IO3 Report

EXECUTIVE SUMMARY

The UpDATE project, funded by the Erasmus+ program, is centered on innovating methodological and technological solutions for professional learning, especially in practical and manual activities. The project emphasizes the enhancement of digital and didactic competencies among trainers to maximize the potential of Distance Learning and enrich the blended didactic approach. Partners involved include ENAIP, VIRSABI, VIKK, and Hellenic Open University.

The document discusses a strategic and operational plan aimed at integrating the experiences from the project into everyday professional practices. It highlights the ambition to contribute to the debate on adopting sustainable, scalable digital solutions and ethical principles in artificial intelligence and data use in education.

The document serves as a comprehensive resource for stakeholders, offering insights into the design, feasibility, and sustainability of integrating digital solutions in vocational education. It highlights the strategic value of investing in digital learning platforms, virtual and augmented reality, data analytics, and industry-specific simulations to prepare a future-ready workforce.

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Plan for the Integration of New Technologies in Teaching Activities

Introduction

Plan for the Integration of New Technologies in Teaching Activities

UpDATE is a project funded by the Erasmus + program aimed at developing innovative methodological and technological solutions, which are sustainable and integrate into learning-professional development contexts; involving mainly practical and manual activities, and increasing the digital and didactic competences of the trainers; to enhance the potential of distance learning, and enrich and integrate face-to-face training (blended didactic). The partners involved in the project are:

- ENAIP - Ente Nazionale Acli Istruzione Professionale (Italy) is a non-profit association, which operates at a national and international level, with initiatives addressed to youngsters, workers, and companies, and has been legally recognised since 1961.
- VIRSABI (Denmark). A technology house of developers and creatives, and one of the first Virtual Reality dedicated companies, offering business consultancy, advisory work and technical development for the utilization of Virtual Reality, Augmented Reality and Mixed Reality.
- VIKK - Viljandi Vocational Training Centre (Estonia), is a school which trains students to Lvl. 4 EQF in more than 20 different professions. Cooperating with local enterprises and other VET institutions both in Estonia and across Europe.
- Hellenic Open University (HOU) is the only Greek State University that offers formal and non-formal lifelong education, in both undergraduate and postgraduate levels, to more than 40.000 students who are dispersed all over the country.

The results developed by the project are: transnational research, focused on the best practices in digital teaching and learning; a blended course addressed to trainers and teachers; and a plan for the integration of new technologies in teaching activities.

This document refers to the the third aspect, the plan, and its purpose is to outline strategic and operational indications to integrate what has been experienced by the daily professional practices of the organizations involved; and to suggest a possible development path addressed to VET providers and schools that feel the need to innovate their practices and moreover their digital ecosystem in general. For this reason, teachers, trainers and tutors are encouraged to read and take suggestions from this document.

The ambition of this plan is to contribute to the debate by enhancing the capability of VET organizations and schools to adopt sustainable and scalable digital solutions; embracing ethical principles for the utilization of artificial intelligence and gathered data in the context of education and learning and promoting lasting research, training and innovation. Through the execution of the suggestions provided in this plan, substantial strides can be achieved in the incorporation of new technologies into teaching practices, thereby improving educational quality and equipping educators and institutions for the evolving digital landscape.

This report will present:

- the blended course and its architecture to support constant learning of teaching / training professionals (chapter 1);
- the feasibility analysis to support integration regarding pedagogical, organizational, technical and financial items (chapter 2);
- a sustainability analysis to highlight the strategies to be adopted in order to put into daily practice what has been experienced in the project (chapter3).

In conclusion, we will provide some recommendations for the implementation of the future IOs foreseen by the project.

Chapter 1

The UPDATE blended course

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1 CHAPTER 1
THE UPDATE BLENDED COURSE: OVERVIEW AND EMPIRICAL RESULTS

Digital technologies play a pivotal role in cultivating skills essential for students' professional performance, including:

- problem-solving;
- the creation of structured thinking;
- and comprehension of processes.

Employing digital platforms, such as online learning and mobile learning technologies, has the potential to enhance the efficiency and effectiveness of capacity building and training initiatives.

Leveraging digital platforms for virtual learning can serve as an effective method to support individualized capacity building. This approach is versatile, facilitating the delivery of both initial and refresher training, along with continuous support and mentorship to enhance and develop skills. Establishing online or mobile training resources does necessitate an investment in a technology platform and, potentially, content creation – particularly if the existing content requires formatting for seamless integration with a digital platform.

The globalization of education has compelled the integration of digital technologies, a trend further accelerated by the COVID-19 pandemic. Institutes worldwide had to swiftly adopt online teaching methods to sustain the education system, with developed countries being better prepared for this transition. The pandemic flooded conventional teaching practices with additional concerns and constraints. Reich et al. (2020) identified the following themes:

- Student motivation: Teachers struggled to motivate students via computer screens.
- Professional loss and burnout: Without familiar means of teaching, instructors’ sense of self- efficacy and professional identity were affected.
- Exacerbated inequities: Perceived loss deepened as teachers witnessed the intensification of the societal inequalities shaping their students’ lives.

While virtual training may involve upfront costs, it can lead to savings in other delivery expenses and contribute to improved knowledge retention and application. Depending on factors such as learners' access to technology, their proficiency in utilizing technology, and their specific needs, capacity building can either be conducted entirely in a virtual setting or benefit from a blended learning approach that combines both in-person and virtual elements, potentially including face-to-face group activities at the workplace.

1.1 Description of the course

What is a blended course?

The blended course design model is a contemporary instructional approach that combines the benefits of both traditional face-to-face teaching and online learning. This innovative type of course seeks to create a dynamic and engaging learning experience for students, leveraging the advantages of both physical and virtual learning environments. By integrating technology and traditional instructional methods, the blended course offers a flexible and personalized learning journey that caters to diverse learner needs. This description will provide an overview of the blended course design model, its key components, and the benefits it brings to the educational landscape.

Overview of the blended course of UpDATE:

The blended course aims to strike a balance between synchronous and asynchronous learning, maximizing interaction, collaboration, and engagement among learners. The course, including four main modules with Units, emphasizes the importance of utilizing digital tools and resources to enhance the learning experience while maintaining valuable in-person interactions.

Learning Goals

- Understand and apply the theoretical principles of digital education/training applied in VET including knowledge of the virtual technologies: virtual reality (VR), augmented reality (AR), mixed reality (MR).
- Design a blended lesson with digital tools.
- Apply the good practices in digital education: wherein experiences and lessons learnt help to develop enabling digital competences.

Expected Learning Outcomes

- Trainers/teachers become proficient in enabling particular ICT in their teaching and training by being able to teach and learn with digital solutions.
- Trainers/teachers become proficient in integrating digital tools in the educational process by being able to effectively apply and exploit technology in vocational practice, such as implement a lesson using VR/ AR/ MR technologies
- Acquire essential soft skills regarding digital education, like communication, teamwork, creative thinking, leadership, change facilitating and time management.

Course Outline

The consortium developed all learning and assessing material in English and then translated into the national languages, delivered in four national pilots [IT, EL, DN, EST]. The 4 different courses are available, upon registration, through the e-learning platform, which is designed and developed by the DAISSy research group – Hellenic Open University (partner).

Module 1: Teaching and Learning with Digital Solutions

Enhances the knowledge and the awareness of the EU recommendations (e.g., Digital Education Action Plan 2021- 2027, Next generation EE, DigComp Framework, DigCompOrg Framework) on digital education and on good practices of digital teaching/learning. The module contains videos, presentations, references and self-evaluation exercises in two units.

- Unit 1.1 enhances the knowledge and the awareness of the EU recommendation on digital education. The unit will present the main institutional plans and programs to implement and develop the EU digital educational strategy.
- Unit 1.2 enhances knowledge and awareness on the good practices of digital teaching/learning. In the unit best practices and digital solutions collected through the research phase of the project are presented.

Module 2: Integrating Digital Tools in the Educational Process

The second module introduces learners to the principles of designing a competency-based lesson, by using and applying digital tools in vocational training. Learners will know the methodological approaches and EU frameworks in order to deliver quality, learner-centered education and training.

- Unit 2.1 supports the learners on how to develop an effective digital education/ training, knowing the benefits and challenges of digital learning technologies in VET. Learners will understand the pedagogical innovation incorporating the digital aspect. Also, the EU framework will provide a common understanding of educators' digital competence and skill needs; and relevant transversal competences that are required for learning, working, and thriving in a digital world.
- Unit 2.2 helps learners to apply a critical approach when adopting technology. They will learn the way that digital technologies can enhance the type and scale of a variety of new or under-exploited types of learning in VET. Unit 2 introduces learners to different technologies that can be applied driving digital transformation in VET.

Module 3: Practical Training on Digital Tools

The third module gives participants an overview of various digital technology tools and solutions that can be integrated into the learning process to enrich the lessons. The participant acquires basic practical skills to use digital technology in the creation of practical teaching materials in vocational education.

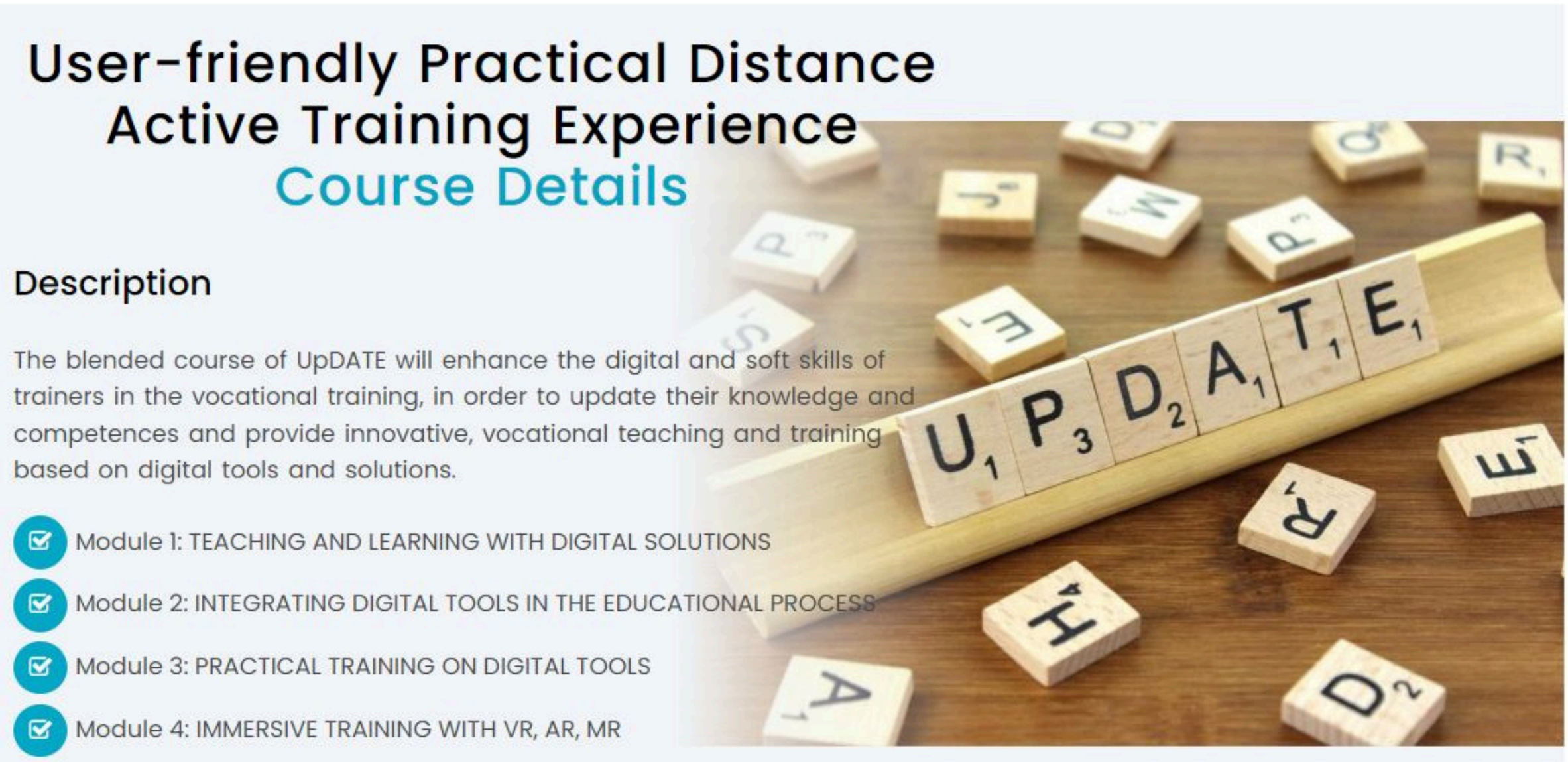
- Unit 3.1 provides an overview of popular and freely available digital platforms that can be used to create interactive learning content or engage students in the learning process.
- Unit 3.2 provides basic knowledge and skills to create an interactive educational video. During the course, recommendations and practical examples are given for creating high-quality educational videos for teaching activities.

Module 4: Immersive Training with VR, AR, MR

The fourth module of the blended course design model explores the realm of immersive training through Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR).

- Unit 4.1 serves as a gateway or introduction to the XR technologies. The main objective is to teach the concept of each of the technologies (AR, VR, MR), their differences and their application in a very general but detailed manner.
- Unit 4.2 This unit goes into a relationship between the XR technologies and education. Provides deeper insight on the educational benefits of the XR technologies and provides an example of curriculum integration.
- Unit 4.3 focuses on putting the knowledge into practice and explains all the necessary precautions of the XR technologies. The unit includes the safety guidelines, technical precautions and considerations to be made while using these technologies in an educational way.

Visit the course website here.



1.2 Evaluation of the blended course

In total 645 VET trainers and tutors expressed interest and registered for the UPDATE course (registered users in the platform) from all 4 partner countries (Italy, Greece, Estonia, Denmark). Out of the total participants, 257 actually followed the UPDATE course, (i.e. presenting progress on the platform, participating in live sessions e.t.c.). From the active UPDATE course participants a remarkable 90% completed the course, marking an outstanding learners' engagement rate and validating the desire of VET trainers and tutors for improving their Digital Education Readiness (DER) and their interest in integrating digital solutions in practical training.

A prerequisite for completing the UPDATE course and obtaining the Grand Certificate was the evaluation of the course by submitting an evaluation form. In total both the UPDATE Course and the UPDATE learning platform received positive feedback from 90% of the participants in all evaluated aspects.

Specifically, the course met the expectations of 95.4% of the participants, these mainly being:

"Learn new digital teaching techniques"

"Improve my digital skills"

"Learning about new tools for innovative teaching"

"Learning how to use digital technologies applied to didactics"

"A new vision for VET teaching"

95.8% of the participants believe that the course has enriched their knowledge of digital and blended learning in vocational education and training; the timeframe for completing the course was considered reasonable by 92.6% of the respondents; and 96.3% would recommend the course to other colleagues. Overall, 55.1% of the participants declared "Very satisfied" by the course. 35.6% declared "Satisfied" and 9.3% "Neutral"; while there were no "Dissatisfied" responses.
As for best features of the course the following was mentioned:

"independence in learning"

"The multiple ways of presenting the material, document, video, transcript"

"Experience of VR glasses"

"Well structured, practical"

"Detailed , comprehensive"

"individual pace of work, resource-rich material"

The recommendations of the participants for the improvement of the course can be summarized from the following:

"The increased use of the devices on a practical level"

"There could be more practical lessons (simulation, use of programs)."

"More ideas for classroom application"

"more instructional videos"

"perhaps an optional possibility to use online tools"

"More presentations/re-enactments of educational programmes with AR/VR"

Regarding the course's e-learning platform

- 94% of the respondents found the online platform easy to use;
- while 95.8% believe that it has enabled them to engage with the learning content.

Following this the respondents were asked to declare their satisfaction with specific aspects of the platform, being:

- aesthetic quality of the graphics; usability while browsing; structure of modules and topics; communication through the different communication tools (forums, direct messages, e-mails, etc.); ease of access to learning materials; and availability of training materials.

All aspects were evaluated positively from more than 87% of the participants. The "strongest" aspects of the platform were:

- the structure of modules and topics; the availability of training materials; the ease of access to learning materials; and the aesthetic quality of graphics.

These received positive feedback from the respondents of 94%, 94%, 93.5% and 92.1% respectively. The "weakest" aspects were:

- the usability while browsing; and the communication through the different communication tools (forums, direct messages, e-mails, etc.).

These received positive feedback by 89.8% and 87.5% respectively. The detailed results of the evaluation of the online platform regarding the aforementioned aspects are displayed in the following table:

How satisfied are you with the online learning environment in the following aspects:	very satisfied	satisfied	neutral	dissatisfied
Aesthetic quality of graphics	55.1%	37.0%	6.9%	0.9%
Usability while browsing	62.0%	27.8%	7.9%	2.3%
Structure of modules and topics	64.4%	29.6%	7.9%	0.9%
Communication through the different communication tools (forums, direct messages, e-mails, etc.)	52.8%	34.7%	11.6%	0.9%
Ease of access to learning materials	68.5	25.0%	4.6%	1.9%
Availability of training materials	71.3%	22.7%	5.6%	0.5%

Overall, 64.4% of the respondents were "Very satisfied" with the quality of the online learning platform; 29.6% were "Satisfied"; 5.6% were "Neutral"; and only 0.5% were "Dissatisfied".

Both quantitative and qualitative evaluation results validate the need and eagerness of VET trainers and tutors to obtain a greater familiarization with digital solutions, improve their digital skills and their Digital Education Readiness (DER).

Chapter 2

The piloting in Italy and Estonia

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2 CHAPTER 2
THE PILOTING IN ITALY AND ESTONIA

2.1 Context and contents of the piloting in Italy

The testing phase regarding the integration of digital teaching and learning in EnAIP within the UPDATE project began in September 2023 with the start of the new training year.

22 trainers were involved in the testing.

- 60% of whom teach technical-professional subjects; while 40% teach basic and/or transversal subjects (Italian; ICT, active citizenship, communication, socio-economic subjects);
- 6 centres (Novara, Domodossola, Cuneo, Settimo, Acqui Terme, and Alessandria);
- 3 classes related to the food sector and 4 classes related to the mechanical and electrical sector, for a total of at least 130 students.

All the trainers involved (4 per centre with the exception of Alexandria with 2) chose to implement an interdisciplinary teaching project (a lesson, module or a laboratory) – mainly involving students from the second year of the course, with prior skills both from a technological and professional point of view – with different objectives and content. In some cases, the trainers proposed an in-depth module on VR applied to teaching and sector-specific content using both the learning environments created by Virsabi and existing virtual games and simulators (e.g., Car Mechanic Simulator or Bartender Simulator, Cooking simulator VR). In other cases, they structured an in-depth intervention by presenting and using specific apps (e.g., Canva) and major social networks (video/reel production on Instagram). Finally, in other cases, they included the use of digital solutions within a complex project that will accompany the class throughout the training period (e.g., conception and creation of an escape room). Overall, the testing concluded at the end of November, while in 2 cases (related to complex projects) the program will continue until June – beyond the closing date foreseen for UPDATE.

All learners used supporting technology infrastructure both provided by EnAIP (dedicated iPad and PCs, Smart TV, Oculus Meta Quest 2 Visor and sliders) and personal (smartphones) according to the BYOD approach (bring your own device which means allowing students to bring their own devices, especially smartphones, into classrooms to support improving student learning outcomes).

The content covered focused mainly on specific work processes and procedures; and safe working procedures. Furthermore, teaching projects were also used to transfer digital and soft skills (with particular reference to problem solving and team building).

Initial feedback has been extremely positive:

- the use of digital solutions allows the class to be actively involved in carrying out the assigned task.
- Students collaborated in an attempt to solve the proposed challenges while learning to move in virtual environments.
- They strengthened their knowledge about work processes and steps (tasks, timing and sequences); as well as the characteristics of the main professional tools and machinery.
- They learned how to interact with each other using digital technologies and technical equipment.
- All students got involved, even those who seemed more closed and shyer in the classroom, immersed in virtual reality were transformed.
- *Enthusiasm* and *participation* were the two key words reported by the trainers about their experience.

The trainers agree in pointing out that the UPDATE trial was a first step, and that continued investment is needed to exploit the full potential of virtual environments and digital solutions applied to teaching/learning as well as to integrate them permanently within the school curriculum.

2.2 Context and contents of the piloting in Estonia

The testing phase of the UpDATE project for the experimentation in Estonia commenced at the Viljandi Vocational Training Centre (VIKK) with the Blended Course in September and October, followed by student piloting in late October. A total of 20 trainers participated, including 17 vocational teaching professionals, as well as the head of studies, class teacher, and apprenticeship coordinator. The instructional areas covered chefs, assistant cooks, car painters, auto body repair workers, auto mechanics, truck drivers and mechanics, and welders. All activities were concentrated within one school, involving 38 students from cooking specialties and 139 students from auto mechanics and metalworks specialties.

VIKK conducts an e-learning week twice a year, initially established to sustain the necessary digital competency to handle potential pandemic situations. Consequently, instructors were already accustomed to utilizing digital technologies for both theoretical and practical lessons.

For the October 2023 week, an agreement was reached for all teachers to use a single platform (Moodle or Tahvel) to store learning materials, and communication between teachers and students would occur through the school's Gmail or chat. Students requiring a computer for home study during this week could request one from the school. Students engaged in independent study on e-courses or with materials provided by the teacher, utilizing communication channels such as Gmail, chat, Facebook messenger, or groups on Facebook to interact with teachers.

What technologies did students use?

Students used their smartphones, tablets, and computers to complete their studies.
The digital environments that were mainly used were:
1. Learning management system Moodle
2. Learning information system Tahvel
3. Various digital environments of the teacher's choosing: Canva, Drive, Gmail, E-koolikott, YouTube, Google Meet, etc.

During the e-learning week the students that took part in the study had 8 different fields of study. Students could, for example, study the following topics:
1. Food hygiene
2. Development of digital competence
3. Estonian national cuisine
4. Menu preparation and calculation
5. Physics for professional purposes
6. CNC plasma cutting

What was the feedback regarding e-week from the learners or teachers?

Participants generally appreciate the e-learning week as it allows them the flexibility to study at their preferred time or pace. Technology plays a crucial role in aiding students with diverse learning styles to navigate through learning materials more efficiently. Overall, the implementation of an e-learning week is beneficial for teachers as well, offering a refreshing break from traditional in-person instruction. During the e-learning week, teachers have the autonomy to choose the subjects they wish to teach, in collaboration with the department head.

The influence of UpDATE, a blended course, on the e-learning week was notable. Teachers enhanced their knowledge and skills in utilizing various digital platforms for teaching their subjects. Initially, there was a reduction in the number of digital tools employed, which is a common occurrence when acquiring a new skill. The adoption of diverse digital environments demands time and motivation from both teachers and students. Consequently, evaluating the complete impact of the course within a short timeframe can be challenging.

2.3 Findings and evaluation of the piloting

After the completion of the piloting phase in Italy and Estonia, both trainers and trainees were asked to evaluate their experience. 33 trainers and 78 trainees took part in the evaluation of the piloting, responding to differentiated evaluation forms based on the role (trainer, trainee).

Regarding the trainers' evaluations

All trainers declared that the piloting met their expectations, which in summary were:

"Training in the practical use of VR and AR technology"

"Learning to use distance education through the use of new technologies to increase opportunities for learning, inclusion and educational success of learners"

"Introduce an innovative and inspiring tool in training"

"My expectation is to learn digital strategies that complement, not complicate, my practical teaching methods."

"It's an opportunity to bring a fresh perspective to my practical classes."

84.9% showed satisfaction from the piloting phase (36.4% Very satisfied, 48.5% Satisfied), 12.1% declared "Neutral", while 3% were dissatisfied. Regarding the guidelines and support provided during the piloting 27.3% were "Very satisfied" and 51.5% were "Satisfied", while 21.2% were "Neutral". All responded that the training improved their skills in the creation of digital content. 93.9% of the trainers stated that they feel more effective and aware in role taking after the UPDATE experience and that the UPDATE experience improved their aptitude towards continuous learning. 84.9% of the trainers feel at least satisfied from the trainees' response to digital teaching (18.2% "Very satisfied", 66.7% "Satisfied"), while 94% respond that the use of digital tools in teaching has improved at least to some extent the acquisition of knowledge/skills (36.4%"It has vastly improved the acquisition of knowledge/skills", 57.6% "There has been a slight improvement").

Being asked to elaborate further in their answer regarding the improvement in the acquisition of knowledge/skills, the following comments summarize the trainers' thoughts:

"*In my case, the use of vr , helped the explanation of mechanical components, as I could not use real parts that were not available."*

"The students showed participation and understood that teamwork is important"

"The use allowed them to see and make artifacts that in reality require expensive materials."

"The technology helps students with different learning styles to better master the material."

"I've noticed an increase in student participation and enthusiasm"

"They seem more invested in the learning process"

"it's encouraging to see shy students participating more actively in these digital spaces"

""they can do some things that otherwise we couldn't do / see in regular classes"

Regarding the trainees' evaluation

- 83.3% enjoyed the experience of the educational activity promoted by the UPDATE project (42.3% "I enjoyed it very much", 41% "I enjoyed participating"), 12.8% were not interested in the experience and 3.8% did not enjoy it.
- 79.5% of the respondents believed that the use of digital tools has improved the quality of teaching, 15.4% stated "I am not sure" and 5.1% sees no improvement.

Following this, the trainees were asked their feelings about specific aspects of their experience with digital tools in the teaching process, specifically whether it made the lesson more interesting; the class more fun; whether they felt like participating more; if they were able to understand the content better; to express their opinion thanks to online interaction; and whether they were able to interact more with classmates.

For all the aspects more than 50% of the respondents were at least satisfied, with the aspects of "It made the lesson more interesting", "I was able to understand the content better" and " It made the class more fun" concentrating the highest percentages of positive responses of 70.5%, 63.5% and 61.9%, respectively, while the aspect of "I was able to interact more with my classmates" being the "weakest". The analytical results on the aforementioned aspects are displayed in the following table:

How do you feel about the following regarding your experience with digital tools in the teaching process:	very satisfied	satisfied	neutral	dissatisfied
It made the lesson more interesting	34.6%	35.9%	21.8%	7.7%
It made the class more fun	23.7%	38.2%	28.9%	9.2%
I felt like participating more	28.4%	28.4%	31.1%	12.2%
I was able to understand the content better	25.7%	37.8%	27.0%	9.5%
I was able to express my opinion thanks to online interaction	24.3%	33.8%	36.5%	5.4%
I was able to interact more with my classmates	21.6%	28.4%	36.5%	13.5%

77.9% of the trainees responded positively on continuing to use these digital tools and content during class. When asked about their teachers' ability to make digital content and use online tools, 65.4% and 66.7% respectively, responded that it has been improved in respect to one year ago. Overall, the feedback from trainees was positive and comments show interest and enthusiasm in the integration of digital solutions in the teaching process.

Evaluation of both trainers and trainees, indicates the need for continuation and advancement of efforts towards UPDATE project's objectives.

Chapter 3

The feasibility analysis

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3 CHAPTER 3
THE FEASIBILITY ANALYSIS

The European Framework for Digitally Competent Educational Organizations (DIGCOMPORG) published in 2015 – resulting from that report – is a candidate to become the approach to organisational digital capacity to support transparency, comparability and peer-learning among EU educational institutions.

The DigCompOrg framework is an approach (method and tools) that can guide a process of self-reflection on the progress of an educational institution towards comprehensive integration and effective deployment of digital learning technologies. Following the suggestions provided by the DigCompOrg, the feasibility analysis follows the idea that the integration of digital technologies requires significant innovation and implies a process of planning for change on three basic dimensions:

- ***pedagogical*** through the strengthening of the competences of tutors/trainers and learners (competent actors);
- ***technological*** through the development of digital tools and contents for learning;
- ***organisational*** through the strengthening of innovation management capacities (digitally competent organisations).

For this reason, this chapter is composed of the aspects of organizational, pedagogical, technical and financial feasibility.

3.1 Organizational feasibility

To integrate new technologies into daily teaching practices it is necessary to adopt an organizational perspective and consider the following items.

1. Identify Key Stakeholders

- Identify and list all stakeholders involved in the technology integration plan.
- Conduct interviews or surveys to gather input and perspective from teachers, administrators, IT staff, students, parents, and secretarial staff.

2. Evaluate Leadership Support

- Assess the level of support and commitment from senior leadership, the school board, board of directors, IT managers, department heads, etc.
- Review official statements, meet with leaders, or distribute leadership commitment surveys.

3. Inventory Resources:

- Compile a comprehensive inventory of existing organizational resources relevant to the plan (personnel, budget, infrastructure).
- Collaborate with relevant departments to gather data and maintain an organized database.

4. Assess Needs:

- Identify the specific needs and requirements of teachers, students, and other stakeholders concerning technology integration.
- Conduct focus groups, surveys, or workshops to gather input on current challenges and desired outcomes.

5. Analyze the Culture of the Organization:

- Analyze the prevailing organizational culture to determine its readiness for change and technology adoption.
- Administer culture assessments, conduct interviews, or review existing cultural documents.

6. Change-Resistance Management Strategy:

- Develop a strategy to manage the resistance to change that outlines approaches for promoting a positive attitude towards technology integration.
- Collaborate with change management experts if available, and create a plan that includes communication, training, and support mechanisms.

7. Assess the Impact on Workflows:

- Analyze how the technology integration plan will affect existing workflows and processes within the organization. Such as teaching department, student secretariat, administrative department, etc.
- Conduct workflow mapping exercises and involve relevant departments in the assessment.

8. Identify and Mitigate Risks:

- Identify potential risks and challenges associated with organizational readiness for technology integration. Including resistance to change, technical challenges, privacy and data security.
- Brainstorm sessions, expert consultations, and risk assessment tools to identify and prioritize.

9. Document Findings:

- Compile all findings from the organizational feasibility assessment into a clear and concise report.

3.2 Pedagogical feasibility

Integrating technology into pedagogy is a suggested approach to enhance the quality of using technology for teaching and learning. Technology integration is promising for increasing the meaningfulness of the use of a device or a tool (Hyndman, 2018) for students' engagement as the best teaching practice (Hechter et al., 2012). Mishra and Koehler (2006) were the first to introduce integration of technology to pedagogy through the technological pedagogical content framework as required knowledge for teachers.

It is crucial to recognize that there are instances where the use of digital tools may not be appropriate. Selecting the wrong tool at the wrong time can lead to suboptimal training outcomes compared to traditional in-person training. Just because a digital tool has been effective in other scenarios does not guarantee its suitability for all specific training challenges.

This pedagogical feasibility study outlines steps to enable trainers and educators in selecting the proper digital tools for training and capacity building.

What is a pedagogical feasibility study?

A pedagogical feasibility study is dedicated to evaluating the viability and efficacy of an educational initiative, program, or method. This study is centered on the educational dimensions of the UpDATE project, scrutinizing whether the proposed approaches adhere to established pedagogical principles and hold the promise of realizing its educational goals. The objective is to verify that the educational aspects of the project are workable and possess the capacity to enhance the learning outcomes of the intended audience.

The **key steps of a pedagogical feasibility study** include:

1.Defining your learning objectives. Precisely outlining the educational aims and objectives of the initiative entails clearly stating the knowledge, skills, or competencies that learners are anticipated to acquire:

a. Start by determining the broader goal of the learning experience. What do you want learners to achieve or accomplish by the end?
b. Break down the overarching goal into specific, measurable, and achievable learning objectives. Each objective should represent a specific skill, knowledge area, or competency.
c. Frame each learning objective with a strong, action-oriented verb that clearly describes the intended outcome. Common verbs include "analyze," "create," "evaluate," "apply," "synthesize," etc. This helps in specifying the type of behavior or cognitive process you expect from the learner.
d. Utilize Bloom's Taxonomy or a similar framework to ensure that your objectives span various cognitive levels. This taxonomy categorizes cognitive skills into levels such as Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation.
e. Make sure that each learning objective is measurable. This allows for assessment and evaluation to determine whether learners have achieved the objectives. Use criteria such as accuracy, speed, completeness, or other measurable indicators.
f. Relate learning objectives to real-world applications whenever possible. This helps learners see the practical relevance of what they are learning.
g. Regularly review and refine learning objectives based on feedback, changes in the learning environment, or improvements in understanding the needs of the learners.

2.Determining your learners. Consider the characteristics, needs, and preferences of the intended learners in order to customize the educational approach to meet their specific requirements. Evaluate whether your intended audience genuinely requires professional development in the identified topic area by: Engage with potential learners to ascertain their specific capacity-building needs or preferences, and document their existing skills. Identify the current tasks, challenges, and motivations of the target audience in acquiring new knowledge or skills. Understanding factors such as workload, technology habits, and literacy rates will assist in determining the suitability of a digital platform for your learners and guide the selection of an appropriate platform.

3.Recognize obstacles and challenges within the pedagogical process, that may hinder the attainment of learning objectives and goals. Some common challenges Some common challenges include:

a. **Varied Learning Preferences**: Students exhibit diverse learning styles and preferences, posing a challenge to effectively engage everyone.
b. **Overcrowded Classrooms**: In classes with large numbers of students, educators may find it challenging to provide personalized attention and support to each individual.
c. **Resource Constraints**: Insufficient access to educational materials, technology, and facilities can impede the implementation of effective teaching strategies.
d. **Technological Limitations**: In settings where technology is integral to learning, a lack of access to devices or the internet can present a significant obstacle.
e. **Language Differences**: In multilingual classrooms, disparities in language may hinder comprehension, especially if instructional materials are not suitably adapted.
f. **Sustaining Student Engagement**: Maintaining consistent student interest and involvement throughout the learning process can prove challenging, particularly in certain subjects or with specific teaching methods.
g. **Assessment Complexity**: Crafting assessments that are both fair and aligned with learning objectives can be intricate. Additionally, grading and providing timely feedback can pose challenges.
h. **Inclusivity Challenges**: Meeting the diverse needs of students with varying abilities and learning disabilities can be a significant challenge without adequate support systems in place.
i. **Time Limitations**: The limited time available for instruction may restrict the depth and breadth of coverage for certain topics.

j. **Professional Development Opportunities for Teachers**: Insufficient chances for teacher training and professional development can impact the efficacy of instructional techniques and the integration of innovative teaching methodologies.

k. **Relevance of Curriculum**: Outdated or irrelevant curriculum content may fail to engage students and may not adequately prepare them for real-world challenges.

l. **Student Motivation**: Sustaining high levels of motivation and interest in the subject matter can be challenging, particularly if students do not perceive the practical relevance of the material.

4. Determine the suitable teaching methods and strategies that align with the characteristics of your professional development users, the specific objectives of the program and the technological solutions provided. Assessing the suggested teaching methods and instructional strategies can guarantee their alignment with pedagogical principles and the desired learning outcomes.

5. Determine the principles for an effective pedagogy. Effective pedagogy is characterized by several principles that contribute to successful teaching and learning experiences:

a. **Active learning**: Active learning is an instructional approach that involves engaging students in the learning process through activities and experiences that encourage them to actively participate, analyze, and apply knowledge rather than passively receive information. In active learning, students take on a more proactive role in their education, improving their engagement, understanding, and retention of information.

b. **Critical thinking:** Students are encouraged to think critically, analyze information, and make connections between concepts, leading to a deeper understanding of the subject matter.

c. **Problem solving:** Activities in active learning often involve real-world problem-solving scenarios, allowing students to apply theoretical knowledge to practical situations.

d. **Creativity:** The ability to think innovatively, generate original ideas, and approach learning in a way that goes beyond conventional methods. Creativity is mostly attributed to some internal factors such as soul, gene, brain, personality, value, cognitive skills, mind, intrinsic motivation and it is seldom attributed to external factors such as education, work, economy, technology, culture and extrinsic motivation.

e. **Collaboration:** Encouraging collaboration among students and fostering a sense of community in the classroom enhances the learning experience and promotes the development of social skills. Students often work collaboratively with peers, engaging in group discussions, projects, or problem-solving tasks, fostering teamwork and communication skills.

f. **Reflection:** Incorporating opportunities for reflection allows students to assess their own learning, encouraging metacognition and a deeper understanding of the material.

g. **Flexibility:** Being adaptable in teaching methods and approaches accommodates different learning paces and styles, promoting a more personalized learning experience.

h. **Interactivity:** Incorporating questions, polls, or short activities during lectures to keep students engaged. Michael Moore (1989) had defined three types of interactions in the context of distance education:

i. **Learner-content interaction** is the intellectual process of interacting with content that results in changes in the learner's understanding and perspective, or the cognitive structures of the learner's mind.

ii. **Learner-instructor interaction** helps instructors to stimulate or at least maintain the student's interest and to motivate the student to learn using self-direction and self-motivation.

iii. **Learner-learner interaction** happens among two or more learners, with or without the presence of an instructor who helps to teach the skill of group functioning.

“Learning to learn” is described by the European Commission’s Joint Research Centre (JRC) as “the ability to pursue and persist in learning, to organize one’s own learning, including through effective management of time and information, both individually and in groups”. Learning to learn is an essential building block to lifelong learning and is determined by a learner’s own behavior, i.e., his or her attitude and engagement towards learning. This is why learning must become a positive experience for all children. Assessment of learning-to-learn capabilities is challenging because it needs to consider both cognitive, psychological and socio-cultural perspectives (EC).

The feasibility study describes the integration of pedagogy into technology associative teaching and learning. For each pedagogical feature there are key questions included to help the trainers and educators select the appropriate digital solution(s), as shown in **Table 1.**

Pedagogical feature	Concepts of Pedagogical features / The learner is able to:	Key questions/ Issues for consideration	Digital Solution
Active learning	Participate, analyze, and apply knowledge	What are activities to transfer the content (constructivism or direct education)?	Synchronous Lessons
Critical thinking	Think critically, analyze information and make connections between concepts	How activities help learners move through the content?	Gamification / Gaming Metaverse
Problem solving	Apply theoretical knowledge to practical situations	How activities help learners tackle real-world problem-solving scenarios?	Virtual Reality/ Augmented Reality Gamification/ Gaming Metaverse
Creativity	Think innovatively, generate original ideas, and approach learning in a way that goes beyond conventional methods	Did you take into consideration internal factors such as soul, gene, brain, personality, value, cognitive skills, mind, intrinsic motivation? Did you take into consideration external factors such as education, work, economy, technology, culture and extrinsic motivation?	Multimedia presentations produced by the trainee, Self-producing video, Conceptual Map
Collaboration	Work collaboratively with peers, engaging in group discussions, projects, or problem-solving tasks, fostering teamwork and communication skills	In which ways technology helps learners understand and reach their purposed destination easier, faster and more effectively?	Social platform / forum

Pedagogical feature	Concepts of Pedagogical features / The learner is able to:	Key questions/ Issues for consideration	Digital Solution
Reflection	Assess their own learning, encouraging metacognition and a deeper understanding of the material	Did you provide enough opportunities for learners for reflection?	Social platform/ forum Conceptual Map
Flexibility	Based on different learning paces and styles, having a more personalized learning experience	What are the characteristics (knowledge, digital skills, expectations and needs) of learners? What is the cultural diversity of learners?	Synchronous Lessons Test/Quiz/Interactive evaluation
Interactivity	Interact with the course content, instructors, and peers in meaningful ways	Which of the three types of interactivities (Learner-content interaction, Learner-instructor interaction, Learner-learner interaction) are covered?	Interactive presentations Test/Quiz/Interactive evaluation

Table 1. Assessment tool in selecting the appropriate digital solution, developed by @Hellenic Open University

Common missteps

- **Failure to Engage or Motivate Users**. Not motivating users can hinder the effectiveness of online or mobile learning. Learners should be encouraged to initiate the course, participate in online forums. Understanding learners' preferences is crucial for designing engaging experiences.

- **Ineffective Incentives**. Incentives are crucial for driving learners' engagement. Whether it's certificates or virtual engagement opportunities, providing tangible rewards can motivate learners to actively use the platform/ online collaboration tools.

- **One-Size-Fits-All Training Approach.** Tailoring training to a specific context is essential. What works in one location may not be suitable elsewhere. Consider factors outlined in understanding the ecosystem to determine the appropriateness of a technology for your specific context.

- **Insufficient Preparation of Facilitators**. Facilitators, especially those new to virtual training, require ongoing professional development. Similar to learners, facilitators need continuous support and opportunities for growth to effectively conduct virtual courses.

- **Inadequate Time and Resource Allocation**. Developing a new training approach demands sufficient time and resources. Allocate time for research, user consultation, and testing to select the right digital tools.

- **Postponing the establishment of metrics** until a course/lesson is in progress or concluding may result in missed opportunities. It is essential to develop metrics early on to assess success, oversee implementation, and collect pertinent data for well-informed decision-making throughout the course.

The first area of attention is paid to whether the incorporation of new technologies would align with both the curriculum and goals of the institutions. Thus, this brief analysis will first dive into how to clarify types of pedagogy to be considered, and then secondly the feasibility of the organizations participation in upskilling and updating.

As one embarks on a pedagogical alignment analysis for the integration of new technologies within educational institutions, the aim is to ensure that technology adoption aligns seamlessly with previously established educational goals. If looking at the pedagogical balance for an instructional design perspective, it is possible to identify a few key areas (Allman et al., 2020):

1. Delivery vs. Pedagogy:

In the realm of education, there is the balance between delivery and pedagogy. It highlights the challenge of effectively imparting knowledge while ensuring that the pedagogical approach aligns with the desired learning outcomes. At times, the emphasis on the delivery of content may overshadow the pedagogical aspects, creating an imbalance. For example, a quiz that is flashy and uses phones or tablets can heighten engagement, but is it as good of an assessor as the previously made paper quizzes? On the other hand, when pedagogy takes precedence, the method of delivery might suffer. In this instance, a student may doubt the credibility of the quiz, if the material itself appears to be of low quality. Their definition of quality is hard to pinpoint, though it is likely to reference aesthetic and professional-looking technologies. As aesthetics can also have an effect on usability (Norma, 2002). This tension highlights the importance of striking a harmonious equilibrium between these two critical aspects of education.

2. Content-Driven vs. Participatory:

In a content-driven approach, the primary focus is on delivering subject matter, often in a structured and systematic manner. This is what is sometimes referred to as the “banking” model, if students are meant to have information deposited into their brains by way of listening to a lecture for instance (Firdaus, 2017). In contrast, the participatory model centers around collaborative interaction and learning activities, where knowledge emerges through engagement and cooperation. Thus the learners are “not simply the objects of the teaching process, but agents in their own education" (Meddings and Thornbury, 2009, p. 14). This, consequently, means it is not a one size fits all. Rather, it is largely determined by the method and teaching style of the individual teacher. This is often why teachers, especially veteran pedagogues, feel resistance to change. Not because it is in their minds a poor innovation, instead because it is a stark contrast to the methods they are most comfortable using. Therefore it is not unreasonable to begin the transitional hybrid approach, where certain elements of the activities remain fixed, while other are flagged as being more flexible and thus can be adapted to a technical environment (Allman et al., 2020).

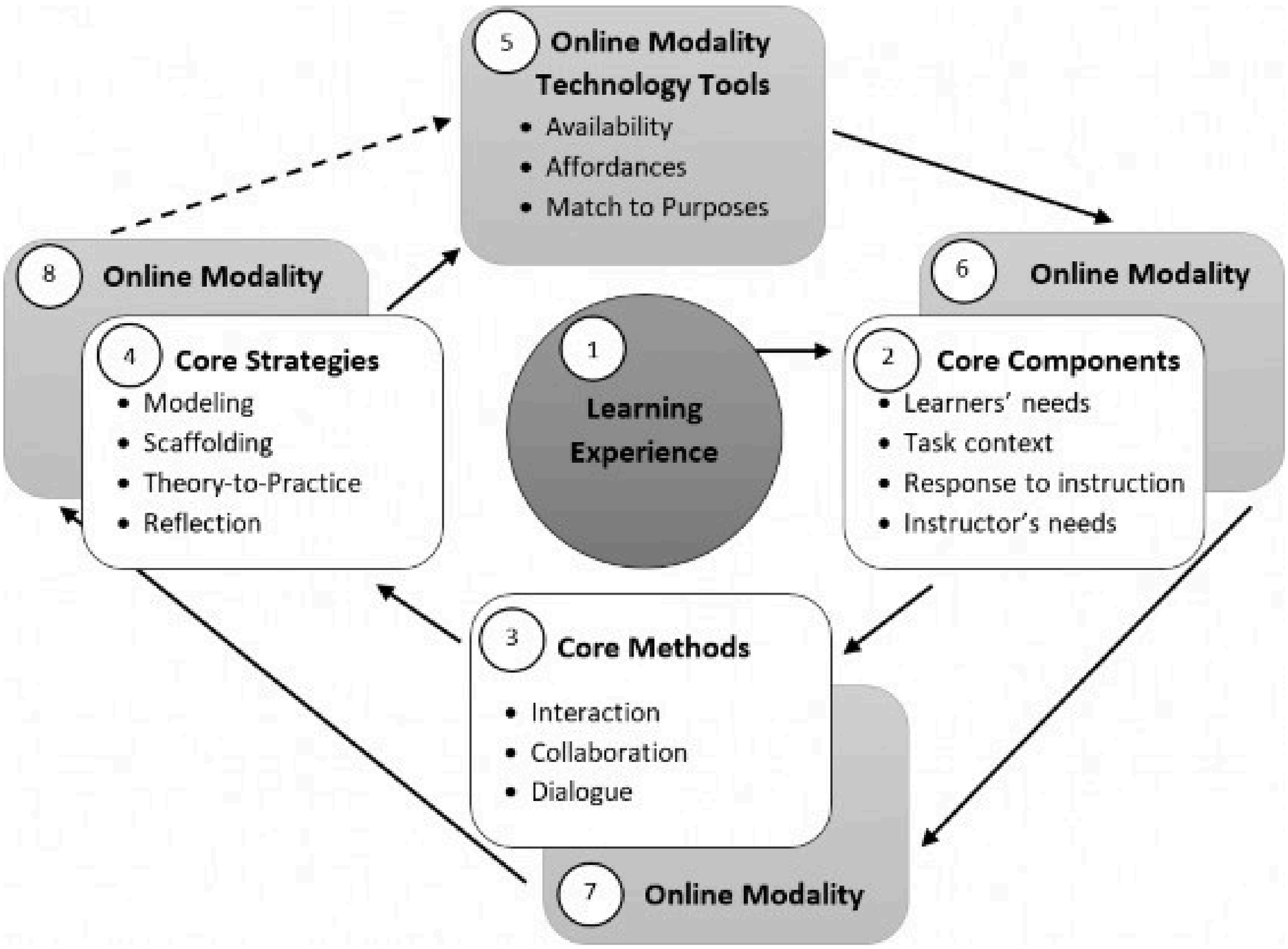
3. Theory vs. Practice:

The dichotomy of theory and practice tends to be the most prevalent in a teacher’s mind in vocational education. On one side, educators may emphasize theoretical concepts, frameworks, and models as the foundation for learning. On the other side, there's a focus on practical application, where learners engage in real-world experiences to understand and apply knowledge. Striking the right balance between theory and practice is crucial to ensure that students not only grasp abstract concepts but can also apply them in practical situations.

Taking a closer look at the physical layer of education, any of these innovations are closely linked to issues of access and cost. Addressing accessibility and cost concerns is essential to create an equitable learning environment for all students. However, cost reduction and return on investments is finding its way into manual and practical skills activities. For instance, before 2004 there were hardly any studies into the use of technology for the fine arts (Rakhat et al., 2021). Now, technology is helping to reduce waste, practice via repetition and even improve technique.

Technology can help bridge the gap between theory and practice, allowing students to understand not only how things work but also why they work the way they do. The insights gained from the highlights of the three core strands of tensions in pedagogical alignment of technology adoption are highly applicable to practical skills training in areas such as cooking, auto mechanic work, building, welding, carpentry, and more. By recognizing the need to balance delivery and pedagogy, content-driven and participatory models, and theory and practice, educators in vocational and practical skills training can create more effective and engaging learning experiences.

The following representation is meant to be read from 1 to 4, in a traditional classroom setting. Then, read again 5 to 8. The second time, it is meant to pair a technology, in this case, an online modality with each component. Though, first #5 checks if technological tools are available (*see chapter 3.2*).



A Visual Representation of the Process of Alignment of Pedagogy with Technology (Allman et al., 2020)

In these hands-on fields, technology can also play a crucial role in enhancing the learning process. For instance, the integration of digital resources, simulations, and online instructional materials can complement traditional apprenticeships and in-person training.

Technologies are already used to expedite certain processes, such as safety training via VR Goggles, as was carried out in the UPDATE project's blended course. Additionally, by focusing on pedagogical alignment and addressing accessibility and inclusivity, practical-skills training programs can better cater to a diverse student body, ensuring that individuals of all backgrounds and abilities have the opportunity to excel in these fields.

Ultimately, the principles and strategies explored are not limited to traditional academic settings but can be applied effectively to practical skills training in other contexts, creating a well-rounded and dynamic learning environment for the next generation of skilled professionals. By conducting a pedagogical feasibility study, educators and decision-makers can ensure that the educational initiative is well-planned, evidence-based, and likely to be effective in achieving its educational goals. This type of study is particularly relevant in the development of new educational programs, courses, or teaching methodologies.

3.2 Technical feasibility

To conduct a thorough technical feasibility assessment for the integration of new technologies in teaching activities, ensuring that the selected technologies align with the organizational infrastructure, support pedagogical goals, and adhere to security and privacy standards.

Box 1 – Indication for technical feasibility assessment

Technology Infrastructure Assessment

1. Existing Technological Infrastructure:
   - Evaluate the institution's current technological infrastructure, including hardware, software, and network capabilities.
   - Identify any potential gaps or areas that require enhancement to support the integration of new technologies.
2. Compatibility with Current Systems:
   - Assess the compatibility of selected technologies with existing systems and platforms used in the educational institution.
   - Ensure seamless integration with Learning Management Systems (LMS), student databases, and other essential tools.
3. Bandwidth and Network Requirements:
   - Determine the bandwidth and network requirements for the proposed technologies.
   - Collaborate with IT experts to assess whether the existing network infrastructure can support the increased demand for online and interactive content.

Security and Privacy Measures

1. Data Security Protocols:
   - Outline data security protocols to protect sensitive information collected and processed through integrated technologies.
   - Ensure compliance with data protection laws and establish encryption standards for data transmission.
2. User Authentication and Authorization:
   - Implement robust user authentication and authorization mechanisms to control access to educational platforms.
   - Verify that only authorized personnel, students, and stakeholders can access and interact with the integrated technologies.
3. Regular Security Audits:
   - Establish a schedule for regular security audits to identify and address vulnerabilities in the technology infrastructure.
   - Engage with cybersecurity experts to conduct comprehensive assessments and penetration testing.

Technical Support and Training

1. Technical Support Infrastructure:
   - Develop a technical support framework to address potential issues and challenges faced by users.
   - Ensure there is a dedicated support team or helpdesk to assist educators, students, and staff with technology concerns.
2. Training Programs for Users:
   - Design comprehensive training programs for educators and staff to ensure proficiency in using the integrated technologies.
   - Include modules on troubleshooting, system navigation, and best practices for incorporating technology in teaching activities.
3. Accessibility Features:
   - Implement accessibility features to cater to users with diverse needs, including those with disabilities.
   - Ensure that the integrated technologies comply with accessibility standards and guidelines.

Scalability and Future-Proofing

1. Scalability of Technology Infrastructure:
   - Assess the scalability of the technology infrastructure to accommodate future growth and increased user engagement.
   - Consider potential expansions of student enrollment, additional courses, and evolving pedagogical needs.
2. Integration with Emerging Technologies:
   - Evaluate the flexibility of the integrated technologies to adapt to emerging trends and innovations in educational technology.
   - Ensure that the chosen technologies can seamlessly incorporate advancements in virtual reality, augmented reality, and other emerging tools.

Box 2 – Characteristics of digital tools and solutions

Learning Management Systems (LMS):
The technical feasibility of implementing an LMS involves assessing the compatibility of the chosen platform (e.g., Moodle, Canvas, Blackboard) with existing IT infrastructure. Considerations include server requirements, data security, and integration capabilities with other educational tools. Additionally, evaluating the learning curve for both educators and students ensures a smooth transition and effective utilization of the LMS features.

Online Collaboration Tools:
Ensuring the technical feasibility of online collaboration tools (e.g., Google Workspace, Microsoft 365) involves verifying network compatibility, device accessibility, and data synchronization capabilities. Compatibility with various operating systems and devices is crucial for seamless collaboration, requiring attention to software compatibility and version management.

Digital Content Creation Tools:
Technical feasibility for digital content creation tools (e.g., Adobe Creative Cloud, Canva) involves assessing software compatibility, system requirements, and accessibility. Evaluating the learning curve for users, system resource utilization, and potential technical support needs ensures that educators and students can effectively leverage these tools.

Video Conferencing and Webinar Platforms:
Implementing video conferencing platforms (e.g., Zoom, Microsoft Teams) requires assessing network bandwidth, device compatibility, and security protocols. Technical feasibility also includes evaluating features like screen sharing, recording, and integration with other tools, ensuring a reliable and user-friendly virtual communication environment.

Interactive Whiteboards and Displays:
Technical feasibility for interactive whiteboards (e.g., SMART Boards, Promethean ActivBoards) involves evaluating hardware compatibility, calibration processes, and software integration. Ensuring that these technologies seamlessly interact with teaching devices and support multimedia content enhances their effectiveness in the educational setting.

Adaptive Learning Platforms:
The technical feasibility of adaptive learning platforms (e.g., Knewton, DreamBox) involves assessing data compatibility, API integration, and scalability. Evaluating the platform's ability to analyze and adapt to individual learning data while maintaining data privacy and security is crucial for successful implementation.

Virtual Reality (VR) and Augmented Reality (AR):
Implementing VR and AR applications requires assessing hardware requirements, software compatibility, and network capabilities. Technical feasibility involves ensuring that devices such as VR headsets or AR-enabled devices are accessible, and that the chosen applications align with educational objectives while providing a seamless user experience.

Online Assessment and Quiz Tools:
Technical feasibility for assessment tools (e.g., Kahoot!, Quizlet) includes evaluating server capacity, real-time responsiveness, and data security measures. Ensuring that these tools can handle simultaneous user interactions and integrate with other platforms for data analysis contributes to their successful implementation.

Coding and Programming Tools:
Introducing coding platforms (e.g., Scratch, Code.org, Python) requires assessing software compatibility, system requirements, and user support. Technical feasibility involves verifying that these tools are accessible on various devices and align with curriculum goals, fostering an environment conducive to learning programming skills.

Robotics and STEM Kits:
Technical feasibility for robotics kits (e.g., LEGO Mindstorms) involves assessing hardware compatibility, instructional support, and maintenance requirements. Ensuring that these kits can be integrated into the existing educational infrastructure, supported by available devices, and align with STEM curriculum goals is essential.

Box 2 (*continued)* – Characteristics of digital tools and solutions

Artificial Intelligence (AI):
Implementing AI-powered platforms (e.g., ScribeSense, Knewton) involves assessing data compatibility, privacy measures, and integration capabilities. Technical feasibility also includes evaluating the scalability of AI algorithms to accommodate diverse educational content while maintaining adaptability to individual student needs.

Open Educational Resources (OER):
The technical feasibility of OER platforms (e.g., Khan Academy, Coursera) includes assessing compatibility with various devices, download options, and accessibility features. Ensuring that these platforms support offline access and integrate with existing learning management systems enhances their technical viability.

Gamification and Game-Based Learning:
Implementing gamification tools (e.g., Minecraft: Education Edition) involves assessing system requirements, network compatibility, and user support. Technical feasibility includes evaluating the adaptability of these tools to different devices and ensuring they align with educational objectives.

Language Learning Apps and Software:
Technical feasibility for language learning tools (e.g., Speakly, Rosetta Stone) involves assessing app compatibility, offline functionality, and data security measures. Ensuring that these tools provide a seamless language learning experience across various devices contributes to their technical viability.

Digital Libraries and E-books:
The technical feasibility of digital libraries (e.g., Project Gutenberg, OverDrive) includes assessing compatibility with e-reader devices, download options, and offline access. Evaluating the platform's ability to integrate with learning management systems enhances the technical viability of these digital resources.

Types and examples of digital solutions and platforms
Learning Management Systems (LMS) e.g. Moodle, Canvas, Blackboard
Online Collaboration Tools e.g. Google Workspace, Microsoft 365
Digital Content Creation Tools e.g. Adobe Creative Cloud, Canva, Corel
Video Conferencing Platforms e.g. Zoom, MS Teams
Interactive Whiteboards and Displays e.g. SMART Boards, Promethean Activ
Adaptive Learning Platforms e.g. Knewton, DreamBox
Virtual (VR) and Augmented (AR) Reality e.g. Occulus
Online Assessment and Quiz Tools e.g. Kahoot!, Quizlet
Coding and Programming Tools e.g. Scratch, Code.org, Python
Robotics and STEM Kits e.g. LEGO Mindstorms
Artificial Intelligence (AI) e.g. ScribeSense, ChatGPT
Online Educational Resources (OER) e.g. Khan Academy, Coursera
Gamification and Game-Based Learning e.g. Minecraft: Education Edition
Language Learning Apps and Software e.g. Speakly, Rosetta Stone
Digital Libraries and E-books e.g. Project Gutenberg, OverDrive

In case the educators / trainers would like to integrate new technologies into their teaching and learning activities, these are some common indicators for different affected areas:

Assessment	• Evaluate current IT infrastructure considering: ◦ server and network capabilities; ◦ security protocols; ◦ device compatibility; ◦ adaptability of existing courses; ◦ student understanding and autonomy.
Training	• Provide comprehensive training for educators and support staff for the new technologies.
Professional Development	• Provide ongoing professional development for educators on utilizing the technology. As both new technology will come about, but existing technology will also be updated.
Integration	• Develop a plan for integrating the new technologies into the existing curricula. • Develop a plan for integrating new technologies into existing technologies.
Security Measures	• Implement security measures to protect sensitive data during collaboration.
Piloting	• Establish a support system for addressing user queries and technical issues.
User Support	• Regularly collect feedback to enhance the usability and effectiveness of collaboration tools.
Feedback Mechanism	• Ensure necessary software licenses and resources are available.
Resource Availability	• Provide ongoing professional development for educators on utilizing the technology. As both new technology will come about, but existing technology will also be updated.
Accessibility	• Ensure accessibility for all students. Consider the type of limitations students may have. For example, excessive password usage can be difficult for students with specific learning disorders.
Regular Updates	• Updates are not only necessary for the technology itself. This can also apply to updating the feedback tools, trainings, and curricula alignment.
Promotion and Awareness	• Continue to promote the use and integration of technologies, so as to allow later integration from more educators and staff.

3.4 Financial feasibility

In order to implement the analysis from a financial perspective we suggest focusing the following items, for each of them we provide tasks and methodologies.

Educational Technology Cost Estimation:

- *Task:* Estimate the initial and ongoing costs associated with acquiring and implementing educational technology solutions.
- *Methodology:* Gather quotes, pricing information from educational technology vendors, and budget data from relevant departments.

Budget Review for Educational Technology Integration:

- *Task:* Review the educational centre's current budget and financial resources available for a technology integration plan.
- *Methodology:* Collaborate closely with the finance department to assess available funds and potential reallocation.

Return on Investment (ROI) Analysis for Education:

- *Task:* Calculate the potential return on investment by comparing projected educational benefits with costs.
- *Methodology:* Consider both quantitative (e.g., cost savings, efficiency gains) and qualitative (e.g., improved student outcomes) factors specific to education.

Cost-Benefit Analysis for Educational Technology:

- *Task:* Conduct a comprehensive cost-benefit analysis to assess the overall impact of the technology integration on education quality and effectiveness.
- *Methodology:* Assign monetary values to educational benefits and costs to determine the net educational benefit.

Cost Reduction Strategies for Educational Technology:

- *Task:* Identify cost-saving strategies while maintaining the quality and effectiveness of the educational technology integration.
- *Methodology:* Explore educational technology consortia, open-source software, and teacher training efficiencies.

Risk Assessment and Contingency Planning for Education:

- *Task:* Identify financial risks associated with educational technology integration and develop contingency plans to mitigate them.
- *Methodology:* Analyze educational risks, such as budget constraints, unexpected expenses, educational outcome variations or the risks associated with adopting a new technology too early, such as a product that may not be perfected or lacking support.

Total Cost of Ownership (TCO) Calculation for Education:

- *Task:* Calculate the TCO for educational technology integration, including all direct and indirect costs over the technology's lifecycle.
- *Methodology:* Consider hardware, software, licensing, training, maintenance, and other educational technology-related expenses.

Financial Reporting and Documentation for Education:

- *Task:* Prepare financial reports and documentation summarizing all financial aspects of the educational technology integration plan.
- *Methodology:* Create clear and well-organized financial documents tailored to the educational center's needs.

Documentation of Financial Insights for Education:

- *Task:* Document financial insights, lessons learned, and best practices specific to educational financial planning to inform future educational technology initiatives.
- *Methodology:* Maintain a repository of financial data and analyses relevant to educational technology integration.

The following table is a useful tool to provide support for the analysis:

Box 3 – Initial checklist for financial feasibility

□ **Detailed Cost Estimation:**

- Ensure a thorough breakdown of both initial and ongoing costs associated with acquiring and implementing educational technology solutions. This should include:
  - hardware, tools and equipment;
  - software, including one time purchases, updates and subscription-based (such as licensing for groups of users);
  - training staff to be able to use the new technologies;
  - maintenance and repairs of the technology and associated systems;
  - other relevant expenses.

□ **ROI Analysis:**

- Calculate the potential return on investment by comparing projected educational benefits with costs. This analysis should consider both:
  - *quantitative factors* - cost savings, efficiency gains, increased course enrollment, early school leaving;
  - *qualitative factors* - such as improved student outcomes.

□ **Funding Sources Identification:**

- Identify and assess potential funding sources for the technology integration plan. This should include:
  - grants or partnerships, such as via ERASMUS;
  - fundraising opportunities;
  - government subsidies tailored to the educational sector.

□ **Resource Allocation Plan:**

- Develop a detailed resource allocation plan that outlines how the budget, instructional staff, and other resources will be allocated to support educational technology integration. Ensure alignment with educational priorities.

□ **Risk Assessment and Contingency Plan:**

- Identify financial risks associated with educational technology integration; and develop contingency plans to mitigate them. Analyze risks such as:
  - budget constraints including unexpected expenses;
  - variations in educational outcomes;
  - risks associated with adopting a new technology too early, such as a product that may not be perfected or lacking technical support.

3.4 Feasibility and risk assessment

This unit is focused on the different potential risks which can be encountered in the implementation of a digital innovation process and related measures to mitigate them.

Organizational Risks

- Resistance to Change:
  - Risk: Resistance from educators and staff to adopt new teaching technologies.
  - Impact: Slow implementation, lack of enthusiasm.
  - Mitigation: Conduct awareness programs, involve educators in decision-making.
- Leadership Support Fluctuations
  - Risk: Changes in leadership affecting support for the integration plan.
  - Impact: Shifting priorities, lack of sustained commitment.
  - Mitigation: Secure ongoing support, involve leadership in long-term planning.

Pedagogical Risks

- Mismatch Between Technology and Pedagogy:
  - Risk: Imbalance between technological delivery and pedagogical effectiveness.
  - Impact: Reduced learning outcomes, dissatisfaction among educators.
  - Mitigation: Conduct regular assessments, provide pedagogical training.
- Student Engagement Challenges:
  - Risk: Inability to effectively engage students with new technologies.
  - Impact: Decreased student participation, lower learning motivation.
  - Mitigation: Implement interactive learning strategies, gather student feedback.

Technical Risks

- System Compatibility Issues:
  - Risk: Incompatibility between new technologies and existing IT infrastructure.
  - Impact: Disruption of teaching activities, technical glitches.
  - Mitigation: Conduct thorough compatibility tests, invest in necessary upgrades.
- Data Security Breaches:
  - Risk: Vulnerability to cyber threats and unauthorized access.
  - Impact: Compromised student and faculty data.
  - Mitigation: Implement robust cybersecurity measures, regular audits.
- Technical Support Challenges:
  - Risk: Insufficient technical support for educators.
  - Impact: Downtime in teaching, frustration among educators.
  - Mitigation: Provide comprehensive training, establish a responsive support system.

Financial Risks

- Budget Overruns:
  - Risk: Unexpected costs in acquiring and implementing new technologies.
  - Impact: Financial strain on the institution, potential project delays.
  - Mitigation: Conduct a detailed cost estimation, build a contingency fund.
- ROI Falling Short of Expectations:
  - Risk: Educational benefits not aligning with the projected return on investment.
  - Impact: Perceived inefficiency of the technology integration plan.
  - Mitigation: Regularly assess educational outcomes, adjust strategies accordingly.

Operational Risks

- Disruption of Teaching Activities:
  - Risk: Technical issues causing disruptions during live classes.
  - Impact: Loss of instructional time, negative impact on student experience.
  - Mitigation: Implement backup plans, conduct technical rehearsals.
- Insufficient Training Programs:
  - Risk: Inadequate training leading to underutilization of new technologies.
  - Impact: Reduced effectiveness, frustration among educators.
  - Mitigation: Develop comprehensive training programs, offer ongoing support.

External Risks

- Changing Technological Landscape:
  - Risk: Rapid changes in technology making current solutions obsolete.
  - Impact: Investment in outdated technologies, need for frequent updates.
  - Mitigation: Stay informed about technological trends, plan for scalability.
- Regulatory Compliance Issues:
  - Risk: Failure to comply with educational technology regulations.
  - Impact: Legal consequences, reputational damage.
  - Mitigation: Regularly update policies, stay informed about regulatory changes.

Chapter 4

Sustainability analysis: Required conditions and inclusion strategies

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4 CHAPTER 4
SUSTAINABILITY ANALYSIS: REQUIRED CONDITIONS AND INCLUSION STRATEGIES

The sustainability analysis and operational plan presented herein serve as a roadmap for the successful integration of technology in the educational environment. By establishing a clear vision and delineating specific goals, it can pave the way for purposeful innovation that aligns with overarching objectives. As we embark on this journey of technological integration, it is crucial to remain agile, responsive to emerging needs, and dedicated to overarching vision. Through these concerted efforts, we are poised to create an educational environment that not only embraces innovation but thrives sustainably in the ever-evolving landscape of technology and education.

4.1 Analysis of the conditions required for upgrading teachers/trainers/tutors' digital skills

The key conditions required for upgrading teachers/trainers/tutors' digital skills include:

- Access to adequate technology.
- Comprehensive and targeted professional development programs.
- Cultivating a culture of lifelong learning.
- Collaborative learning communities.
- Supportive institutions and leadership.
- Timely evaluation and feedback mechanisms.

These conditions collectively create an enabling environment for educators to acquire, develop, and apply digital skills effectively in their teaching, training, and tutoring practices. By addressing these conditions, educational institutions and policymakers can support educators in meeting the evolving demands of the digital age and ensuring high-quality education and training for learners.

In today's rapidly evolving educational landscape, the integration of technology in teaching, training, and tutoring has become paramount. To effectively leverage technology and meet the needs of modern learners, upgrading teachers, trainers, and tutors' digital skills has emerged as a crucial priority. This analysis aims to provide an in-depth breakdown of the key conditions necessary for upgrading the digital skills of educators. By understanding these conditions, educational institutions and policymakers can design effective strategies and initiatives to support professional development and ensure educators are equipped with essential digital competencies.

Access to Adequate Technology

To upgrade their digital skills, educators require access to reliable and up-to-date technological infrastructure. This includes access to computers or laptops, high-speed internet connectivity, and appropriate software and digital tools. Without access to these resources, educators may face significant barriers in acquiring and practicing digital skills. Educational institutions and policymakers may need to secure funding for technology investments, establish partnerships with technology providers, and ensure equitable access across educational settings.

Comprehensive and Targeted Professional Development Programs

It is essential to tailor professional development initiatives to the specific needs of educators, considering their existing skill levels, teaching contexts, and subject areas. These programs should be comprehensive, covering a wide range of digital competencies, including digital literacy, digital content creation, online collaboration, and digital assessment methods. Furthermore, these programs should offer ongoing support and follow-up opportunities to ensure continuous growth and improvement. Professional development can be delivered through various formats, such as workshops, training sessions, online courses, webinars, or coaching sessions, catering to educators' diverse learning preferences.

Cultivating a Culture of Lifelong Learning

Educational institutions and policymakers should foster an environment that encourages continuous professional development and embraces the integration of technology in teaching and learning. This can be achieved by providing incentives, recognition, and opportunities for educators to engage in self-directed learning, attend workshops and conferences, and participate in collaborative learning communities. It is important to recognize that educators, especially at a senior level, can feel comfortable in their roles and adverse to new technologies. Learning and developing skills does not have to be a source of conflict, though it is important to understand the perspective of those involved in order to develop a healthy lifelong-learning mindset.

Collaborative Learning Communities

Establishing communities or joining existing professional learning networks allows educators to share experiences, exchange best practices, and learn from one another. These communities can be formed at the institutional level or through online platforms, fostering peer-to-peer support and mentorship. Through these communities, educators can develop a sense of belonging, build professional networks, and access a wide range of expertise to enhance their digital skill sets.

Supportive Institutions and Leadership

Decision-makers need to demonstrate a commitment to digital upskilling and prioritize the professional development of educators. This includes allocating resources; providing time for training and experimentation; and recognizing the importance of digital skills in achieving educational goals. Leadership should promote a positive attitude towards the use of technology in lessons and encourage educators to embrace and develop their digital competencies. By fostering a collaborative relationship between leadership and educators, institutions can ensure a culture of continuous improvement and create opportunities for innovation.

Timely Evaluation and Feedback Mechanisms

Regular evaluation and feedback mechanisms are essential to assess the effectiveness of digital skills upskilling initiatives and to make necessary adjustments. A replicable process should be established for evaluating the impact of initiatives to improve educators' digital skills and teaching practices. The feedback should be timely, to ensure responses are still fresh in the mind, and to make the feedback collection itself a part an integral part of the process. By leveraging data and feedback, institutions can refine their strategies, address gaps, and enhance the overall quality of digital skills development initiatives.

4.2 Identification of strategies for the effective transfer of skills in the adoption of new technologies

The strategic issues to be considered to promote the adoption of new technologies in teaching are connected with the empowerment of individuals, groups and organizations.

The following activities aim at promoting on the one hand a process of self-activation in trainers, teachers and tutors and on the other hand developing an attitude towards valorization and capitalization of skills and human capital in the organizations themselves.

Design and implement comprehensive professional development programs

Programs that specifically target the digital skills required for integrating new technologies in teaching should be sought after and/or developed. These programs should be well-structured, provide hands-on training, and offer ongoing support to educators. The content and delivery methods should be malleable to suit the needs and preferences of the participants.

Provide access to adequate technological resources

Ensure that educators have access to the necessary technological resources, including hardware, software, and internet connectivity. This may involve upgrading or equipping classrooms with computers, providing licenses for educational software, and ensuring reliable internet access.

Foster a supportive and collaborative learning environment

Create opportunities for educators to collaborate and share their experiences with new technologies. Participate in communities or professional networks where educators can exchange ideas, seek guidance, and learn from one another. Encourage peer mentoring to enhance skill transfer and adoption.

Offer continuous support and follow-up

Professional development should not end with a one-time training session. Provide ongoing support and follow-up opportunities to reinforce and expand upon the skills acquired. Encourage educators to reflect on their practice and seek continuous improvement.

Encourage experimentation and risk-taking

Create a safe space where educators feel empowered to take risks and embrace technology in their teaching practice. Encourage educators to try out different tools, explore innovative teaching methods, and learn from both successes and failures.

Recognize and celebrate successes

Acknowledge and celebrate the successes of educators who successfully adopt new technologies in their teaching. Highlight and share best practices, success stories, and innovative approaches. This recognition not only motivates individual educators but also inspires others to embrace technology and work towards enhancing their digital skills.

Incorporate feedback and evaluation

Regularly gather feedback from educators and students about their experiences with the adoption of new technologies. Use this feedback to assess the effectiveness of the strategies and make necessary adjustments. Additionally, conduct evaluations to measure the impact of technology integration on student learning outcomes and teacher effectiveness. This data can inform future professional development efforts and guide decision-making.

4.3 General guidelines applicable to any education system

Creating digital practical lessons can be an effective way to deliver instruction and engage learners in an interactive and hands-on manner. Here is a collection of operational guidelines to help you create high-quality digital practical lessons. By following these operational guidelines, you can create effective and engaging digital practical lessons that promote active learning and enhance the educational experience for your learners:

- **Define learning objectives**
  - Clearly outline the specific learning outcomes you want to achieve through the practical lesson. This will guide your content creation process and ensure that the lesson is focused and aligned with the desired learning goals.

- **Identify the target audience**
  - Consider the characteristics and prior knowledge of your target audience. This will help you tailor the content and language appropriately to ensure maximum comprehension and engagement.

- **Choose a suitable digital platform**
  - Select a digital platform or learning management system that supports the creation and delivery of interactive practical lessons. Consider factors such as ease of use, multimedia integration, and accessibility options.

- **Plan the lesson structure**
  - Organize the lesson into logical sections or modules. Introduce the topic, clearly present the steps or procedures involved, and conclude with a summary or assessment.

- **Use multimedia elements**
  - Incorporate relevant multimedia elements such as images, videos, audio clips, and infographics to enhance the learning experience. Visual aids can help clarify complex concepts and make the instructions more accessible.

- **Break down complex tasks**
  - If the practical lesson involves complex tasks or processes, break them down into smaller, manageable steps. Clearly explain each step using concise and straightforward language.

- **Provide clear instructions**
  - Ensure that your instructions are clear, concise, and easy to follow. Use numbered or bulleted lists to break down the steps and consider providing additional explanations or examples where necessary.
  - Include interactive elements. Engage learners actively by including interactive elements such as quizzes, drag-and-drop activities, or simulations. These interactive components can reinforce learning and provide opportunities for immediate feedback.

- **Incorporate real-life examples and scenarios**
  - Relate the practical lesson to real-life situations or scenarios to make the content more relatable and applicable. This helps learners understand the practical relevance of the concepts they are learning.
  - Include practice exercises.
  - Provide opportunities for learners to practice and apply the skills or knowledge covered in the practical lesson. Include practice exercises, case studies, or hands-on activities that allow learners to reinforce their understanding and build proficiency.

- **Test for comprehension**
  - Include formative assessments or knowledge checks throughout the lesson to gauge learners' understanding. Use multiple-choice questions, short quizzes, or interactive activities to assess comprehension and provide immediate feedback.

- **Ensure accessibility**
  - Design your digital practical lessons with accessibility in mind. Provide alternative text for images, captions for videos, and use readable fonts and color contrasts. Consider the needs of learners with disabilities and provide appropriate accommodations.

- **Seek feedback and iterate**
  - After creating and delivering the practical lesson, collect feedback from learners and instructors. Use this feedback to improve and refine your content and delivery methods for future lessons.

4.4 VET education relevant guidelines

When creating digital practical lessons for vocational education and training, here are some additional considerations and relevant information:

Industry-specific terminology

- Understand the terminology and language used in the vocational field you are focusing on. Incorporate industry-specific terms and explain their meaning to familiarize learners with the vocabulary they will encounter in their careers.

Safety protocols and procedures

- Emphasize safety guidelines and best practices relevant to the specific vocational career. Include detailed instructions on how to handle equipment, use personal protective equipment (PPE), and follow safety protocols to ensure a safe working environment.

Demonstrations and simulations

- Utilize video demonstrations or interactive simulations to provide learners with a realistic experience of vocational tasks. This can include step-by-step walkthroughs, virtual labs, or virtual reality (VR) experiences that allow learners to practice and gain confidence in their skills.

Work-based learning experiences

- Incorporate real-world scenarios, case studies, or virtual internships to give learners exposure to practical situations they may encounter in their vocational careers. This helps bridge the gap between theoretical knowledge and hands-on application.

Collaborative learning opportunities

- Foster collaboration among learners by incorporating group projects or discussions. This allows them to work together, share experiences, and problem-solve as they would in a vocational workplace setting.

On-the-job challenges and problem-solving

- Present learners with authentic challenges or problem-solving scenarios that mirror real-life situations they may face in their vocational careers. Encourage critical thinking and decision-making skills by asking learners to devise solutions and justify their approaches.

Integration of technology

- Depending on the vocational field, explore ways to integrate relevant technology tools or software applications into the practical lessons. For example, in the automotive industry, learners can practice using diagnostic tools or computerized systems for vehicle maintenance and repair.

Industry guest speakers or mentors

- Arrange for guest speakers from the industry or mentors who can share their experiences and insights with learners. This helps learners understand the practical aspects of the vocation and provides networking opportunities.

Continuous assessment and feedback

- Implement ongoing assessments, such as quizzes, performance evaluations, or portfolio submissions, to gauge learners' progress and provide constructive feedback. This allows learners to track their development and identify areas for improvement.

Professional development resources

- Provide additional resources, such as recommended readings, online tutorials, or webinars, to support learners' professional development beyond the digital practical lessons. Encourage them to explore further learning opportunities and stay updated with industry trends.

Tip: In order to tailor these guidelines to the specific vocational careers you are focusing on, consider the unique skills, knowledge, and challenges associated with each field.

Chapter 5

Recommendations

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5 CHAPTER 5
RECOMMENDATIONS

This report developed by the UpDATE consortium acts as a systematic and objective examination of the proposed project. It is intended to help stakeholders make informed decisions about its viability, potential challenges, and overall feasibility. It is a crucial step in the planning process, laying the groundwork for successful implementation and minimizing the risk of failure.

The document comprises four main chapters:

- Chapter 1 discussed the design of the blended course and its framework, aimed at facilitating continuous learning for training professionals.
- Chapter 2 reported on the findings of conducting our own empirical research.
- Chapter 3 focused on conducting a feasibility analysis to support the integration of various aspects, including pedagogical, organizational, technical, and financial considerations.
- Chapter 4 delved into a sustainability analysis, shedding light on the strategies required to implement on a daily basis the lessons learned from the project, concludes by providing recommendations for the implementation of the future IOs envisioned by the project.

It is evident that a comprehensive long-term technologies integration plan in vocational education is a strategic investment in the future workforce. By harnessing the power of digital learning platforms, virtual and augmented reality, data analytics, and industry-specific simulations, educational institutions can prepare students to meet the evolving demands of the job market. It is essentially a strategic investment in shaping a future workforce that is not only to be proficient in traditional vocational skills but is also to be well-versed in cutting-edge technologies. By strategically incorporating various technological tools, educational institutions can offer an enriched and future-ready learning experience for their students.

As we navigate the technological landscape of the 21st century, a commitment to ongoing innovation in vocational education ensures that students are not only equipped with the skills of today but are also adaptable to the challenges of tomorrow.

In the ever-evolving landscape of education, the integration of technology has become paramount to prepare students for the challenges of the future. This holds especially true for vocational education, where aligning with long-term technological advancements is crucial. A well-thought-out long-term technologies integration plan in vocational education can bridge the gap between traditional skill development and the demands of the modern workforce.

A feasibility and sustainability study are a critical step in the early stages of planning for a project, or in the education process. The primary purpose of a feasibility study is to assess the viability, practicality, and potential success of the proposed undertaking. The present plan is a useful guide addressing the needs of all educators and trainers in evaluating their teaching methods, with any potential for success in terms of meeting objectives, achieving goals, and producing the desired outcomes.

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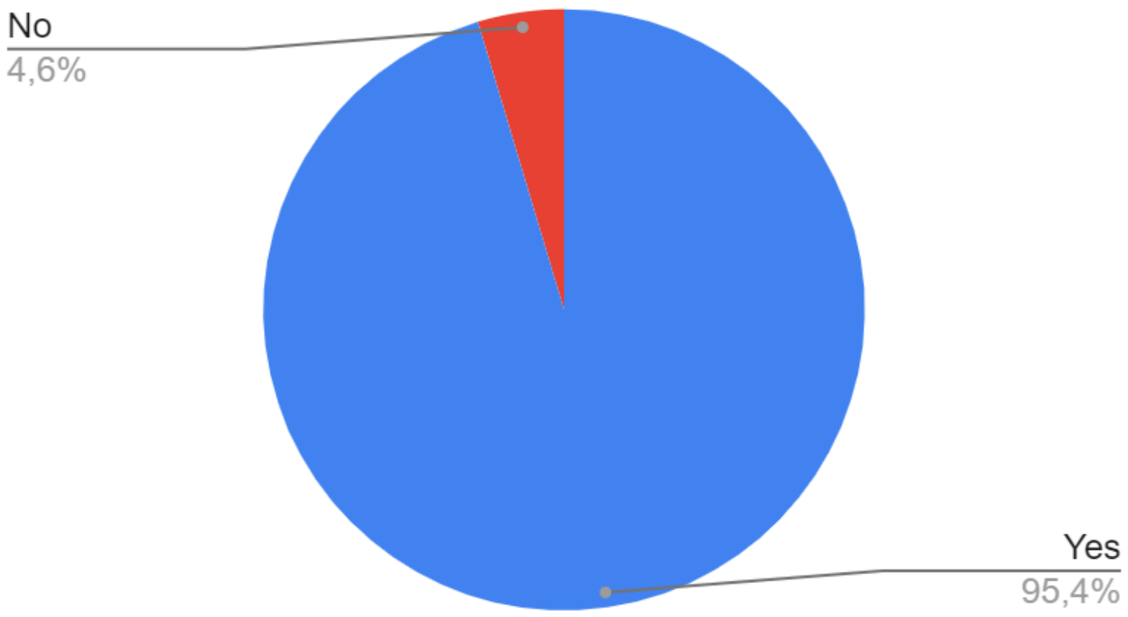
- Learning and Creativity by European Commission: https://www.coe.int/en/web/digital-citizenship-education/learning-and-creativity

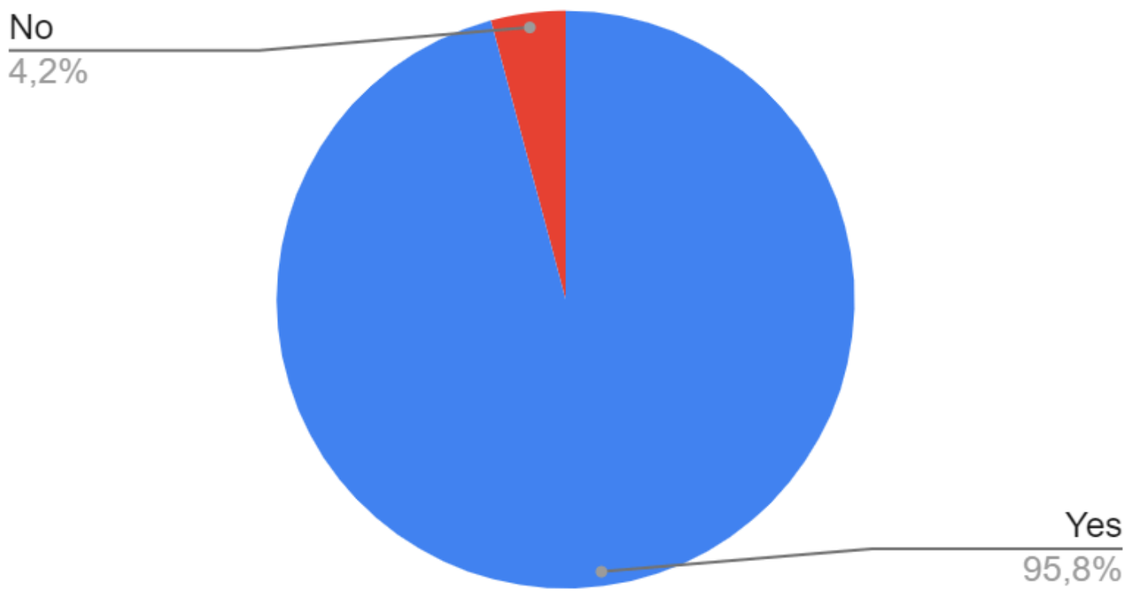
Annexes

ANNEX I. Graphs from evaluation of the blended course

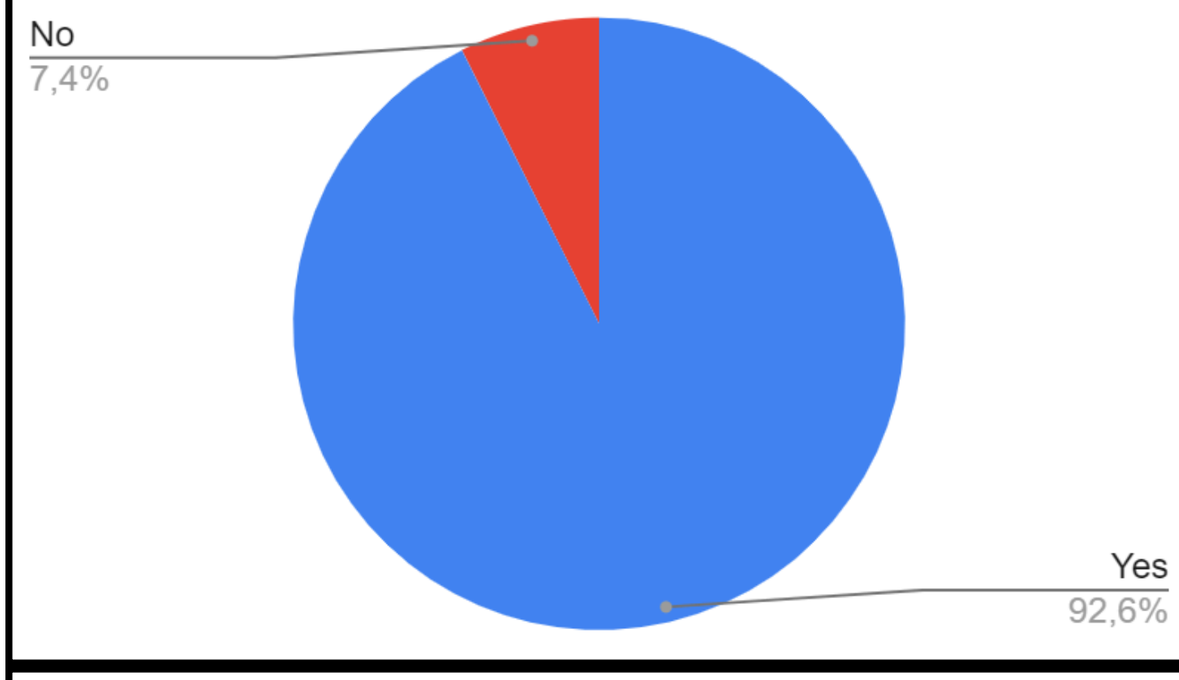
Did the course meet your expectations?



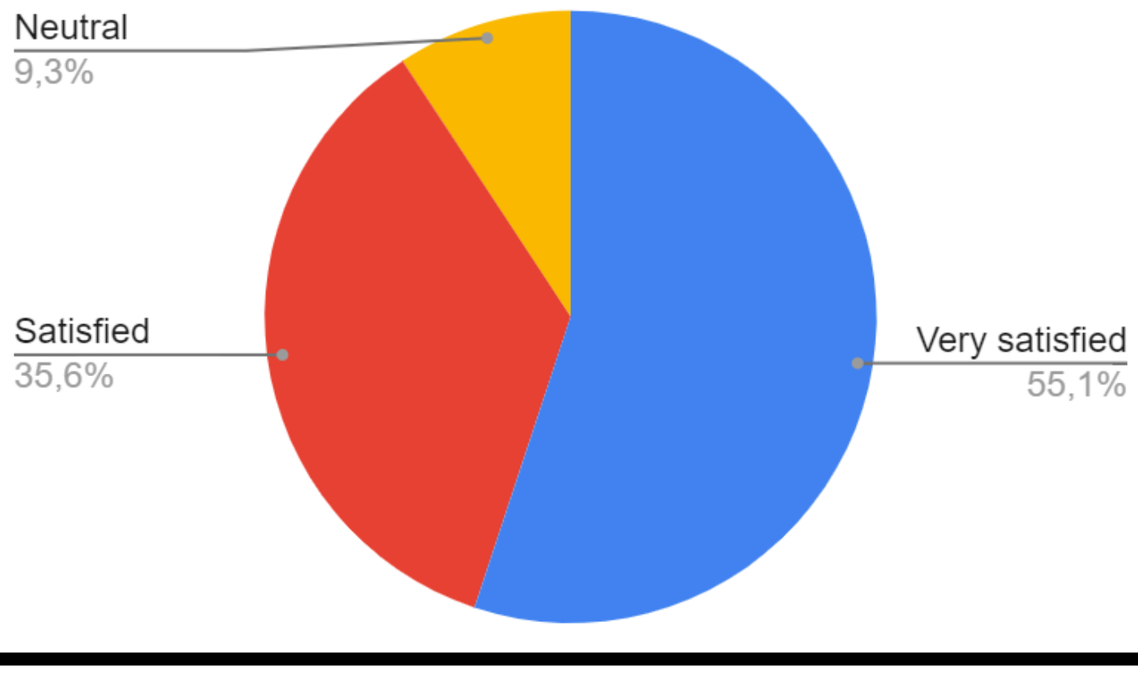
Has the course enriched your knowledge of digital and blended learning in vocational education and training?



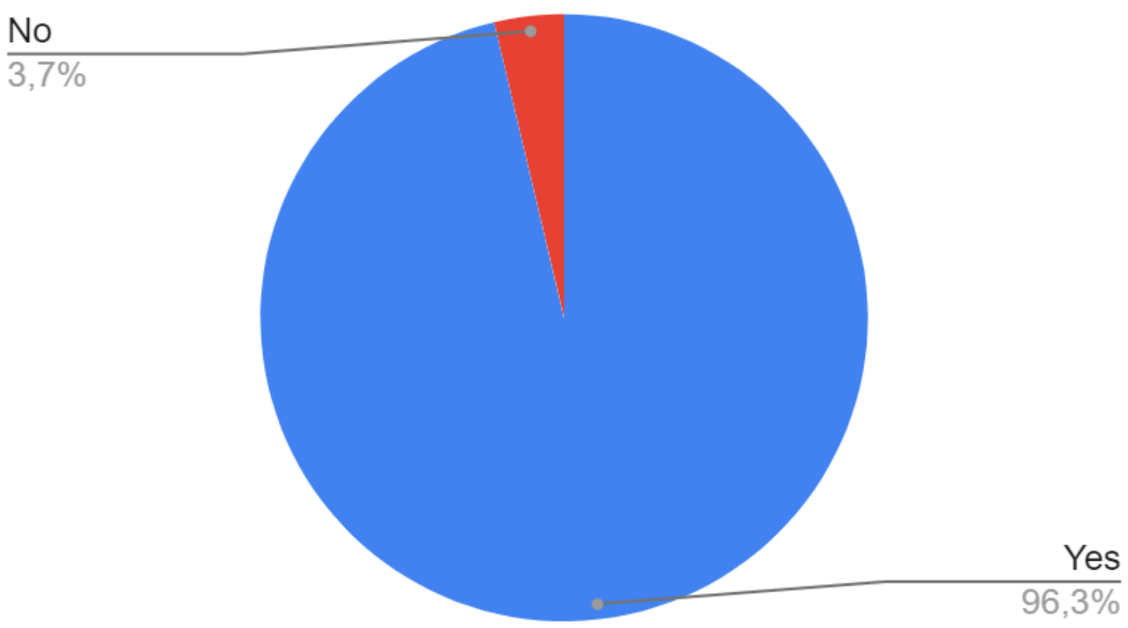
Did you find the timeframe reasonable?



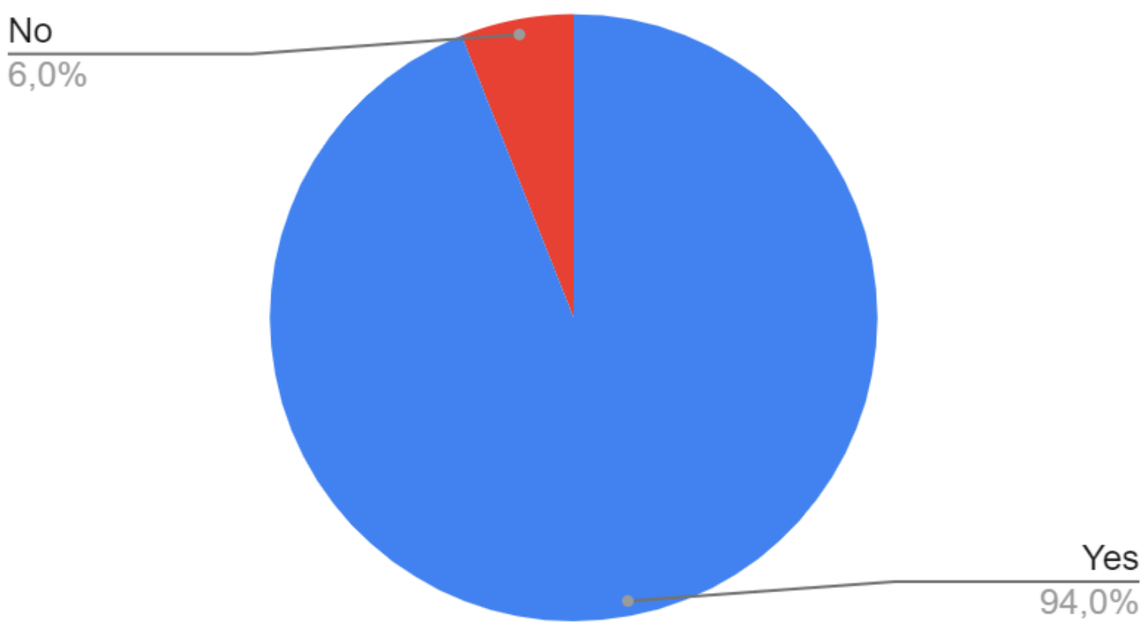
How satisfied are you with the overall quality of the UPDATE course?



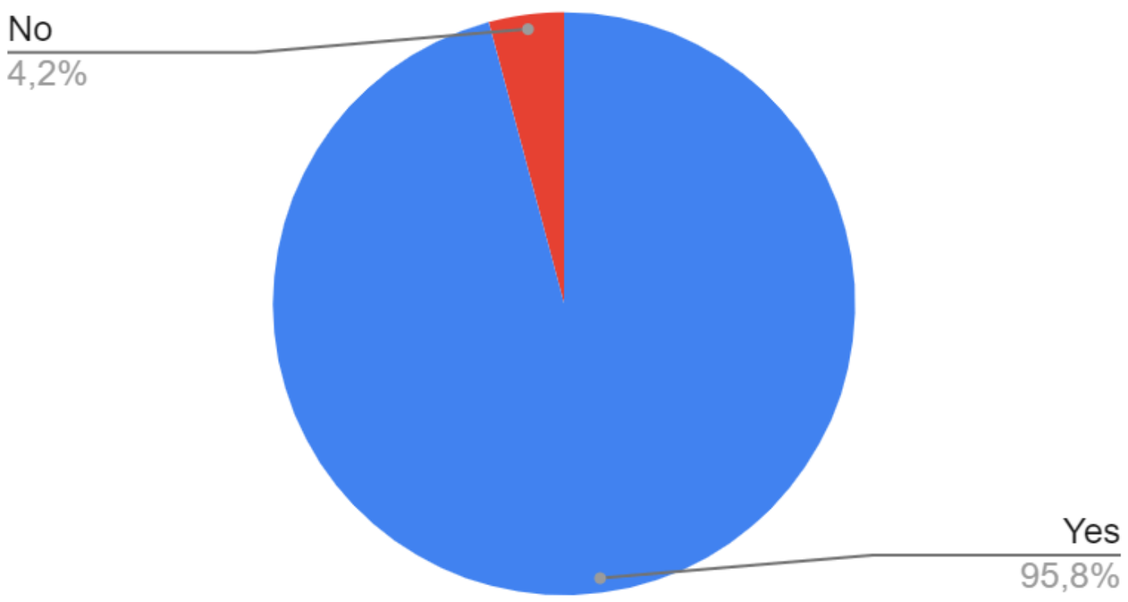
Would you recommend this course to other colleagues?



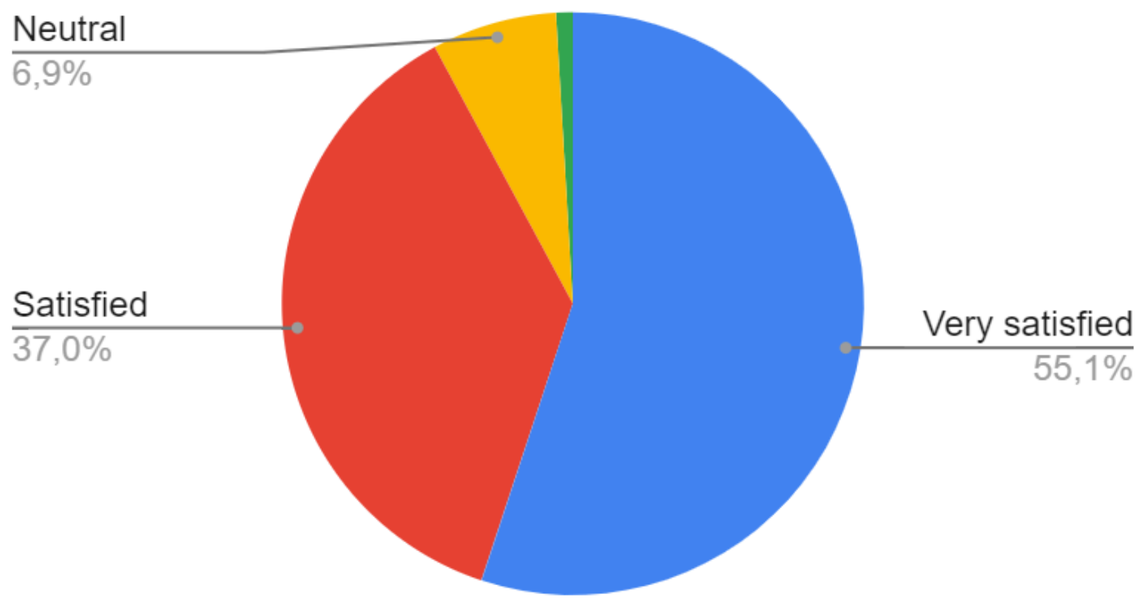
Did you find the online learning platform easy to use?



Are you satisfied with how the online learning platform has enabled you to engage with the learning content?



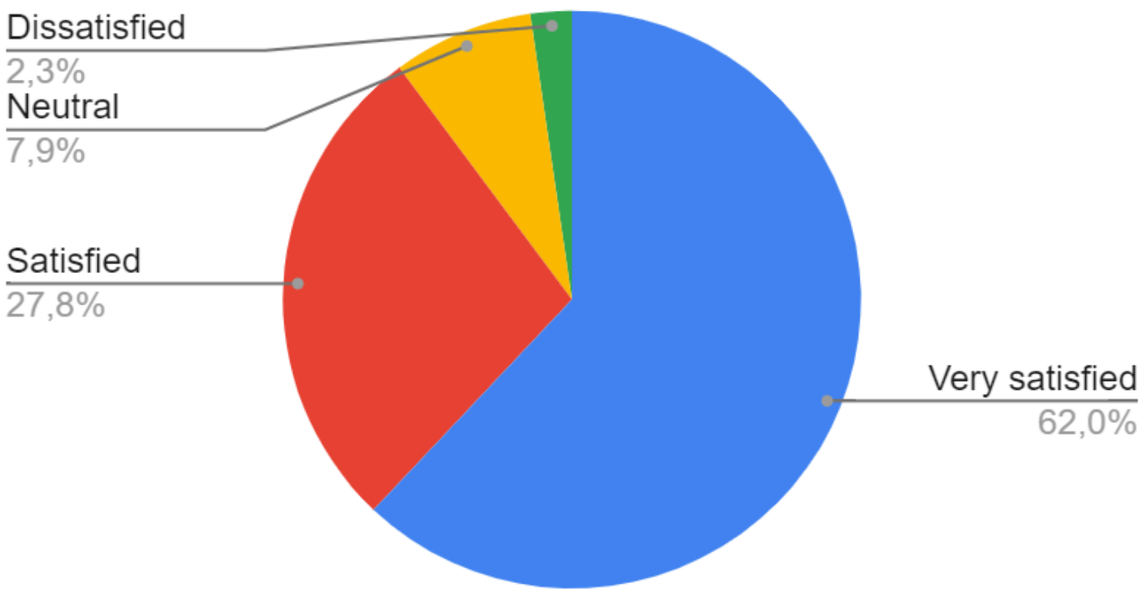
How satisfied are you with the online learning environment in the aesthetic quality of graphics



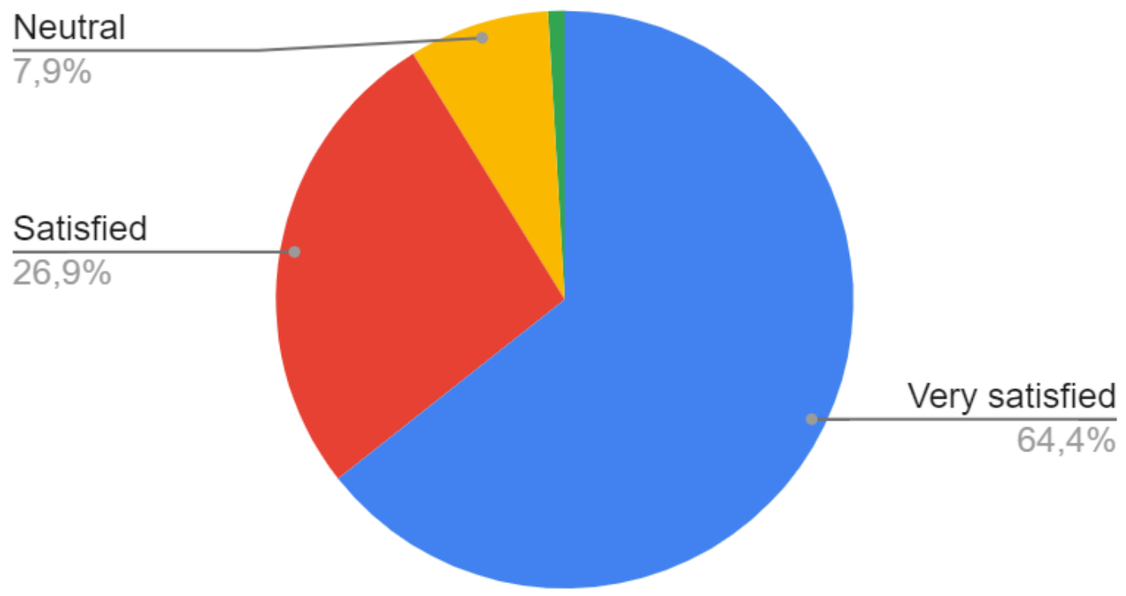
Annexes

ANNEX I. Graphs from evaluation of the blended course

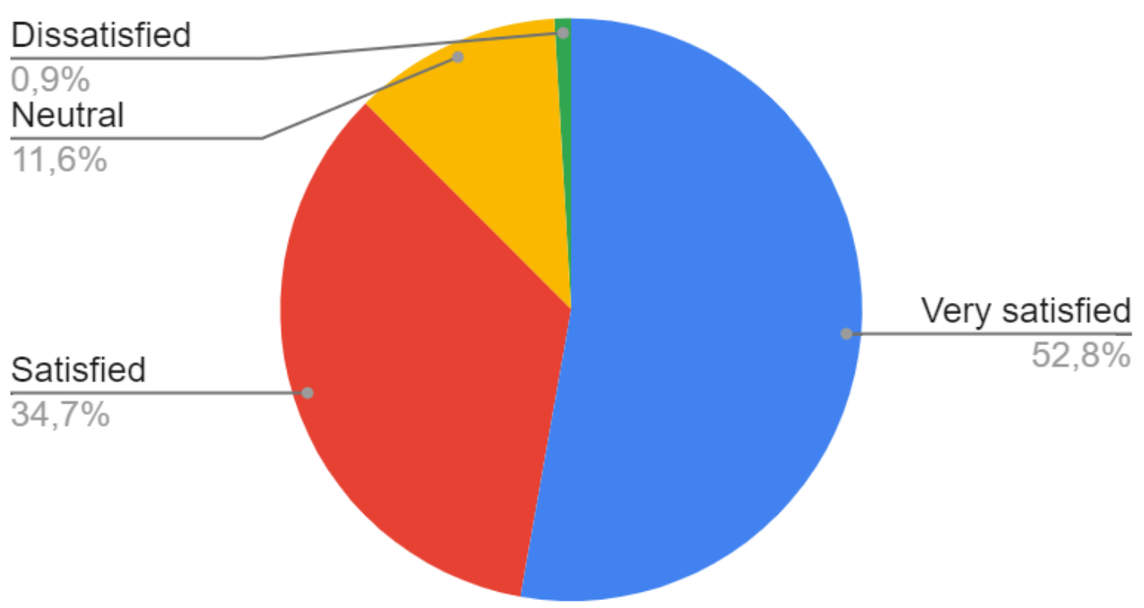
How satisfied are you with the online learning environment in the usability while browsing



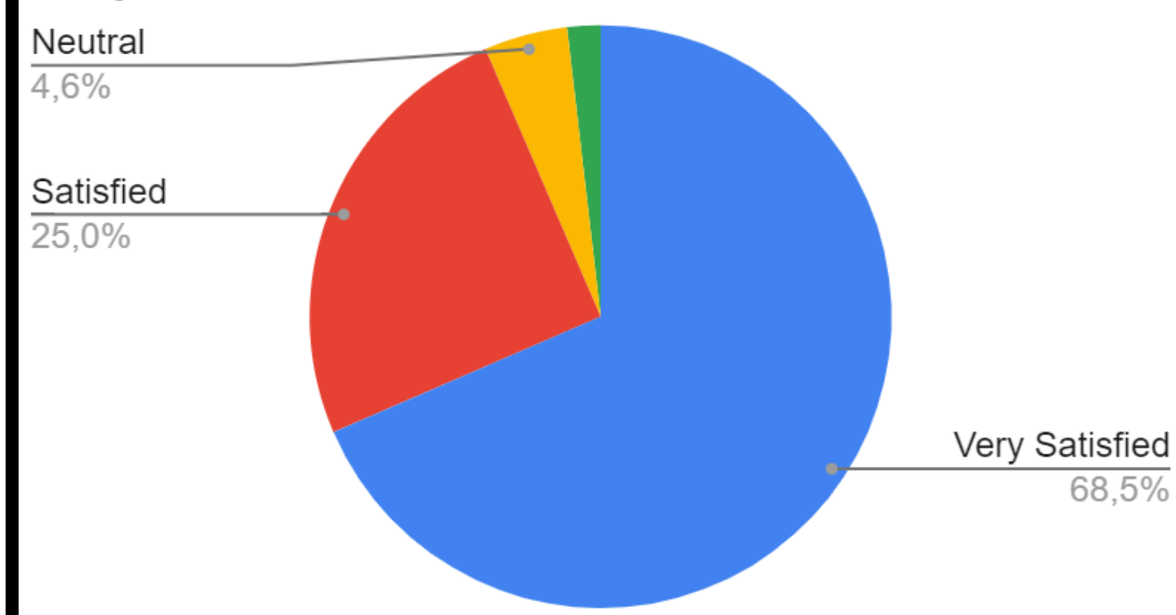
How satisfied are you with the online learning environment in the structure of modules and topics



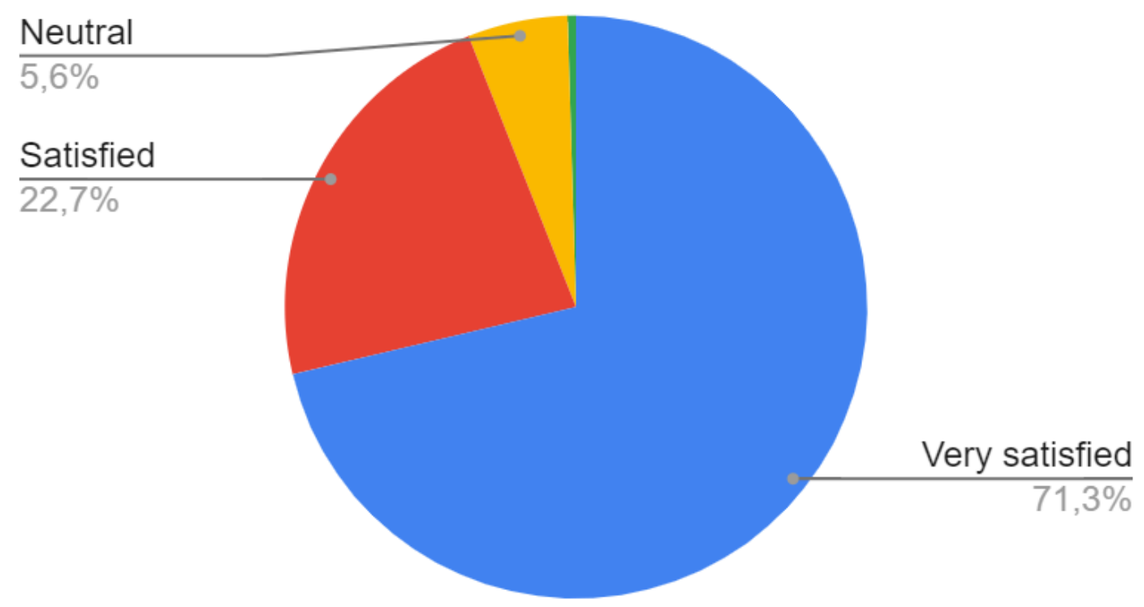
How satisfied are you with the way you communicate through different communication tools (forums, direct messages, e-mails, etc.)]?



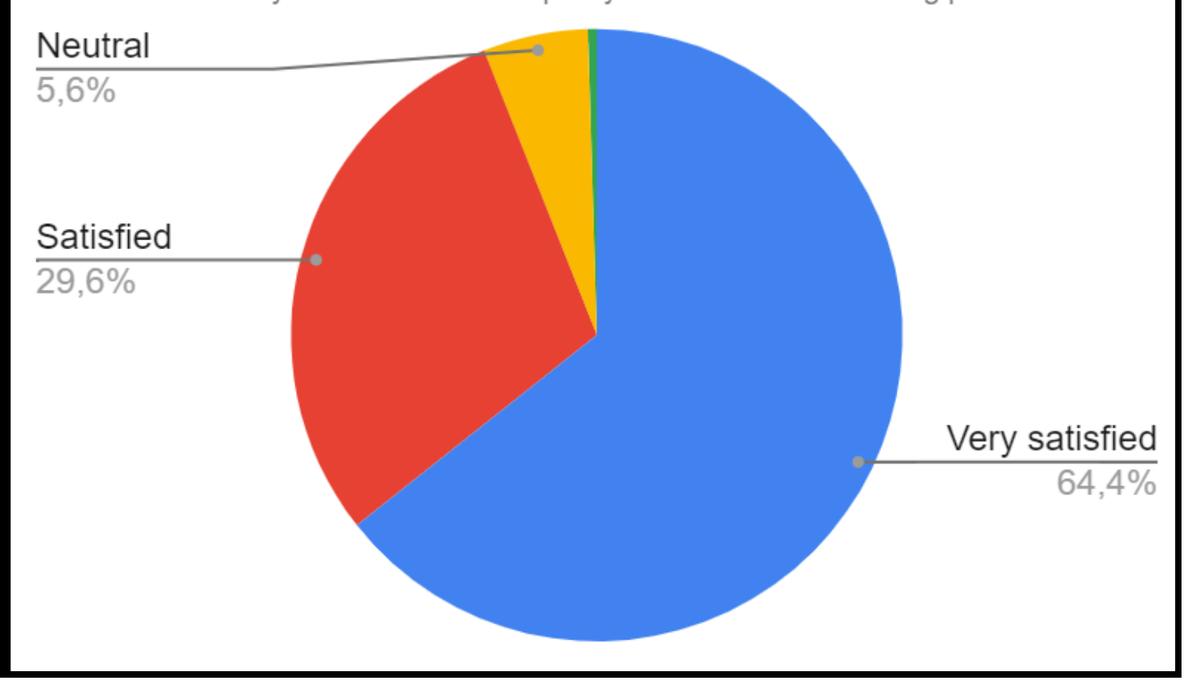
How Satisfied are you with the online learning environment in the ease of access to training materials



How satisfied are you with the online learning environment in the availability of training materials



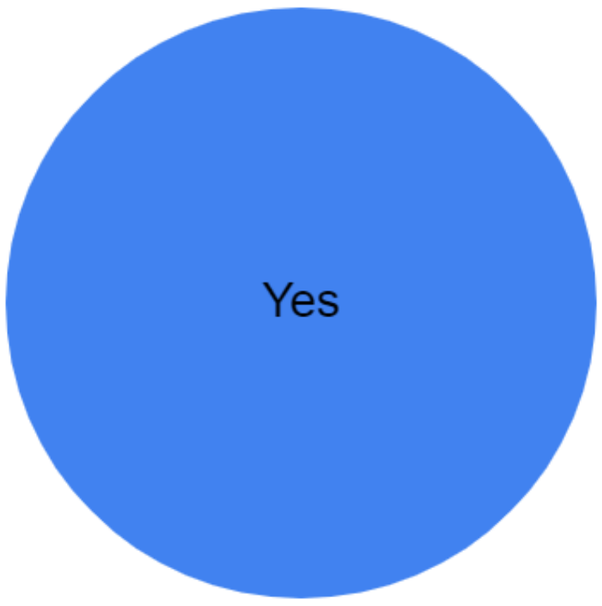
How satisfied are you with the overall quality of the UPDATE learning platform?



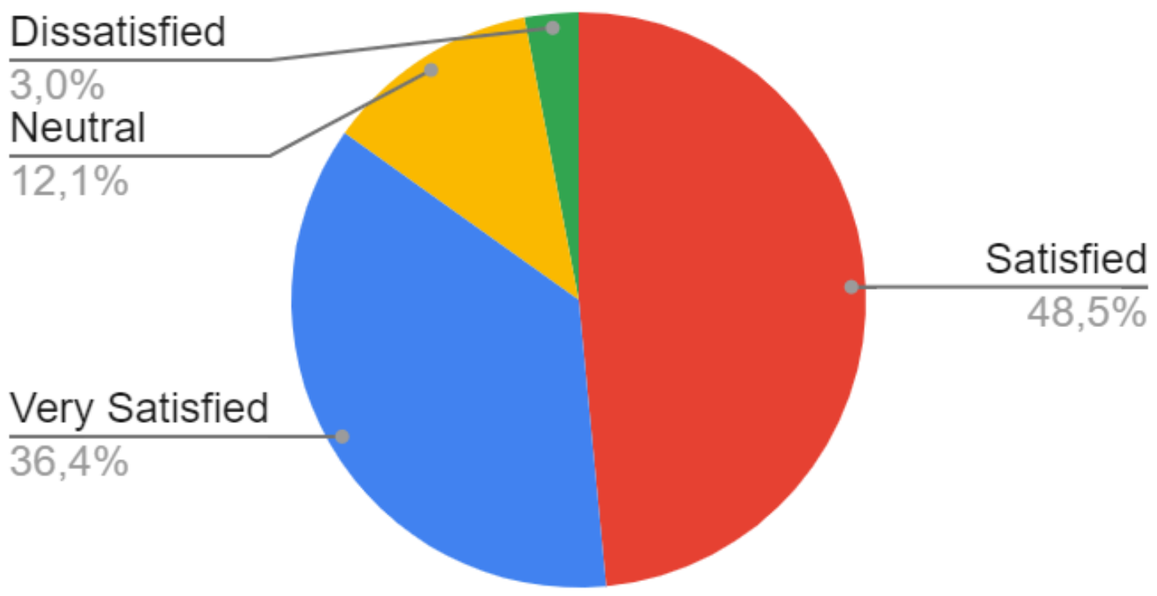
Annexes

ANNEX II. Graphs from evaluation of the piloting/experimentation phase (trainers)

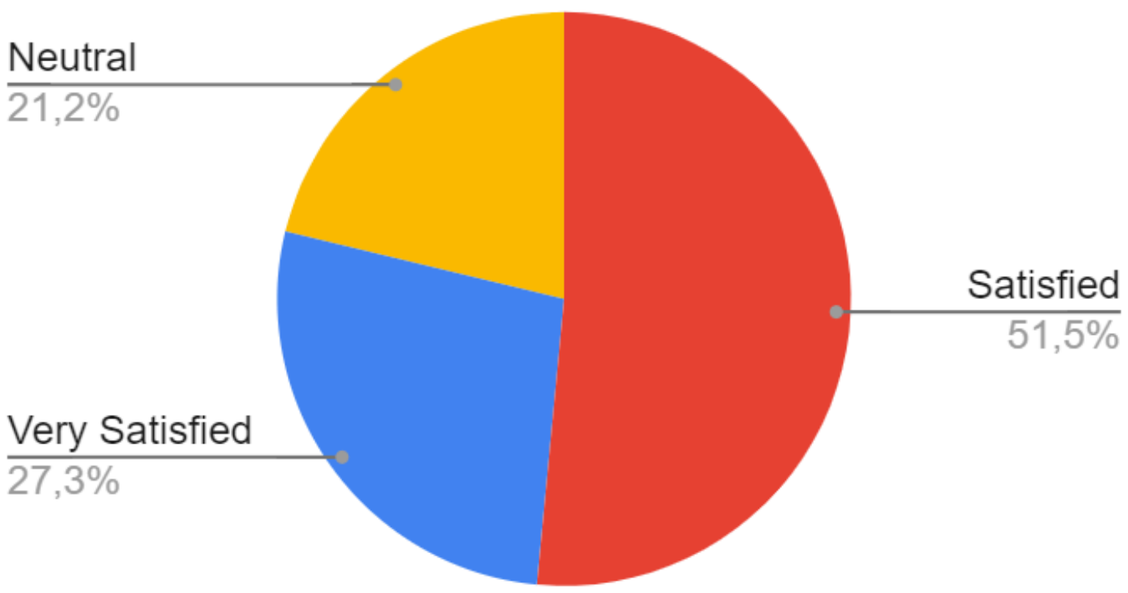
Were your expectations met?



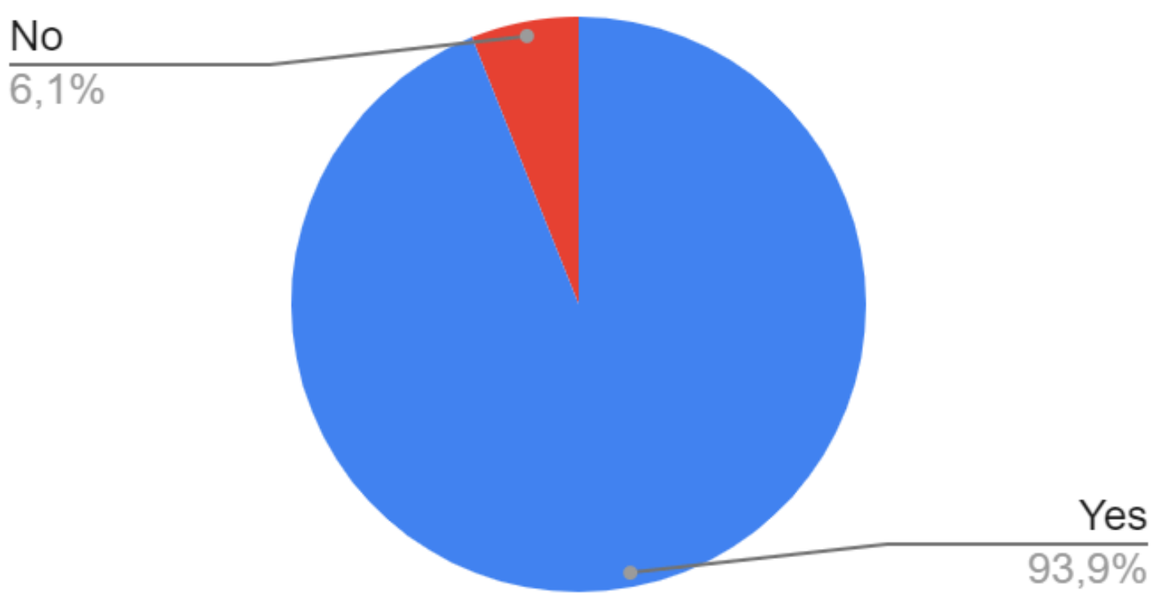
What is your overall satisfaction from the UPDATE experimentation phase?



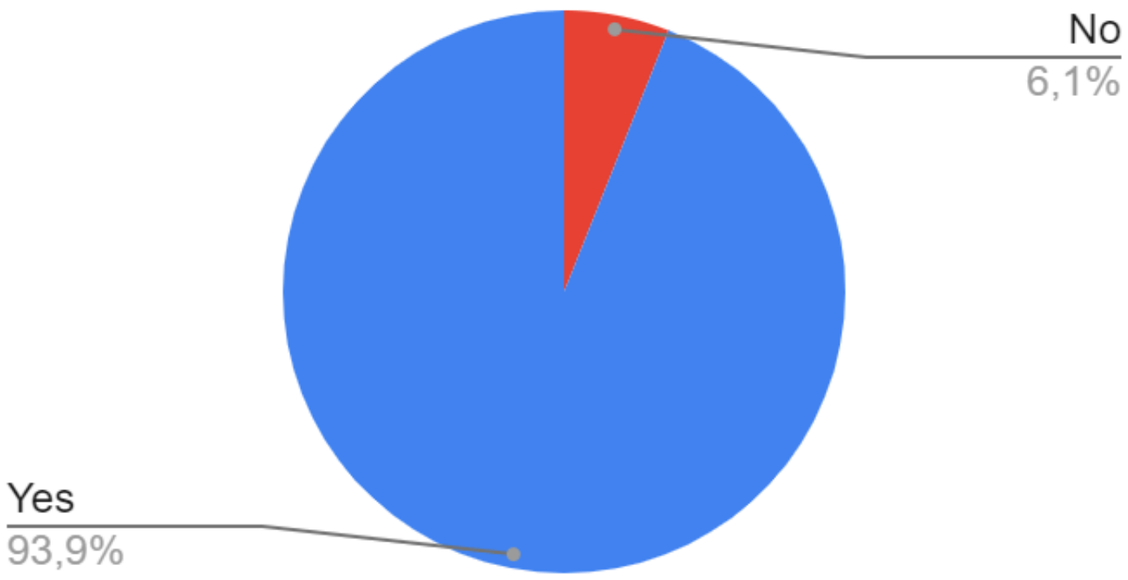
How satisfied are you with the guidelines and support provided during the experimentation?



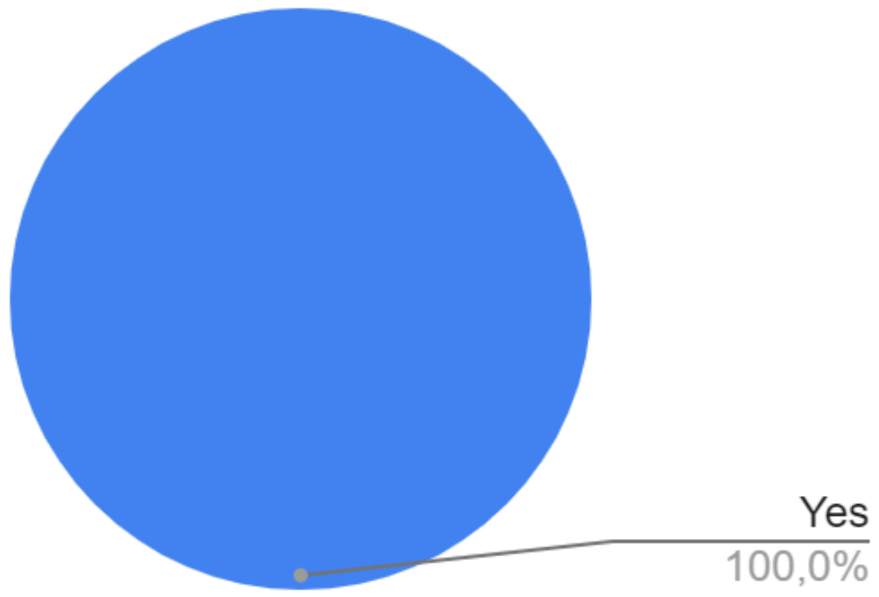
Do you feel more effective and aware in role-taking after the UPDATE experience?



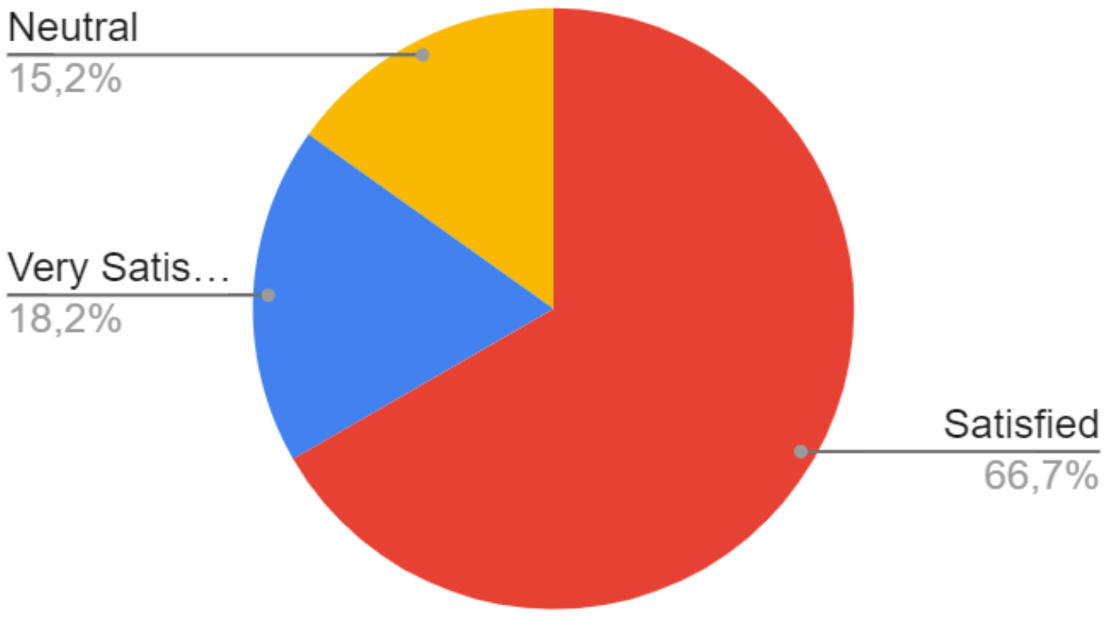
Has the UPDATE experience improved your aptitude towards continuous learning?



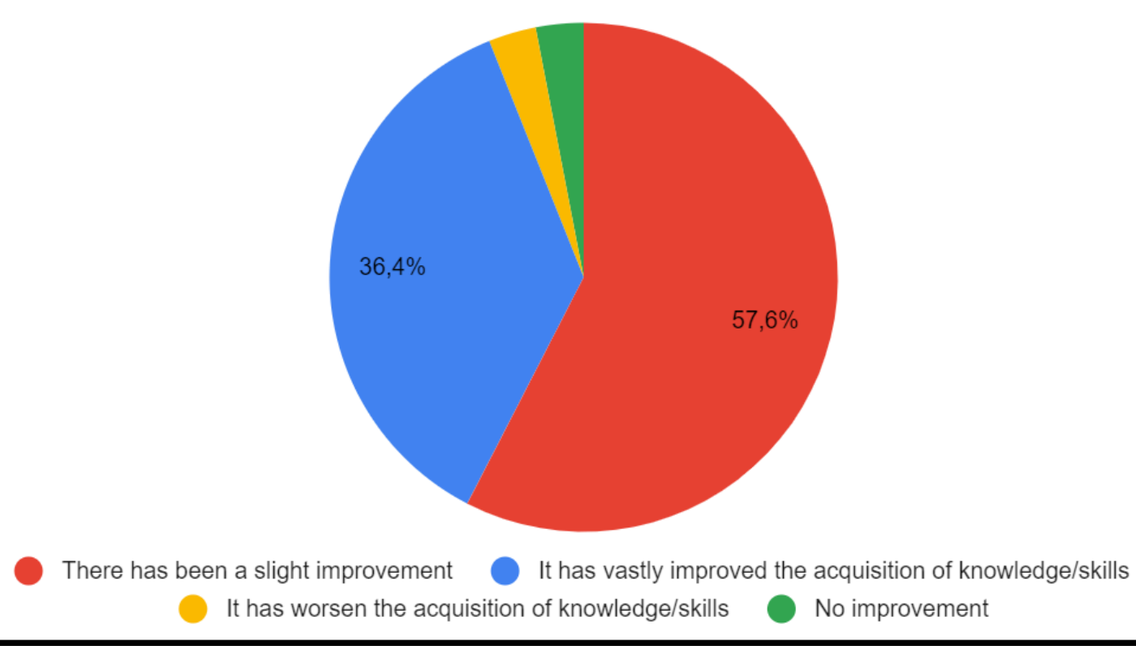
Has the training improved your skills in the creation of the digital contents?



How satisfied are you with the trainees' response to digital teaching?



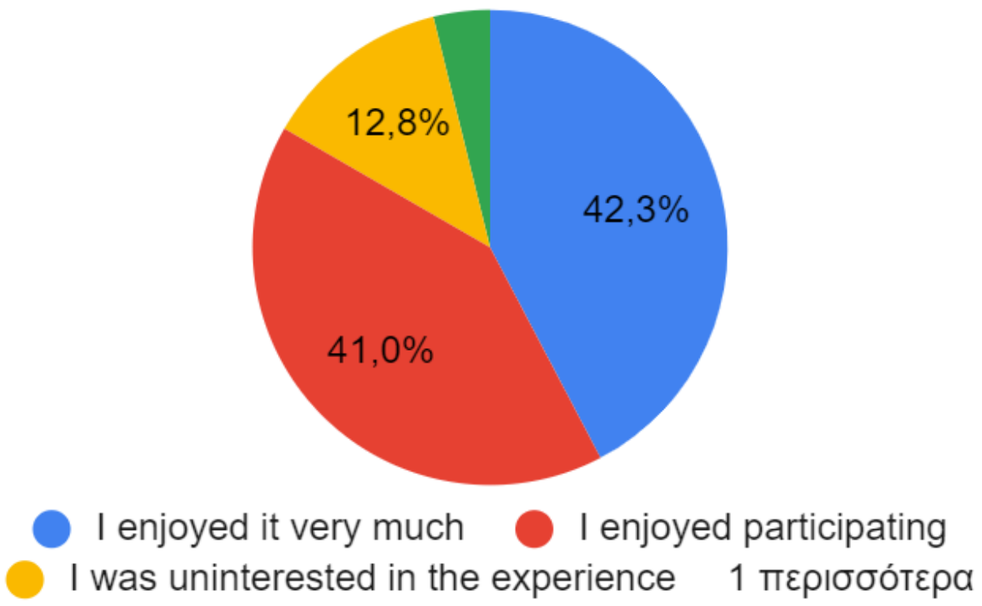
From your point of view, to which extent has the use of digital tools in teaching improved the acquisition of knowledge/skills?



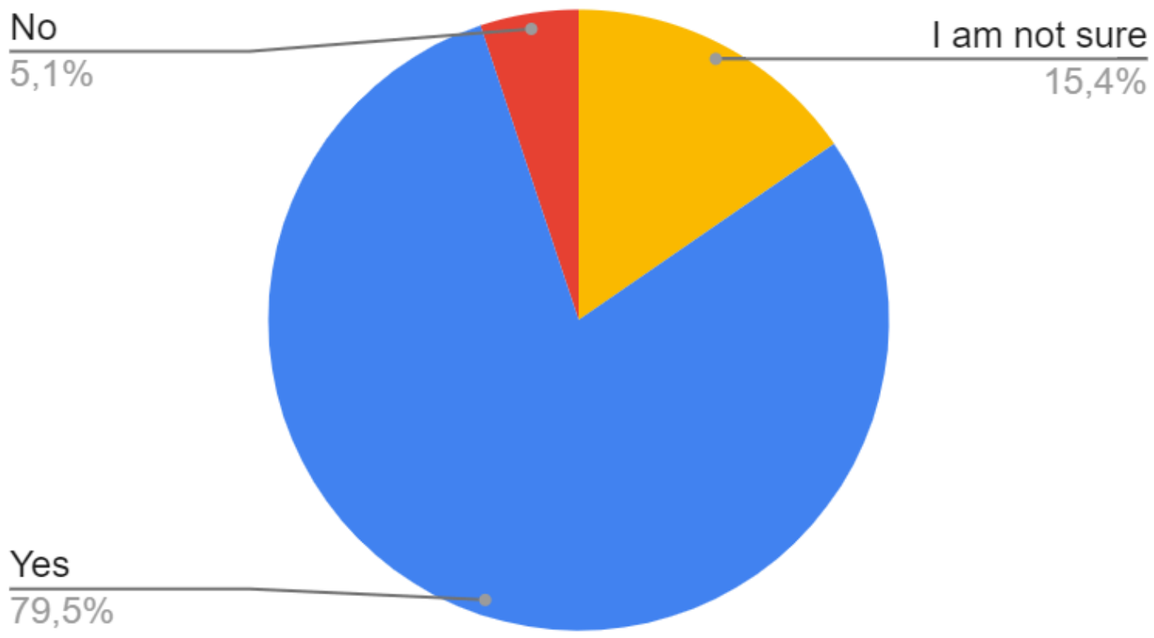
Annexes

ANNEX II. Graphs from evaluation of the piloting/experimentation phase (trainees)

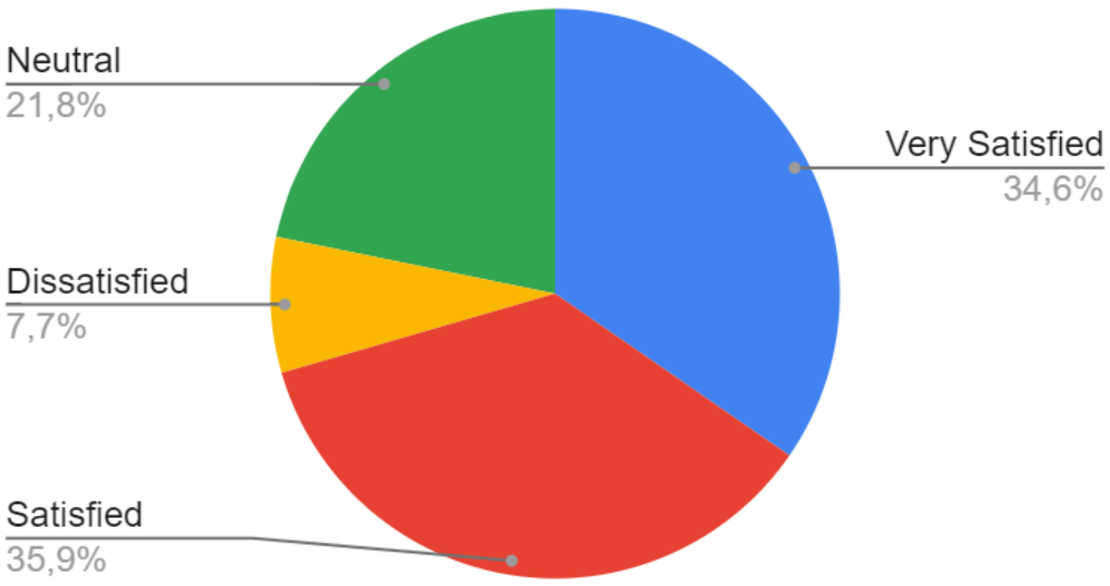
Did you enjoy participating in the educational activity promoted by the UPDATE project?



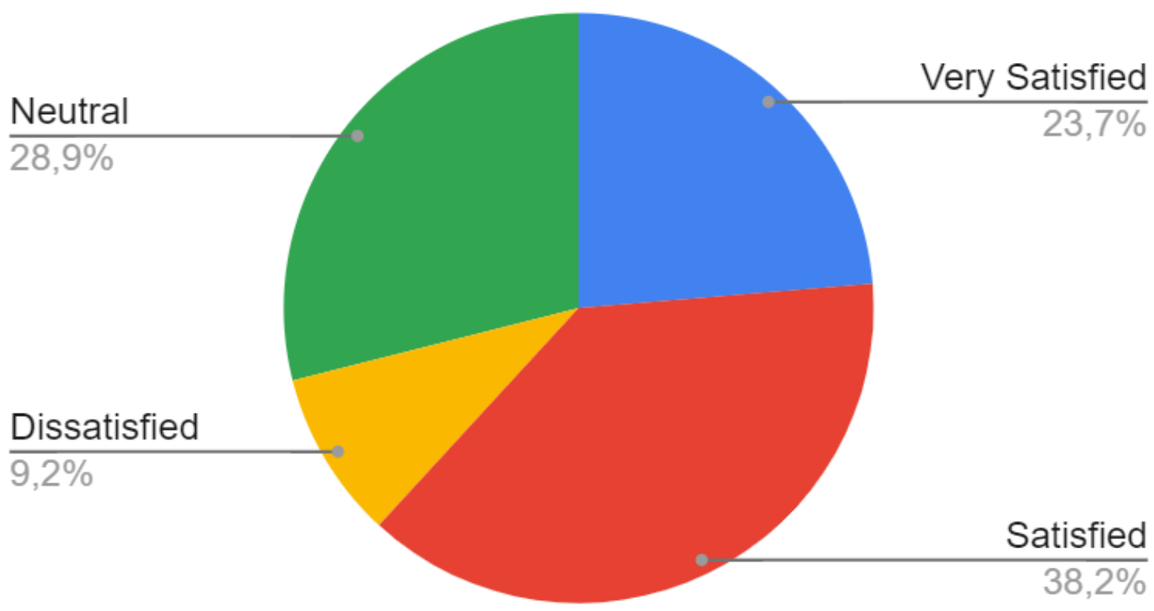
In your opinion, does the use of digital tools improve the quality of teaching?



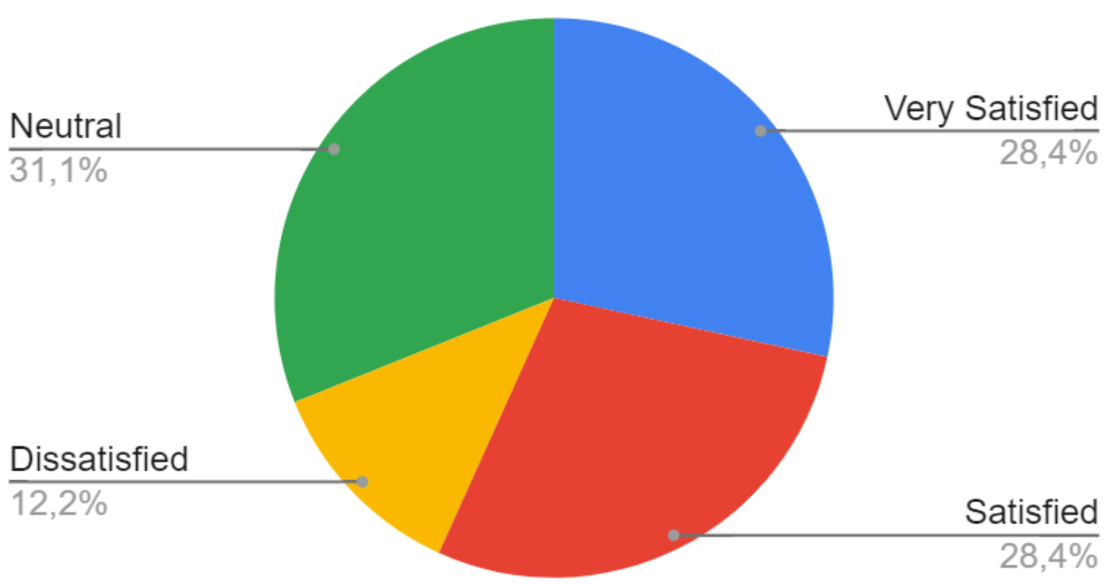
How do you feel about the following regarding your experience with digital tools in the treaching process: [It made the lesson more interesting]



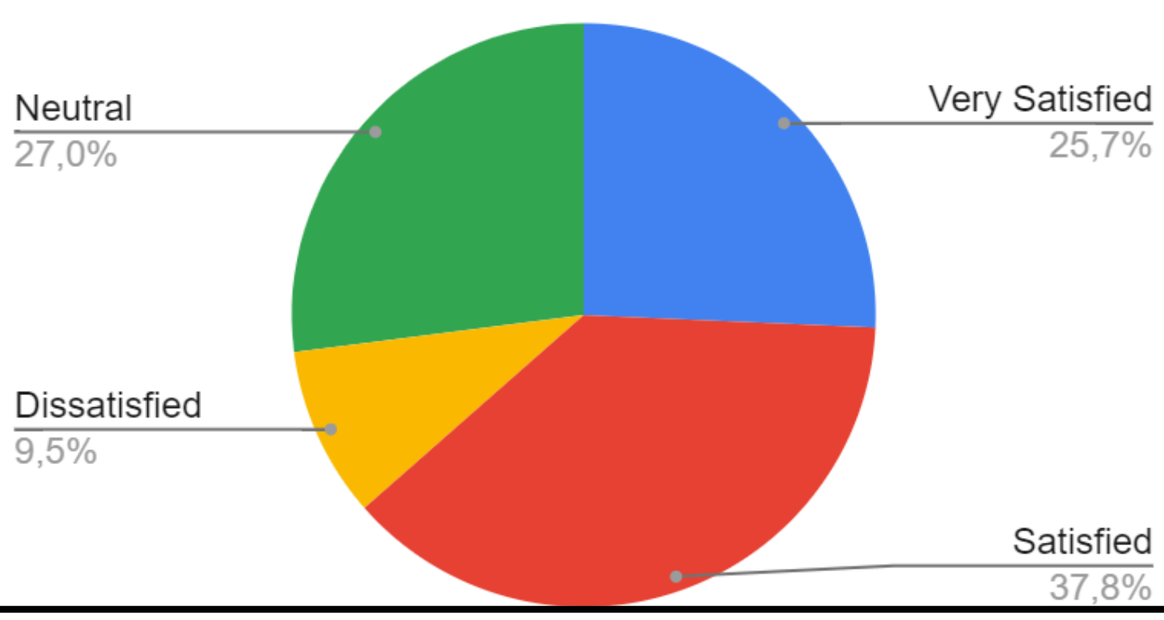
How do you feel about the following regarding your experience with digital tools in the treaching process: [It made the class funnier]



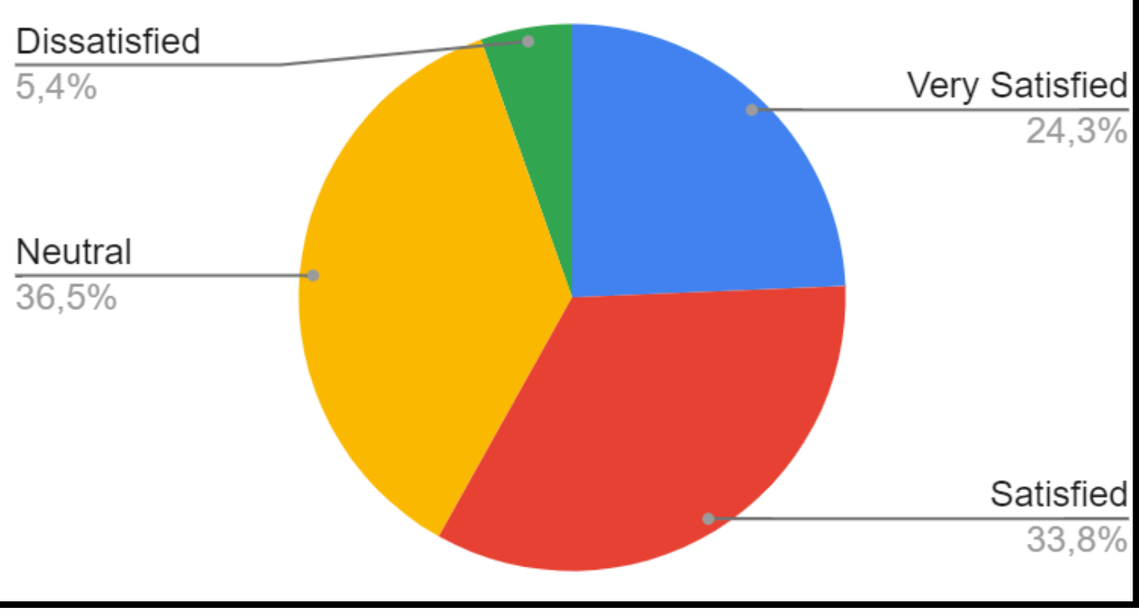
How do you feel about the following regarding your experience with digital tools in the treaching process: [I felt like participating more]



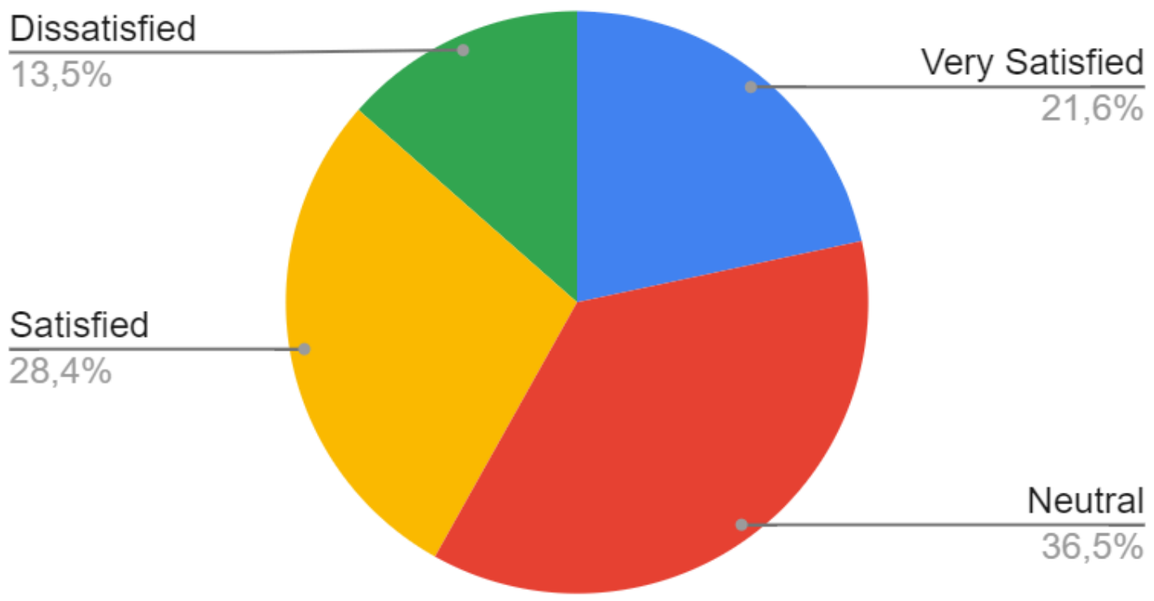
How do you feel about the following regarding your experience with digital tools in the treaching process: [I was able to understand the content better]



How do you feel about the following regarding your experience with digital tools in the treaching process: [I was able to express my opinion thanks to online interaction]



How do you feel about the following regarding your experience with digital tools in the treaching process: [I was able to interact more with my classmates]



Annexes

ANNEX II. Graphs from evaluation of the piloting/experimentation phase (trainees)