 educators and encompasses a variety of advanced teaching approaches, including flipped classrooms, project-based, problem-based, inquiry-based, and team-based learning. It also assesses the transition to different modes of delivery such as blended, hybrid, and online education, along with the inclusion of entrepreneurial competencies. The primary focus is on understanding educators' experiences and challenges in adopting these innovative methods during and after the COVID-19 pandemic. The research was conducted over the academic year 2022/2023, employing a methodology designed to reflect real-life implementation of redesigned courses. Data were collected through an anonymous feedback survey from educators involved in piloting, which included responses from 90% of the educators. It included the self-reflection of educators based on the documented journals and their summarised view of students' perspectives. Availability of technology and training opportunities for educators enhanced the use of innovative teaching and learning approaches. The results indicate that with appropriate support in redesigning their courses, educators found the innovative approaches to be effective and potentially sustainable.

## 1 INTRODUCTION

Advancements in technology have brought far-reaching impacts to educational delivery. The use of technologies has become essential in a broad range of pedagogical activities and promoted the development of new modes of education. (Wong et al., 2022) review that there has been an increasing trend in the amount of work on hybrid learning and teaching over the past decade. In response to COVID-19 pandemic lockdowns, hybrid learning and teaching have been widely adopted as a substitution for the face-to-face approach. Such a sudden shift in the mode of educational delivery has also contributed to the rapid development of this emerging learning and teaching mode (Li et al., 2023).

On the other hand, the growth of the need to improve entrepreneurship education developing skills necessary for the labour market has challenged educators to reconsider what to teach and how to teach (Canziani et al., 2015; Fiet, 2001), and how to

include innovative teaching and become more entrepreneurial in their teaching (Peltonen, 2015).

Research results presented here were conducted during 2022 and 2023 within Erasmus+ project e-DESK – Digital and Entrepreneurial Skills for Teachers implemented in the period 2021-2023. Its main objective was to provide European HE educators with the required digital skills and entrepreneurial mind-set to succeed in the 21st century teaching environment. The project included the expertise of four European universities (University of Cantabria (UC), NOVA University of Lisbon (NOVA), University of Zagreb (UZ), Lappeenranta-Lahti University of Technology (LUT)) and the International Entrepreneurship Centre of Santander (project coordinator) in online training, curricula design and entrepreneurship education.

(OECD, 2009) states that it is useful to distinguish between teaching competences and educator competences and understanding the importance and the necessity of both for the 21st century educators and e-

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DESK project was focused on the innovative combination of the established pedagogies (Peterson et al., 2018) as active learning accelerators, as well as a successful enabler for the development of digital and entrepreneurship skills of educators described in the EntreComp (Bacigalupo et al., 2016), a common reference framework that identifies 15 entrepreneurial competences in 3 key areas. The novelty within the project was based on the goal to research and pilot how the development of entrepreneurial competences can be integrated in teaching and learning activities using novel pedagogical approaches. At the beginning of the e-DESK in 2021 the state-of-the art survey was performed among educators from the e-DESK partner countries to find out more about the experiences of HE educators with the shift to digital teaching during the COVID-19 pandemic (Svetec et al., 2022). The study found the portion of educators fully using ICT was almost three times higher than before the pandemic but also that some innovative pedagogies were not used to their full potential. About more than a half participants (56.3%) found their organization needed to offer more support to improve online teaching.

Since designing, implementing, and assessing learning experiences in hybrid, blended, or fully online delivery modes can be a transformative journey for both educators and students if it goes hand in hand with implementation of innovative pedagogies, e-DESK offered key considerations and strategies for designing effective learning experiences, successful implementation, and monitoring with respect that successful implementation requires continuous reflection, adaptation, and improvement (e-DESK, 2023).

Also, the project was delivered within the acknowledgement that as education continues to evolve, it is essential to embrace the possibilities offered by hybrid, blended, and fully online delivery modes since these modes provide opportunities for personalized learning, collaboration, and self-directed exploration.

(OECD, 2022) reports that a lack of ICT skills continues to be one of the key barriers keeping people from fully benefiting from the potential of digital technologies, including opportunities for online learning. Most OECD countries found resources to purchase digital tools for in-classroom and remote learning and to train educators in their use which was a big step in the right direction, but they did not go far enough. To fully benefit from digitalisation, the innovation culture must be strengthened in education.

Based on the objectives of the e-DESK project and performed activities, the aim of the study is to answer the following research questions: RQ1: What is the experience of educators introducing innovative pedagogies during and post-COVID higher education (HE)?; RQ2: Did available technology and professional development increase the use of innovative teaching approaches and/or vice versa? RQ3: Were there any country-related differences in reported piloting experiences?

## 2 BACKGROUND

As seen by (Pischetola, 2022) the sudden digitalisation that occurred with the COVID-19 pandemic has shown us that one of the most complex and daunting challenges for HE educators is managing the ongoing transformation of learning environments.

This entails identifying emerging technologies and platforms (EdTech) with potential relevance for teaching and customisation and providing students with high-quality learning experiences (Rapanta et al. 2020; Ní Shé et al., 2019). It also requires institutional and organizational strategies to foster educator sensitivity to expanded possibilities beyond space-time boundaries (McGregor, 2003) and conventional face-to-face lectures (Hodges et al., 2020).

What regards the modes of delivery, as analysed by (Ulla and Perales, 2022) the literature presents no clear definition of hybrid teaching, its differences from other modes of lesson delivery (e.g., blended learning), and how such teaching methodology was conducted in the teaching and learning environment, especially during the COVID-19 pandemic. Very often studies used the concept of hybrid interchangeably with blended learning (O'Byrne and Pytash, 2015; Klimova and Kacetl, 2015; Solihati and Mulyono, 2017; Smith and Hill, 2019), emphasizing the combination of classroom instruction with online instruction. However, in the context of e-DESK project we distinguish between hybrid, blended and online learning, in line with (Svetec et al., 2022) where hybrid mode of teaching considers that students are simultaneously present in the same classroom, either physically or remotely. It means that an educator is working simultaneously with a group of students physically present in a classroom, and those present remotely via a conferencing system.

The use of innovative pedagogies hand in hand with the hybrid and fully online teaching was of particular interest during the pandemic. For innovative pedagogies such as flipped classroom

(FC), literature findings indicated that those who had used FC 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 (Divjak et al., 2022).

Furthermore, in the context of e-DESK project, hybrid learning modes and active learning methods that ask students to engage in their learning by thinking, discussing, investigating, and creating and where they practice skills, solve problems, make decisions, propose solutions is important for the development of entrepreneurial competences. (Joensuu-Salo et al., 2021) state that educators, as entrepreneurship educators, are acknowledged to play a significant role in developing entrepreneurial ways of thinking and acting in students.

Therefore, and based on EntreComp framework, project e-DESK created a free and open e-DESK MOOC in 10 units aiming to support educators on the development of digital and entrepreneurial competences for the implementation of digital tools, and innovative pedagogical techniques in their classrooms. During 2022, 40 educators from e-DESK partner institutions used this MOOC to prepare themselves for the piloting of redesigned courses: <https://edeskeurope.eu/e-desk-mooc/>.

### 3 PILOT METHODOLOGY

#### 3.1 Sampling and Instrumentation

The main aim of the e-DESK piloting performed during the academic year 2022/2023 was to experiment with the methodology developed within the project in real-life educational situations.

The educators were selected at partner institutions in a piloting group helping the e-DESK team validate the methodology and training scheme (e-DESK MOOC) developed for this project. The selection process was conducted as an open call for all interested educators. The suggested optimal number was 10 educators/pilots per involved educational institution (4).

The piloting data collection instrument was developed (recommended diary and final survey, both for qualitative and quantitative data collection) within project partner meetings and tested on a small sample.

The piloting was divided into three different phases focused on: preparation of the learning design (Phase 1), support in the delivery and monitoring of the designed courses (Phase 2), and guidance through the evaluation and reporting of the experience (Phase 3). Educators were supported in their design and

implementation work within regular workshops and meetings at the beginning/end of each phase, as well as via e-DESK MOOC.

#### 3.2 Demographic Features

The piloting data was collected anonymously after the piloting and received from 90% of the educators involved in piloting (36/40). It included 10 responses from LUT (Finland), 9 from NOVA (Portugal), 6 from UC (Spain) and 11 from the UZ (Croatia). (see 4.3)

The piloting courses were planned (Phase 1) using the following methods/tools: 20 Balanced Design Planning (BDP) learning design tool, 10 spreadsheet planning, 4 other design tools, 2 without design tools. Within 36 pilots the educators reported the following modes of delivery: 51 blended deliveries, 46 hybrid, 16 fully online and 10 other modes of delivery (see 4.2).

In addition, different methodological approaches have been implemented in the pilots: 21 reported entrepreneurial competencies development, 19 flipped classroom method, 17 project-, 19 problem-based learning, 27 team-based learning while 10 included inquiry-based learning and 10 other (e.g. Joint Creative Classrooms, Gamification Labs) approaches. Regarding the number of the involved educators and students: besides the responding educator, each pilot mainly (n=17) involved 1 additional educator, 9 pilots were performed by a single educator, 7 with 3 educators, and there were 1 pilot examples with 4, 5 and 5+ educators; all courses together included more thousands of students in the following ranges: 4 courses with 6-10 students, 3 with 11-15 students, 5 with 16-20 students, 6 with 20-30 students, 11 with 30-100 students, 6 with 100-300 students and 1 course with 300+ students.

#### 3.3 Data Collection

Data was collected in the academic year 2022/2023 with the Ethical Approval of the Ethical Committee of the Faculty of Organization and Informatics, University of Zagreb. The instrument was used for final data collection and was distributed electronically by each project partner among their educators. The conducted research was not experimental design research and therefore it did not include a control group.

##### 3.3.1 Qualitative Data

Educators were instructed to take journal notes on how they have proceeded in the learning design process (Phase 1). The process included the selection

of the suitable course or course part and topic(s), selecting and better defining the learning outcomes, used technologies, delivery modes etc. Also, they were advised to make notes about the experience in using the e-DESK MOOC and learning design tools.

During the implementation (Phase 2), educators took notes on how designed activities succeeded (e.g. did the technology and delivery mode work as planned, did the planned assignments work as planned, were the learning outcomes achieved and what feedback came from students to educator(s)).

### 3.3.2 Quantitative Data

Qualitative data included student grades (where available) and the digital footprint in LMS (participation, engagement, time-on-task, the number of students taking part in activities). In some cases, it included the questionnaires for students, with close- and open-ended questions, related to course delivery.

The data was collected and analysed (Phase 3) in collaboration and with the guidance of the institutional project coordinator. The reporting process, important to close the improvement cycle, was done using an online questionnaire (see 4 Results) which guided educators to summarize specific quantitative and qualitative data collected and prepared throughout the piloting.

## 4 RESULTS

In this study, we focus on educators' perspective within e-DESK piloting, taking into account the different national contexts and teaching areas in which the pilots were performed.

The results include the analysis of the answers from 36 pilots (90% of all included) provided by educators involved in the pilot. Since the context of the project allowed that one educator performs multiple different pilots, the feedback was gathered by pilots (redesigned courses) and not by educators. Besides general questions about the institution, modes of course delivery, course planning tool and used innovative approaches, the instrument included 12 statements developed by the e-DESK project team. The answers were collected as the feedback based on the Likert scale (5 Fully Agree -1 Fully Disagree). Educators' answers were based on their monitoring of a learning design orchestration.

### 4.1 General Results

The following overall feedback was received:

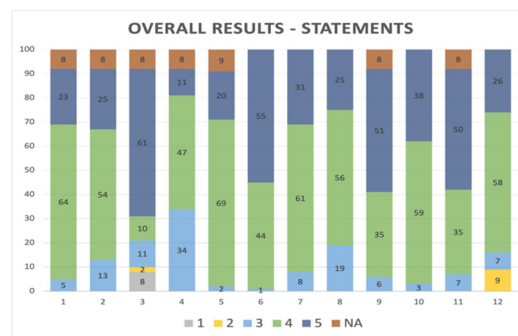


Figure 1: Overall results (%).

Statement 1 - *I defined the learning outcome for pilot delivery without significant difficulties*: 64% educators agree and 23% fully agree with the statement.

Statement 2 - *I adapted teaching and learning activities to align with pilot goals without significant difficulties*: 54% of educators agreed and 25% fully agreed with the statement.

Some negative answers were received within statement 3 - *I had sufficient access to technical infrastructure within my University/department*: 8% of educators completely disagreed and 2% disagreed. However, 61% of educators fully agreed with the statement, only 10% agreed with the statement while 11% neither agreed nor disagreed. Further research revealed that the disagreement is mostly present in one organization while other educators have positive experiences.

Regarding students' perspective: in statement 4 - *I perceived the students' engagement in the chosen mode of delivery higher than before*: 34% of educators stated that they neither agree nor disagree and 47% stated that they agree while 8% of them find the statement not applicable. Further, within statement 7 - *I perceive this pilot supported my students in better achieving intended learning outcomes*: 61% of educators agreed with the statement and 31% fully agreed. Very similarly within statement 8 - *I perceive the interest of my students towards the piloted subject has increased*: 56% of educators agreed and 25% fully agreed with the statement while 19% of them neither agreed nor disagreed.

Within statement 5 - *I find the support for pilot delivery provided within e-DESK MOOC useful*: 69% agreed with the statement, 20% fully agreed while 2% neither agreed nor disagreed or found the statement not applicable (9%).

What regards educators' future intentions: within statement 6 - *I find this pilot helpful for my future teaching delivery*: 55% of educators fully agreed,

while 44 agreed, and 2% neither agreed nor disagreed. Further, within statement 9 - *I am planning to include this delivery mode in my future teaching*: 51% of educators fully agreed, 35% agreed while others neither agreed nor disagreed (6%) or found the statement not applicable (8%). In further research results (below) we state the distribution of future intentions of the included educators by delivery modes.

Regarding the pilot success and relevance, within statement 9 - *I find the pilot overall successful*: 58% of educators agreed and 38% fully agreed with the statement. Very similarly, within statement 11 - *I find this pilot relevant to my institution*: 54% of educators fully agreed and 39% agreed.

Finally, the educators were asked to provide feedback on the requested workload within statement 12 - *I find my workload invested into this pilot justified by the results*. Although 9% disagreed with the statement, 26% of educators completely agreed and 58% agreed.

## 4.2 Results per Delivery Mode

The educators included in the piloting were free to decide which of the recommended delivery modes they piloted and their choice was based on their personal and institutional preferences.

### 4.2.1 Blended

The piloting experiment included 51 blended experiences, 30 of which have been planned within a collaborative BDP tool, 13 by using spreadsheet planning and 8 by using other design tools.

Regarding the included competences or new pedagogical approaches, the educators reported the use of: 9 developing entrepreneurial competencies, 10 FC, 6 Inquiry-based learning, 8 problem-based learning, 5 project-based learning, 11 team-based learning and 2 other. All approaches were more or less used by educators from all involved institutions with the exception of the educators from NOVA that minimally used FC and inquiry-based learning (1 example).

The institutions using a blended mode of delivery included: UZ (17), LUT (16), UC (15) and NOVA (3) with the following number of educators: the majority of courses included 2 (23) and 3 educators (12) or single educator (9), and other courses had 5 (3) or 6+ educators (4). Regarding the class sizes: 14 deliveries included 100-300 students, 16 included 30-100, 5 included 16-20, 6 included 20-30, and 10 included 6-10 students.

Educators reported great satisfaction that the workload invested into this pilot was justified by the results: 10% fully agreed, 75% agreed and 15% neither agreed, nor disagreed; as well as high level of the intention of further use of blended delivery since 49% of educators reported to fully agreed and 31% agreed to continue with blended delivery.

### 4.2.2 Hybrid

The piloting experiment included 52 hybrid experiences, 30 of which have been planned within a collaborative BDP tool, 20 by using spreadsheets for planning and 2 without a tool.

Regarding the included competences or new pedagogical approaches, the educators reported: 7 developing entrepreneurial competences, 8 FC, 3 inquiry-based learning, 9 problem-based learning, 9 project-based learning, 11 team based learning and 5 other, not listed.

Institutions using hybrid mode of delivery included: UZ (24), NOVA (20), UC (6) and LUT(2) while the majority of courses included 2 and 3 educators (17) or single educator (11), and other courses had 4 (3) or 6+ educators (4).

Hybrid teaching was not dependant on the class size since in 3 deliveries 300+ students were involved, in 6 deliveries 100-300, in 13 deliveries 30-100, in 9 deliveries 16-20, in 8 deliveries 23-30 in 4 deliveries 11-15 and in 3 deliveries 6-10 students.

What regards the educator satisfaction about the workload invested into hybrid pilot justified by the results: 52% fully agreed, 40% agreed and 8% neither agreed, nor disagreed which is in line with the intention to further use the hybrid teaching since 62% of educators fully agreed that they are planning to include hybrid delivery mode in their future teaching, 23% agreed and 6% neither agreed nor disagreed with the statement. Others found the statement not applicable (9%).

### 4.2.3 Online

The piloting experiment included 17 fully online experiences, 15 of which have been planned mainly planned within a collaborative BDP tool (15). Regarding the included competences or new pedagogical approaches, the educators reported: 4 developing entrepreneurial competences, 2 Inquiry-based learning, 2 problem-based learning, 2 project-based learning, 3 team based learning and other 4. Educators did not report the use of flipped classroom method in fully online teaching.

Institutions using a fully online mode of delivery included: LUT (12), UZ (4) and NOVA (1). The

educators from UC did not report using a fully online mode of delivery.

The majority of courses included 1 educator (10) or 2 educators (6), and only 1 course reported 3 included educators. There were no fully online courses with 4 or more educators with the following number of students - 1 course included 100-300 students, 5 included 30-100 students, 4 included 20-30 students and there were 7 courses with 11-15 students. The fully online teaching was not used with 300+ groups nor with the groups including 10 or less students.

The educators fully agreed that the workload invested into the online was justified by the results (12%), or agreed (59%), while 6% neither agreed, nor disagreed and 23% disagreed.

Despite high disagreement with the workload, 59% of educators reported to fully agree and 41% agree to deliver online teaching in future.

#### 4.2.4 Other

The educators in piloting experiment from UZ (4) and UC (6) also reported the use of other modes of delivery, usually together with the above listed options (e.g. gamification labs, technology enhanced learning...) These courses mainly included 2 (6) or 1 educator (4) and smaller groups of students (20-30 - 6 courses; 6-10 - 4 courses).

What regards the included teaching methods, the piloting experiences were diverse: 1 included developing entrepreneurial competences, 2 flipped classroom, 1 problem-based, 2 project based and 3 team-based teaching and learning. These courses were planned by use of BDP tool (4), other design tools (4) or without a tool (2).

All educators (100%) agreed that they will continue to practice that kind of teaching.

### 4.3 Results per Institutions

Overall, the educators from LUT, Finland (n=10) created 30 piloting experiences and found the piloting experience positive. The statement where they disagree most is statement 4 - *I perceived the students' engagement in chosen mode of delivery higher than before* where the majority of educators (66%) neither agree nor disagree while 33% agree. Regarding further use, 53% of LUT educators fully agree and 40% agree that they are planning to include piloted delivery mode in their future teaching. The educators from LUT were mainly (53%) using blended delivery mode and online mode (40%) with the following learning approaches: Developing entrepreneurial

competences (30%), team-based learning (27%), problem-based learning (13%) and inquiry-based learning (10%). Only in one piloting experience (3%) they used the flipped classroom approach. Regarding the learning design of the piloted courses, 87% of the educators from LUT reported to have used the BDP collaborative design tool, and 13% to have used other design tools.

Educators from FOI, Croatia (n=11) created 49 piloting experiences and were the most positive with the piloting experience and the most positive in statement 3 - *I had sufficient access to technical infrastructure within my University/department* where 78% of educators fully agreed while 2% agreed and 10% found the statement not applicable. Regarding further use, in 43% of piloting experiences educators fully agreed and in 37% agreed that they are planning to include piloted delivery mode in their future teaching while 20% consider the statement not applicable. Educators from FOI reported to use all delivery modes: hybrid (49%), Blended (35%), online (8%) and other (8%) combined with the following innovative approaches: problem (20%) and project based learning (20%), flipped classroom (16%), team-based learning (16%), inquiry based learning (12%), developing entrepreneurial competences (8%).

Educators from UC Spain (n=6) created 27 piloting experiences and also expressed very positive and useful piloting experience with unanimous agreement within statement 12 - *I find my workload invested into this pilot justified by the results*. However, although the piloting instructions, as well as e-DESK MOOC included the strong suggestion for educators to use a learning design tool (e.g. collaborative BDP tool), only 33% of piloting experiences designed by the educators from Spain was designed via a design tool (and never via a collaborative BDP tool). Regarding further use the educators from Spain were extremely positive and 60% of them fully agreed and 40% agreed that they are planning to include piloted delivery mode in their future teaching. They reported the use of the following delivery modes: blended (56%), hybrid (22%) and other (22%) combined with the following innovative approaches: flipped classroom (30%), team-based learning (22%), developing entrepreneurial competences (11%), problem (11%) and project based learning (11%), as well as inquiry (3%) and other (Technology Enhanced Learning, Gamification) approaches (11%).

Educators from NOVA, Portugal (n=9), although giving very positive feedback on most of the statements, 50% disagree with the statement 3 - *I had*

sufficient access to technical infrastructure within my University/department. Also, they show strong agreement with statement 6 - *I find this pilot helpful for my future teaching delivery* and statement 9 - *I am planning to include this delivery mode in my future teaching*. Only 17% of piloting experiences by NOVA educators were designed with the support of the tool (collaborative BDP tool).

Regarding further use, in 58% of piloting experiences educators fully agreed and in 17% agreed that they are planning to include piloted delivery mode in their future teaching.

Also for 63% piloting experiences educators fully agreed and for 27% agreed that the workload invested into pilot was justified by the results. Educators from Portugal reported the following deliveries: blended (13%), hybrid (83%) and online (4%) combined with the following innovative approaches: flipped classroom (13%), team-based learning (25%), developing entrepreneurial competences (21%), problem (13%) and project based learning (17%), as well as inquiry (4%) and other approaches (8%).

## 5 DISCUSSION

Considering the above presented results, and regarding the RQ1 it is evident that the educators and institutions have made a successful effort at planning and piloting their courses in including innovative pedagogies, and supporting development of digital and entrepreneurial skills of educators and students.

The educators followed all planned implementation phases, gathered quantitative and qualitative data about the orchestration of a learning design, as well as about the student satisfaction and achievement of learning outcomes, and provided feedback on their experience. The results confirmed that the guidance provided within the e-DESK project and the peer support had a positive impact on the educators' satisfaction and they expressed that the piloting experience helped them deciding to include innovative pedagogical methods and non-traditional modes of delivery in their future teaching. It seems that provided training made them comfortable with the use of learning outcomes and constructive alignment (Biggs, 1996) in LD, which have been recognized as challenging for educators (Goodyear, 2020).

Furthermore, the positive attitude of the educators reflects in the fact that 86% of them in total perceived the invested efforts being justified by the results, but also that they planned to use innovative approaches

and technology-supported delivery mode in the future.

Structured feedback on the learning design related to the intended learning outcomes was available only to those educators using the planning tools (70%). As stated above, the educators were encouraged to use such tools and especially the collaborative BDP tool (RQ2).

Croatian educators reported the highest satisfaction with technical infrastructure, the highest satisfaction with the pilots, as well as the willingness to use new approaches in the future. This supports the claim that infrastructure and peer-learning is a necessary condition for pedagogical innovation and sustainability (Rapanta et al., 2021)(RQ2).

Regarding RQ3, this piloting confirmed once again that the education innovation is both a pedagogic and organizational challenge approached differently in different countries (OECD, 2016).

Related to the mode of delivery, blended and hybrid were more popular choices than fully online. This is in line with the institutional strategies because involved institutions are primarily campus-based and encourage technology-enhanced teaching and learning. There are country-related differences with Finnish educators preferring online delivery while the hybrid delivery was mainly used by educators from Croatia (RQ3).

Educators used a variety of pedagogical approaches, mostly flipped classroom (FC), project-, problem-, team- and inquiry-based learning. Interestingly, educators did not report the use of FC in online delivery while FC was a very popular choice in blended and hybrid delivery. This can be linked to the earlier research results (Divjak et al., 2022) or due to teaching tradition at an institution and previous training in certain pedagogical approaches required by institutional or national authorities (RQ3). Finally, the highest level of satisfaction with the results, as well as with the workload invested into this pilot, expressed the educators with hybrid delivery experiences.

Differences regarding the organizational support relate to the conclusion of the (Svetec et al., 2022) conducted within e-DESK prior to the piloting stating more than a half (56.3%) found their organization needed to offer more support to improve online teaching. Within this research, the participants from Portugal reported that the received access to the needed institutional infrastructure did not meet their expectations while other participants mainly agreed about the sufficient access to technical infrastructure within their institutions. The limitation of the research is that the sample is too small to generalize but it will

be useful in future research to relate the level of support and infrastructure availability to the use of mode of delivery.

Furthermore, regarding the students' engagement being higher than before course re-design, the majority of educators from Finland (80%) neither agreed nor disagreed with the statement, while the educators from other countries mainly reported agreement with the statement. The answers to this statement were based on students' questionnaires and sometimes on the educators' personal observations and prior teaching experience. This means evaluations were also dependent on the usual levels of students' engagement in different national education systems, as well as on their prior experience with different teaching modes and innovative teaching approaches. Further, since there was no unified student satisfaction survey created within the e-DESK project, it can be considered as a limitation since the student experience data was gathered by educators according to their preferences. Moreover, preferences and willingness to use structured approach to learning design also varied (RQ3). The acceptance of the BDP tool was the highest in Croatia and Finland and the lowest in Spain and Portugal. These differences can be rooted in the institutional approaches to learning design and recommended tools at different institutions. On the other hand, explicitly recognizing development of entrepreneurial competences was the highest among the educators from Finland and Portugal and reason might be in previous stronger promotion of their importance on institutional level. However, one of the e-DESK project goal was to strongly promote the fact that the entrepreneurial competences can be developed by use of innovative pedagogical approaches (e.g. problem-, project and team-based learning) and we can notice that there are many learning designs that incorporated both.

To summarize, the limitation of this research include the size of the sample since larger sample and a wider range of participants may have elicited different results. Furthermore, collecting more data directly from the students about the quality of learning design and implementation of new pedagogical approaches, as well as about the students' grades might shed more light on the results and interpretation of it.

Finally, studying organizational culture and in-depth analysis of infrastructure availability and opportunities for professional development can more firmly support claims related to RQ2. These limitations can also pave the avenues for further research.

## 6 CONCLUSION

This study sheds light on the integration of innovative technology-enhanced pedagogical practices and especially those that support development of entrepreneurial competences (e.g. project-based learning, team work) in HE within four European countries.

The experiences of educators in transitioning to hybrid, blended, or online modes of delivery reveal advancements in achieving learning outcomes and generating student interest for their courses. However, challenges persist in enhancing active student engagement through these innovative methods. Educators preferred blended and hybrid modes of delivery to fully online or face to face.

A key finding is the positive impact of structured support, including professional development and learning design planning tools, on educators' willingness to embrace and sustain new teaching approaches. The variations in preference for delivery modes among institutions highlight the importance of contextual factors, such as institutional strategy, peer learning and technical infrastructure, in the successful adoption of these methods.

While the study identifies a general readiness among educators to continue using innovative approaches, it also underscores the need for continued support and respected resources to ensure long-term sustainability and effectiveness of innovations.

Future research should focus on expanding the scope of participants and incorporating more detailed analyses of organizational culture and infrastructure, which are crucial in understanding the dynamics of pedagogical innovation in HE.

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## REFERENCES

- Bacigalupo M, Kampylis P, Punie Y and Van Den Brande L. (2016) *EntreComp: The Entrepreneurship Competence Framework*. EUR 27939 EN. Luxembourg (Luxembourg): Publications Office of the European Union; 2016. JRC101581



- Biggs, J. (1996). Enhancing teaching through constructive alignment. *Higher Education* 32, 347-364
- Canziani B, Welsh DHB, Hsieh Y, et al. (2015) What pedagogical methods impact students' entrepreneurial propensity? *Journal of Small Business Strategy* 25(2): 97–113.
- 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.
- Divjak, B., Rienties, B., Iniesto, F., Vondra, P., & Žizak, 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. <https://doi.org/10.1186/s41239-021-00316-4>
- eDESK Toolkit/Guide for Educators. (2023) <https://edeskeurope.eu/edesk-tools/>
- Fiet J. (2001) The pedagogical side of entrepreneurship theory. *Journal of Business Venturing* 16: 101–117.
- Goodyear, P. (2020), Design and co-configuration for hybrid learning: Theorising the practices of learning space design. *Br J Educ Technol*, 51: 1045-1060. <https://doi.org/10.1111/bjjet.12925>
- Hodges, C., Moore, S., Locke, B., Trust, T., & Bond, A. (2020). The difference between emergency remote teaching and online learning. *Educause Review*, 27 March. <https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning>.
- Joensuu-Salo, S., Peltonen, K., Hämäläinen, M., Oikkonen, E., & Raappana, A. (2021). Entrepreneurial teachers do make a difference – Or do they? *Industry and Higher Education*, 35(4), 536-546. <https://doi.org/10.1177/095042220983236>
- Klimova, B. F., and Kacatl, J. (2015). Hybrid learning and its current role in the teaching of foreign languages. *Proc. Soc. Behav. Sci.* 182, 477–481. doi: 10.1016/j.sbspro.2015.04.830
- Li KC, Wong BTM, Kwan R, Chan HT, Wu MMF, Cheung SKS. (2023). Evaluation of Hybrid Learning and Teaching Practices: The Perspective of Academics. *Sustainability*; 15(8):6780. <https://doi.org/10.3390/su15086780>
- Mcgregor (2003). Making Spaces: teacher workplace topologies. *Pedagogy, Culture and Society*, 11(3), 353-377. <https://doi.org/10.1080/14681360300200179>.
- Ní Shé, C., Farrell, O., Brunton, J., Costello, E., Donlon, E., Trevaskis, S., & Eccles, S. (2019). Teaching online is different: critical perspectives from the literature. Dublin: Dublin City University.
- O'Byrne, W. I., and Pytash, K. E. (2015). Hybrid and blended learning. *J. Adolesc. Adult Lit.* 59, 137–140. doi: 10.1002/jaal.463
- OECD. (2009). *Creating Effective Teaching and Learning Environments. First Results from TALIS*. Paris: OECD. <http://www.oecd.org/dataoecd/17/51/43023606.pdf>
- OECD (2016), *Innovating Education and Educating for Innovation: The Power of Digital Technologies and Skills*, OECD Publishing, Paris. <http://dx.doi.org/10.1787/9789264265097-en>
- OECD (2022), *Education at a Glance 2022: OECD Indicators*, OECD Publishing, Paris, <https://doi.org/10.1787/3197152b-en>.
- Peltonen, K. (2015) How can teachers' entrepreneurial competences be developed? A collaborative learning perspective. *Education + Training* 57(5): 492–511.
- Peterson, A., et al. (2018), "Understanding innovative pedagogies: Key themes to analyse new approaches to teaching and learning", OECD Education Working Papers, No. 172, OECD Publishing, Paris, <https://doi.org/10.1787/9f843a6e-en>.
- Pischetola, M. (2022) Teaching Novice Teachers to Enhance Learning in the Hybrid University. *Postdigit Sci Educ* 4, 70–92. <https://doi.org/10.1007/s42438-021-00257-1>
- Rapanta, C., Botturi, L., Goodyear, P., Guàrdia, L., & Koole, M. (2020). Online University Teaching During and After the Covid-19 Crisis: Refocusing Teacher Presence and Learning Activity. *Postdigital Science and Education*, 2(3), 923–945. <https://doi.org/10.1007/s42438-020-00155-y>
- Smith, K., & Hill, J. (2019). Defining the Nature of Blended Learning through Its Depiction in Current Research. *Higher Education Research & Development*, 38, 383-397. <https://doi.org/10.1080/07294360.2018.1517732>
- Solihati, N., and Mulyono, H. (2017). A hybrid classroom instruction in second language teacher education (SLTE): a critical reflection of teacher educators. *Int. J. Emerg. Technol. Learn.* 12, 169–180. doi: 10.3991/ijet.v12i05.6989
- Svetec, B., Oksanen, L., Divjak, B. & Horvat, D. (2022). Digital Teaching in Higher Education during the Pandemic: Experiences in Four Countries. in: Vrček, N., Guàrdia, L. & Grd, P. (ur.). *Proceedings of the 33rd Central European Conference on Intelligent Information Systems (CECIIS)*.
- Ulla MB and Perales WF (2022) Hybrid Teaching: Conceptualization Through Practice for the Post COVID19 Pandemic Education. *Front. Educ.* 7:924594. doi: 10.3389/educ.2022.924594
- Wong, B.T.M.; Li, K.C.; Chan, H.T.; Cheung, S.K.S. The publication patterns and research issues of hybrid learning: A literature review. In *Proceedings of the 8th International Symposium on Educational Technology*, Hong Kong, China, 19–22 July 2022; pp. 135–138.