EDUdig e-Handbook

Enhancing the Development of Educators' Digital Competencies

Co-funded by the Erasmus+ Programme of the European Union
2020-1-AT01-KA226-HE-092677

UNIVERSITY OF APPLIED SCIENCES UPPER AUSTRIA

AMMATTIKORKEAKOULU University of Applied Sciences

universidade de aveiro

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Co-funded by the Erasmus+ Programme of the European Union
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Enhancing the Development of Educators' Digital Competencies

Ruben Alves, Ana Balula, Susana Caixinha, Tarja Chydenius, Barbara Ehrenstorfer, Sari Haapa, Annukka Korvenranta, Adrijana Krebs, Theodor Leiber, António Moreira, Paula Oliveira, Tanja Peherstorfer, Georg Seppmann, Sandra Soares, Wolfgang Sprengard, Robertt Valent

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2020-1-AT01-KA226-HE-092677

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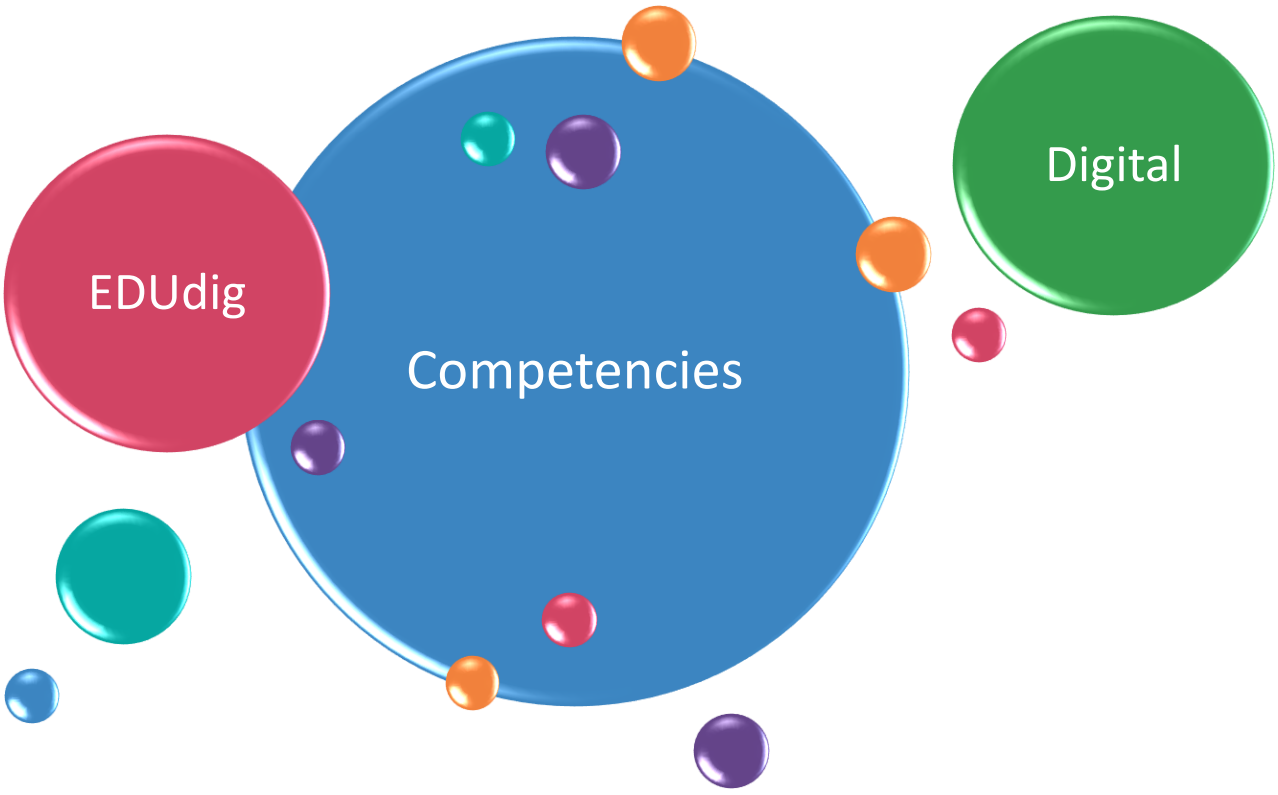

EDUdig
Competencies
Digital

Introduction and overview

What this e-handbook is about and who created it

This e-handbook was developed as part of the Erasmus+ Strategic Partnership "Enhancing the Development of Educators' Digital Competencies" (EDUdig). The handbook consists of the following elements:

- Introduction and overview
- Check-in
- Chapter 1: Digitally enhanced collaboration
- Chapter 2: Forming teams online
- Chapter 3: Facilitating digitally enhanced collaborative learning
- Chapter 4: Collaborative Online International Learning (COIL)
- Check-out

Image 1

These chapters are organised into sections and subsections, all of which are usually structured into three columns:

- A central column where learners find the main contents and flow of argument presented including graphics and additional information via hyperlinks connecting to EDUdig sources as well as external sources
- A left-hand column where learners find the table of contents
- A right-hand column where learners find further information, particularly about proficiency levels of digital competencies (also see section below)

The basic objective of the e-handbook is to accompany and guide learners who want to improve digital competencies on the path of self-directed learning without instructor.

More specifically, this e-handbook focuses on competencies required for digitally enhanced collaboration, team building and collaborative learning including international dimensions. Going through the handbook will allow learners to check and improve their knowledge and skills related to these competencies and guide them along relevant results of the EDUdig project and further sources to deepen their understanding.

This e-handbook has been created by a team from the following four institutional EDUdig partners:

- UNIVERSITY OF APPLIED SCIENCES UPPER AUSTRIA (Hagenberg, Linz, Steyr, Wels; Austria), lead partner/coordinator
- LAUREA UNIVERSITY OF APPLIED SCIENCES (Uusimaa region at six different campuses, Finland)
- EVALUATION AGENCY BADEN-WUERTTEMBERG (evalag, Mannheim, Germany)
- UNIVERSITY OF AVEIRO (Aveiro, Portugal)

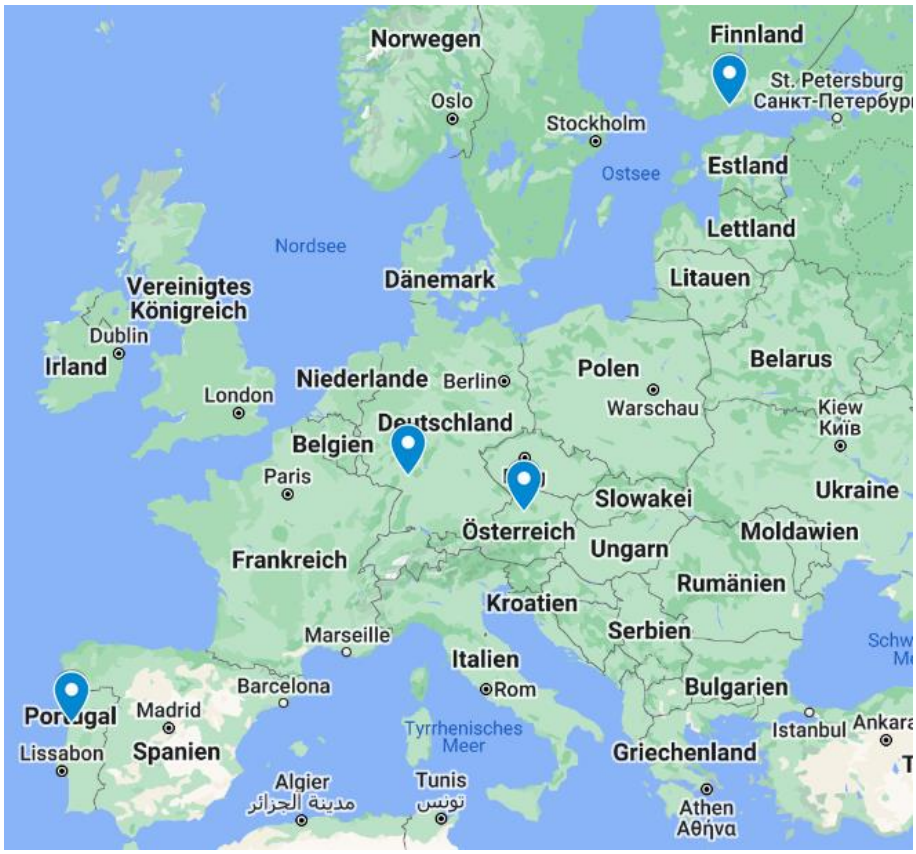


Image 2: Locations of institutional EDUdig partners – Aveiro (Portugal), Mannheim (Germany), Linz (Austria), Leppävaara (Finland) (screenshot Google Maps)

For further EDUdig project information see also: EDUdig-Erasmus+ and EDUdig evalag

Why this e-handbook has been created and for whom

Until recently, implementing e-lectures and digital courses in general was more a nice-to-have than a must-have, an add-on delivered and provided by digital enthusiasts, including those who are strongly interested and engaged in digital transformation of (higher) education. The COVID-19 pandemic, however, forced educators to rapidly change their way of teaching from physical, face-to-face teaching into online modes of distance teaching. This sudden transformation demanded considerable adaptations and changes from various educational stakeholders, mainly though from teachers and students. Didactic concepts had to be rearranged, e-learning tools had to be found and tested, and new ways of communicating and working together had to be defined.

Image 3

All these experiences, gained in the sudden transformation of the educational model caused by the COVID 19 lock-down period, confirm the necessity of a common, standardised, and structured content plan that helps teachers (as well as other stakeholders such as students and administration) to reflect and develop their digital and e-teaching competencies. Thus, they would also contribute their indespensible part to the digital transformation of (higher) education which has been announced and praised for decennia but not always and everywhere been as successful as desired and required [1].

Against this background, the well-established European Framework for the Digital Competence of Educators (DigComEdu) [2] integrates different approaches and defines educators' professional and pedagogic competencies as well as learners' competencies in the following six specific areas of

- Professional Engagement;
- Digital Resources;
- Teaching and Learning;
- Assessment;
- Empowering Learners;
- Facilitating Learners' Digital Competencies.

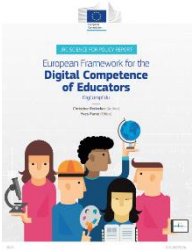


Image 4

These areas comprise 22 basic competencies, ranging from organisational communication through assessment strategies to information and media literacy, each of which is characterised by a list of activities (DigComEdu) [2]. However, it was a starting point and motive of the EDUdig project that these activities of the DigCompEdu Framework are rather abstract, operationally less specific and do not provide educators with practical information on how to achieve and implement the outlined goals in practice.

Therefore, the main objective of the EDUdig project was to fill the DigCompEdu Framework with practical content, including didactic concepts for online lectures, e-learning tools, and recommendations. These contents were developed in the first phase

of the project, thus generating a Collection of Didactical and Digital Approaches and Tools for Educators. Using the results of the EDUdig project, educators also have the opportunity to develop their online competencies, depending on their level of progression (A, B and C proficiency levels, see below), through online courses and through this e-handbook for self-paced learning. The aim was to enhance and augment the DigCompEdu Framework so it can serve as a practical, useful resource for educators willing to develop their digital competencies.

The main target groups of this e-handbook are all educators with focus on higher education. However, many results of the EDUdig project can also be used by other stakeholder such as students and in other educational contexts such as secondary eductaion or lifelong learning.

Proficiency levels of digital competencies

In favour of practicality, the EDUdig e-handbook differentiates three proficiency levels of digital competencies:

- A level or beginner level

  Beginners have had very little contact with digital tools or have just started using them. Beginners need guidance to expand their competencies.

- B level or integrator level

  Integrators use and experiment with digital tools for a range of purposes, trying to understand which digital strategies work best in which contexts.

- C level or expert level

  Experts use a range of tools confidently, creatively, and critically to enhance their professional activities. Experts continuously expand their repertoire of practice.

While the basic level of the e-handbook themes corresponds to a B level, in addition on several occasions throughout the e-handbook specific topics and information are given on A, B and C levels, thus guiding the learners through different aspiration levels of digital competencies.

For illustration randomly selected examples for A, B and C level competencies are given on the right-hand side.

Tips for exploration
(A levels)

Collaborative search of information

Find more
(B levels)

Collaborative tools

Enhance practice
(C levels)

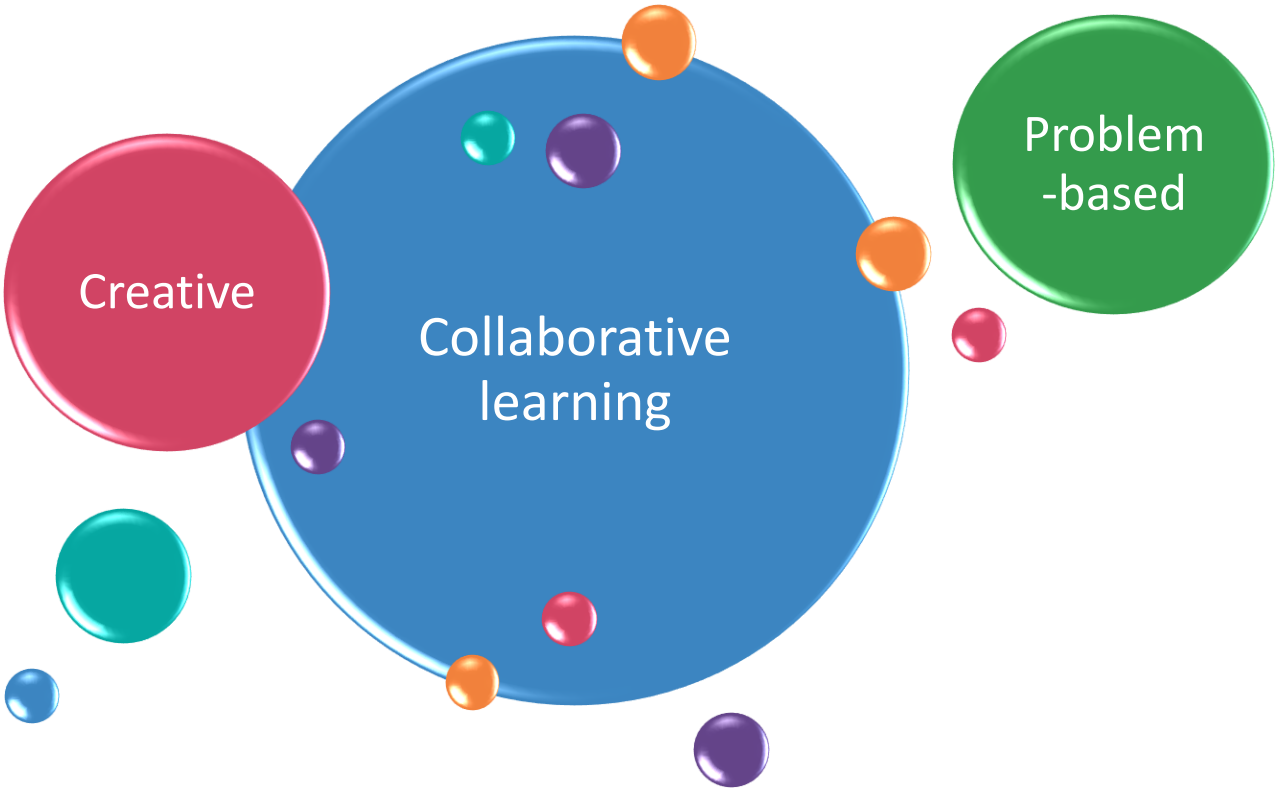
Grouping learners using virtual teaching assistant

References

[1] Leiber, T. (2022). Digital transformation in higher education learning and teaching: The quality digital literacy we need. In: B. Broucker, R. Pritchard, C. Milsom & R. Krempkow (eds.) (2022). *Transformation Fast and Slow: Quality, Trust and Digitalisation in Higher Education*. Leiden: Brill, 54–77.

[2] Redecker, C. (2017). *European Framework for the Digital Competence of Educators (DigComEdu)*. Punie, Y. (ed). EUR 28775 EN. Luxembourg, Publications Office of the European Union, JRC107466.

Image 5


Creative
Collaborative learning
Problem -based

Check-in into e-handbook topics

This check-in is meant as a more concrete introduction into the various chapters of this EDUdig e-handbook which shall give a first glimpse and deliver a few appetizers motivating for the contents of the e-handbook.

Chapter 1: Digitally enhanced collaboration

Main topics

Chapter 1 focuses on the benefits of digitally enhanced collaboration for the learning process in educational settings. Accordingly, collaboration techniques and digital tools enabling and supporting collaboration are presented and discussed.

Image1

Thus, Chapter 1 aims at supporting learners, particularly teachers, to identify benefits of digitally enhanced collaboration for the learning process including the promotion of learner engagement and accountability. Different digital tools are characterised and valued.

Online references to results of the EDUdig project and other open sources are also given.

Reflective questions

Three reflective questions may serve as an attunement and as a motivator:

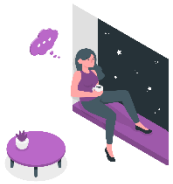


Image 2

- What are the characteristics of digitally enhanced collaborative learning as compared to other forms of learning?
- What do I expect from introducing collaborative learning activities into my own courses?
- What do I need for the pedagogical transformation towards collaborative learning?

Chapter 2: Forming teams online

Main topics

Chapter 2 focuses on the team formation in online teamwork which has become an important issue as (higher) education increasingly moves to online learning and teaching environments. Accordingly, various digital approaches and practical tools enabling and supporting team forming are presented and discussed.

Thus, Chapter 2 aims at supporting learners, particularly teachers, to identify purposes for teamwork, choose appropriate approaches for online team formation and facilitate online team engagement. Different digital tools are characterised and valued.

Image 3

Online references to results of the EDUdig project and other open sources are also given.

Reflective questions

Three reflective questions may serve as an attunement and as a motivator:

- What are the characteristics of online teamwork as compared to other forms of teamwork?
- What do I expect from virtual group and teamwork?
- How can I enhance students' commitment towards online teamwork?

Image 4

Chapter 3: Facilitating digitally enhanced collaborative learning

Main topics

Chapter 3 focuses on digital settings which facilitate collaborative learning including the development of future skills that go beyond traditional knowledge acquisition. Among these future skills are self-development, teamwork, critical thinking and inter- and transdisciplinarity. The main goal of collaborative learning settings is in promoting learning as a reflective and co-constructed process between students. Accordingly, various digital approaches and practical tools enabling and supporting collaborative learning are presented and discussed.

Image 5

Thus, Chapter 3 aims at supporting learners, particularly teachers, to promote collaborative learning as a reflective and co-constructed process between students which is exemplified by designing gamification, a digital escape room and a podcast.

Online references to results of the EDUdig project and other open sources are also given.

Reflective questions

Three reflective questions may serve as an attunement and as a motivator:

Image 6

- What are the characteristics of collaborative learning approaches as compared to other forms of learning?
- What do I expect from digitally enhanced collaborative learning?
- How can I enhance students' commitment towards virtual collaborative learning?

Chapter 4: Collaborative online international learning (COIL)

Main topics

Chapter 4 focuses on collaborative online international learning (COIL), a type of online educational collaboration which involves students and educators from different countries working together in joint projects, assignments, or courses. Coil uses digital technologies and tools to facilitate cross-cultural and intercultural communication and collaboration. Accordingly, various digital approaches and practical tools enabling and supporting COIL activities are presented and discussed.

Image 7

Thus, Chapter 4 aims at supporting learners, particularly teachers, to identify benefits and constraints of COIL and design a COIL project. Different digital tools are characterised and valued.

Online references to results of the EDUdig project and other open sources are also given.

Reflective questions

Three reflective questions may serve as an attunement and as a motivator:

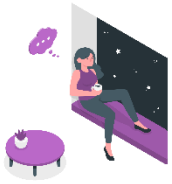
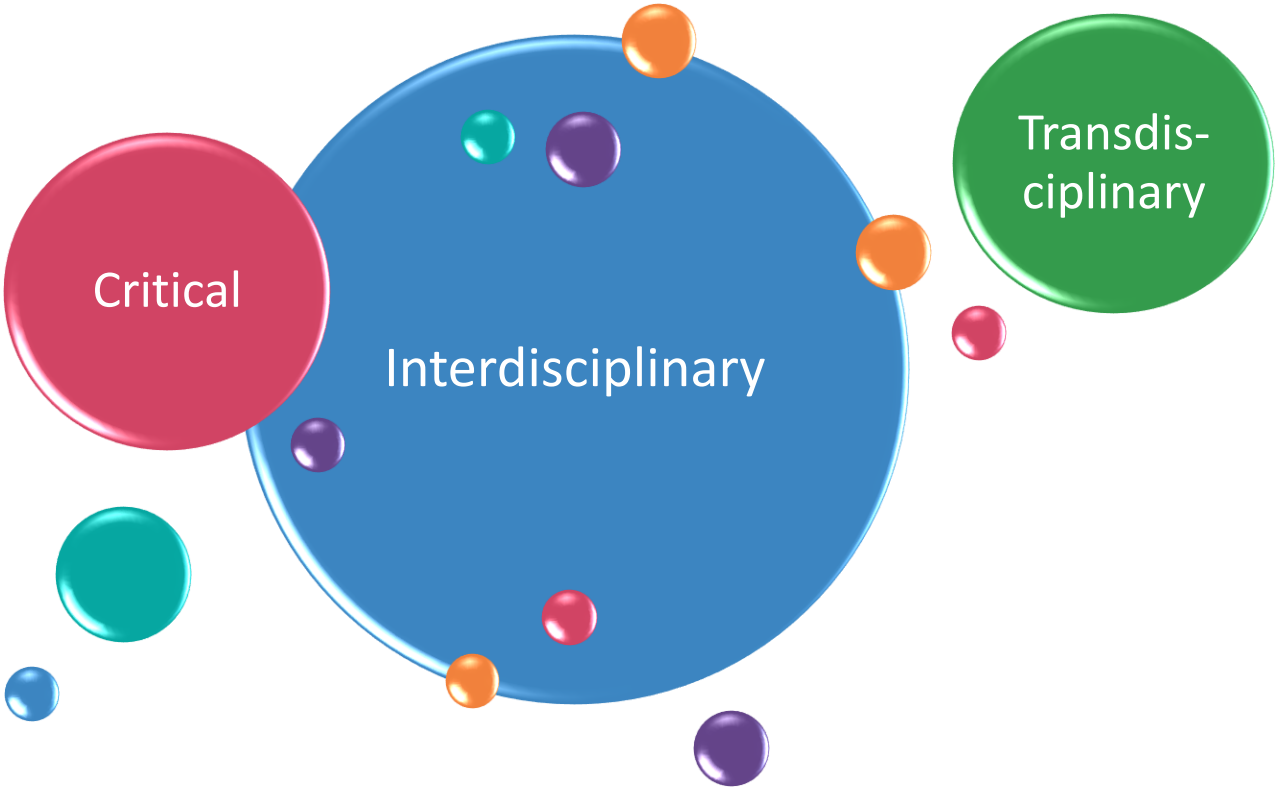


Image 8

- What are the characteristics of COIL as compared to other forms of learning?
- What do I expect from COIL activities?
- How can I enhance students' commitment towards COIL?


Critical
Interdisciplinary
Transdis-
ciplinary

Chapter 1. Digitally enhanced collaboration

1.1 About this chapter

Digitally enhanced collaboration refers to the use of digital technology to facilitate and improve communication and joint work among individuals and groups in various settings, such as in the workplace, education, and social networks. This can include tools such as video conferencing, instant messaging, online document sharing, and project management software that allow people to work together efficiently and effectively regardless of their physical location. The goal of digitally enhanced collaboration is to increase productivity, promote innovation, and enhance social interaction and learning opportunities.

Image 1

In this chapter, the focus is to reflect on the concept of collaboration in educational settings, highlighting its potential to promote learner agency. Hence, light is shed over some collaboration techniques and digital tools to support them that may drive the educators' creative processes.

The main goal of this chapter is to ensure that trainees can achieve the following learning goals:

- Recognise and identify the benefits of collaboration for the learning process;
- Analyse the potential of different digitally enhanced collaboration activities to promote learner engagement and accountability;
- Characterise the advantages and disadvantages of different digital tools that may support the development of collaborative learning.

In terms of time, the creation of a collaboration strategy strongly depends on the familiarity of the educator with the learning goal and/or the selected digital tool. In average, it should not take longer than 1/2 hours.

1.2 What is collaborative learning?

1.2.1 Collaborative vs. cooperative learning

Collaboration refers to working peer-to-peer, in groups or teams to solve problems, complete tasks, or build new knowledge. Thus, generally, educational approaches based on collaboration promote joint intellectual effort to search for meanings, deeper/ more holistic understanding or solutions. In collaborative learning, students are urged to work with their peers, contributing to the discussion of solutions with their ideas and listening to and reflecting upon other viewpoints and articulating their points, to get a more comprehensive understanding than they could individually.

Collaborative learning differs from cooperative learning. Even though they are both also based on team or group work, in the latter participants section off their area of action and assume responsibility for that part of the work, thus contributing with their work/expertise in a specific area to the work. In cooperative learning, the roles of the group/team members are usually pre-established, i.e., even though their tasks tend to be closely interrelated, they are given some autonomy and flexibility in their individual work. On the other hand, in collaborative learning, the roles, resources, and organisation are left up to the group/team members; therefore, they tend to assume a more active role in the negotiation of solutions, given that they share accountability, authority and learning goals.

[audio] Steve Hiles podcast on *Cooperative and Collaborative Learning* (2021)

1.2.2 Benefits of digitally enhanced collaborative learning

Collaborative learning strategies refer to explicit, clear guidelines to develop collaborative learning activities. Its framework should provide detailed instructions to facilitate meaningful student engagement, grounded in active discussion and participation among participants for the achievement of a certain learning outcome [1]. Their design is based on pair or group work and can be integrated within several active learning methodologies, such as inquiry-based learning, which includes challenge-based learning, problem-based learning, project-based learning, etc.

Tips for exploration
(A levels)

Online etiquette

Collaborative resume

The development of digitally enhanced collaborative learning strategies may have a great impact on the students' engagement and proactivity because it enables students to

incoroporate digital communication into their communication and learning routines. The latter are, for instance, used to convey information in a concise manner, which is very important to capture the fundamentals of arguments in complex discussions, i.e., a key competency for learning, inside and beyond the classroom.

It is widely accepted that learning experiences that are active, social and student-centred lead to deeper learning. Based on a positive interdependence of group/ team members, collaborative learning is a valid approach to meet these premises. Research highlights that, besides promoting the inclusion of experts [2], it also fosters the students'

- Learning from the viewpoints of others and listening to/ dealing with criticism;
- Development of higher-level thinking through discussion;
- Development of transversal competencies, such as self-management, leadership, collaboration and critical thinking;
- Creativity, accountability and engagement.

On the one hand, students tend to delve deeper into topics by actively bridging different points of view with their prior knowledge, resulting in higher-order learning. On the other hand, students learn to have an active voice to express their ideas and values, acknowledging and handling differences and developing respect for others. Hence, one of the main advantages of collaborative learning is to learn to dialogue for consensus-building, which is key in general civic life. Given that collaborative learning is socially and intellectually tangled, it may contribute to prepare students for real working contexts and develop their global citizenship [3].

Find more
(B levels)

- Creating interactive learning activities

Image 2

Enhance practice
(C levels)

- Inquiry based learning
- Challenge based learning
- Problem-based learning
- Project-based learning
- Collaborative learning

1.2.3 Activities of digitally enhanced collaborative learning

Collaborative learning activities may include simple and/or more complex activities: discussions, role-plays, jigsaws, etc. It has been underlined [4] that the most important is to select the solutions that better correlate to the intended learning outcomes and organise collaborative learning techniques into 6 different categories: discussion (e.g. think-pair-share, round-robin, etc.), reciprocal peer teaching (e.g. fishbowl, jigsaw, test-taking teams, etc.), problem-solving (e.g. send-a-problem, case studies, etc.), graphic information organisers (e.g. sequence chains, etc.), writing (e.g. peer editing, dialogue journals, etc.) and games (e.g. jeopardy, friendly feud, etc.).

Examples of **discussion techniques** using, for instance, breakout rooms or chat tools in an LMS (Learning Management System), can be:

- **Talk partners** – students are organised in pairs for short discussions and pairs can be selected or randomly defined. In this type of activity, it is critical to establish or negotiate with the students clear ground rules beforehand.
- **Think-Pair-Share** – Students are asked to think individually of an answer to an initial question and only then discuss and reason it with a peer. After reaching (some) consensus, answers can be shared with a larger group (e.g., the whole class) for a follow up discussion. This allows for students to learn by reflection, discussion and verbalisation.
- **Listening triangles** – typically, it implies assigning different roles to the three students in each group: a speaker (which explains the topic), a questioner (which listens carefully and asks for clarification or further detail) and a note-taker (provides feedback to both speaker and questioner).
- **Snowballing** – Students discuss a topic in pairs, after which each pair joins another pair (and become a group) to share and discuss their findings/solutions. The process repeats as many times as necessary (i.e., groups merge with other groups), so that the final group is made up of all the students involved. This could be articulated with **Jigsaw**, by breaking problems into small parts (pieces) and distributing term by groups – for example, each student in a group might be assigned a distinct article to read on a shared topic or issue; and, in the end, the topic would be synthesised with key information from all articles.

There are **other techniques** that are also gaining momentum in digitally enhanced environments and that can easily articulate with those exemplified above, for instance:

- **Lightweight teams** – Students are assigned a task that they can discuss in predefined groups, nevertheless, their grades are determined by their individual effort and outputs [5]. For this, students can use discussion fora

Tips for exploration
(A levels)

Introduce yourself

e-communication policy

Polls in online teaching

Students answering questions during the lecture

Collaborative files

Find more
(B levels)

Talk partners

Think-Pair-Share

Whiteboards

Enhance practice
(C levels)

Listening triangles

Jigsaw

Digital Escape Rooms

Creating online collaborative spaces

available in LMSs, which can be organised by topics or online collaborative dashboards or whiteboards, such as *Padlet* or *Miro*.

Gamifying the course

Digital Escape Rooms – Students are asked to collaboratively solve the clues and unlock codes, so that they can (essentially) escape the (breakout) room. Tasks can include solving a series of puzzles, riddles or find clues that build on one another. There is an array of digital tools that can be used to design and create digital escape rooms, e.g. *ThingLink* for interactive images and videos, *Google Forms* to create breakout forms, *Kahoot* for quizzes and games, *Edpuzzle* for interactive videos [6].

1.2.4 Digital tools to support collaborative learning activities

There are several collaborative learning activities that may benefit from the use of digital technology. Some examples are:

- **Team-based learning activities**, which are based on iterative individual Readiness Assurance Tests (iRAT) and team Readiness Assurance Tests (tRAT) and can benefit from the use of Classroom Response Systems (CRSs). These enable teachers to launch questions and to provide student feedback (as well as automatic grading). Even though these platforms somehow differ in terms of functionalities, most include game-based features, which may enhance student engagement through BYOD teaching and learning initiatives. Some examples are: Kahoot! (https://kahoot.it/v2/), Quizizz (https://quizizz.com/), PollEverywhere (https://www.polleverywhere.com/), Socrative (https://www.socrative.com/) and Top Hat (https://tophat.com/);

- **Discussion-based activities**, which can be video- or audio-based, using, for instance, Flipgrid (https://auth.flipgrid.com/), or based on collaborative writing, using Googledocs (https://www.google.com/docs/about/) or Perusall (https://www.perusall.com/)

- **Storytelling activities**, which may include the creation of interactive timelines for the stories, with multi-format information (https://www.timetoast.com/), the creation of digital comics (https://www.pixton.com/) or the development of multi-format collaborative stories (https://www.utellstory.com/);

- **Concept mapping activities**, which are used to visually depict a system of relationships between concepts (e.g., cause-and-effect relationships, category and sub-category relationships, etc.). Some examples are: CmapTools (https://cmap.ihmc.us/) or Mindmeister (https://www.mindmeister.com/);

- **Interactive multiformat presentations**, which can be used to present project results, resorting to, e.g., Nearpod (https://nearpod.com/).

Tips for exploration
(A levels)

Introduce yourself

Eight nouns

Find more
(B levels)

Team-based learning activities

Concept mapping

Enhance practice
(C levels)

Audio discussion boards

Creating interactive educational materials

Promoting student interaction

1.3 Consolidation and intensification

1.3.1 Reflect

For making the most of your online learning implementation, try to answer the following questions:

Image 3

- Can I **select** one of my own courses where it would be beneficial to introduce collaborative learning activities?
- Can I **identify** the learning outcome(s) and transversal competencies (a.k.a., soft skills) that I want to address with collaborative learning?
- Can I **identify** the pedagogical transformation towards collaborative learning I want to carry out in my course?
- Which are the main advantages and challenges posed by pedagogical transformation towards collaborative learning?
- Which resources do I need for this pedagogical transformation towards collaborative learning?

1.3.2 Takeaways

Here you have some takeaways for organising digitally enhanced collaboration and collaborative learning that may also serve as tips to get started:

Image 4

- **Make sure that students know each other before creating the groups/teams**. If needed allow students to develop rapport and group/team cohesion through icebreakers or team-building activities.
- **Explain the common learning goals and set clear student expectations**. Students must understand the process, i.e., how groups or peer discussion will operate and how their learning will be assessed.
- **Clarify roles and responsibilities**. Present or negotiate the activity guidelines and ensure that students know what is expected from them and how their achievements will be assessed.
- **Set the ground rules for participation and assessing contributions**. Students must be fully aware that it is very important to be open to each other's ideas – listening and compromising are key to reach a joint consensus. Self- and peer assessment should always be considered.

1.3.3 Dig deeper

Here you have some sources for digging further into the issue of digitally enhanced collaboration and collaborative learning:

Barkley, E. & Major, C. (2020). *Student Engagement Techniques: A Handbook for College Faculty*. Hoboken, NJ: Jossey-Bass.

The Bell Foundation (2022). *Collaborative Activities*.

Stephens de Jonge, J.L. (2021). *Creating Digital Escape Rooms – Blending Mystery, Story and Puzzles to Highlight Fundamental Knowledge and Foster Curiosity* [presentation & extra materials].

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1.4 References

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[4] Barkley, E.F., Cross, K.P., & Major, C.H. (2014). *Collaborative Learning Techniques: A Handbook for College Faculty*. Hoboken, NJ: John Wiley & Sons.

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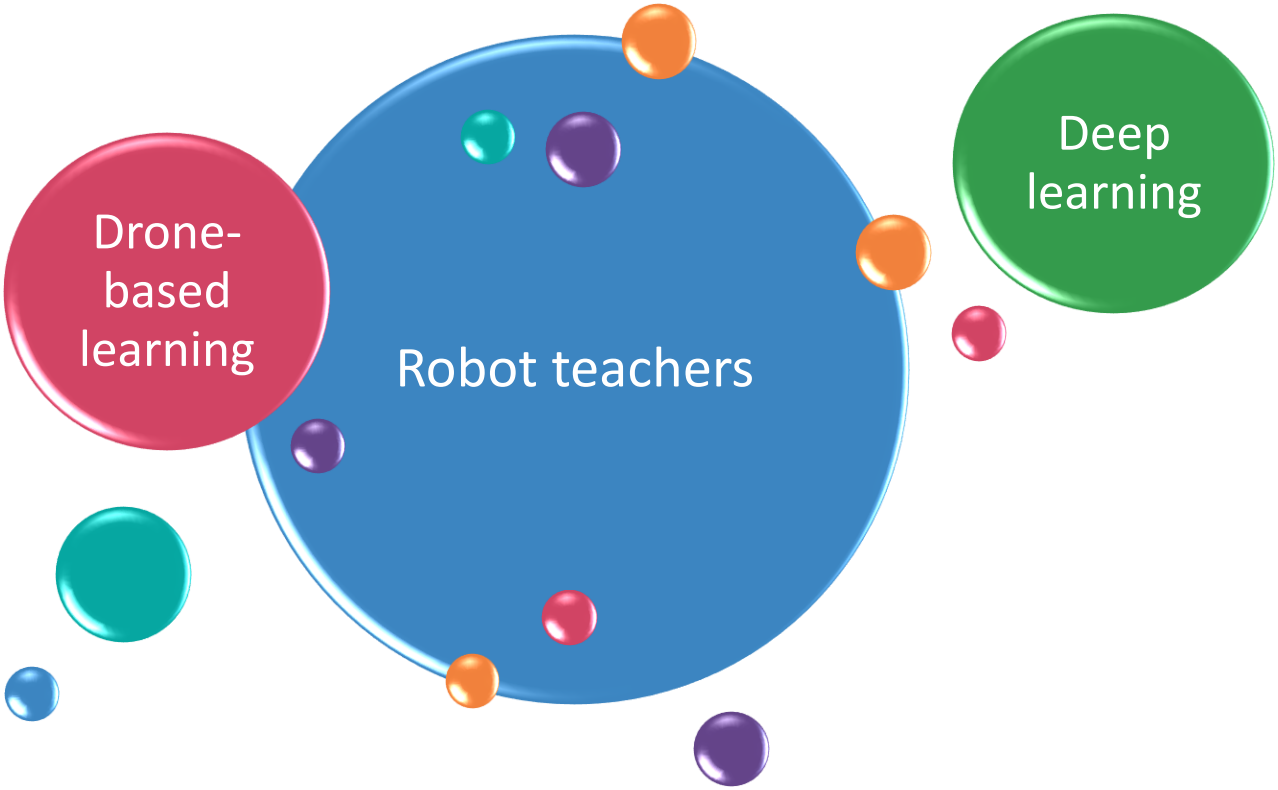
[6] Neumann, K.L., Alvarado-Albertorio, F., & Ramírez-Salgado, A. (2020). Online approaches for Implementing a digital escape room with preservice teachers. *Journal of Technology and Teacher Education*, 28(2), 415–424. Available at

Image 5


Drone-based learning
Robot teachers
Deep learning

Chapter 2. Forming teams online

2.1 About this chapter

Higher education has increasingly moved to online learning environments. At the same time, institutions need to equip their graduates for global virtual teamwork. Teamwork is an essential part of collaborative learning promoting shared learning[1].

Image 1

To get the online teamwork rolling, an effective and supportive start is important. This chapter focuses on the team formation, aiming at introducing various team forming approaches and giving practical tools for educators at different digital proficiency levels, such as beginner, integrator, expert or innovator.
The main goal of this chapter is to ensure that trainees are able to achieve the following **learning goals**:

Read more on Digitally enhanced collaboration

- Identify various purposes for teamwork;
- Choose appropriate approaches for online team formation;
- Identify alternative technologies for forming teams online;
- Facilitate effective online team engagement.

Preparations: Time for preparation varies between 30 and 120 minutes, depending on how familiar the educator is with the chosen platform and material.

Online session or activity: For the actual team formation, including guidance, it is good to reserve 20-30 minutes.

Time allocation for team members' introductions and work on the team rules and practices, depends on several factors: number of teams, number of members in each team, students' familiarity with the topics, familiarity with other team members, need for technical support etc. Minimum for this process stage is about 60 minutes.

Consider reserving time for additional team warm-up activities.

2.2 Forming teams for collaborative learning online

2.2.1 Challenges and benefits of virtual teamwork

Research suggests that students may experience stress and face challenges with various kinds of group work (e.g. [2], [3], [4], [5]). Especially, online learning settings may expose students to severe stress as online learning environments seldom offer similarly effective interactive resources to bond, build trust and overcome potential conflicts in teamwork as in face-to-face learning environments. At the same time, many work-life organizations employ global virtual teams, and offering students opportunities for virtual teamwork provides them excellent experiential learning [1].

2.2.2 Groups versus teams

Groups and teams differ in their purpose, composition and level of engagement. Group work is suitable for any learning cooperation while teams are needed for genuinely collaborative learning. Teams are typically smaller in size and formed for a longer-term purpose, such as a learning project with a work-life partner. Teams require real integration and coordination to perform given tasks towards an agreed upon goal.

Image 2

Online team dynamics are mostly hidden for the educator and students often suffer from lack of trust and lower work commitment if online interaction and support for team building processes are insufficient.

High-performing online teams typically follow a similar development as in physical contexts. For example, the stages of forming, storming, norming, performing, adjourning [6] are typical at recurring team evolution stages. This chapter focuses on the forming stage as a collaborative and well-functioning teamwork process depends on successful team formation.

Read more on Team-building for online collaborative learning

2.2.3 Conditions and purposes for online teamwork

Identifying the most purposeful approach for forming teams and facilitating online teamwork depends on several factors, one of them being the online learning setting. Various teaching and learning conditions often overlap and many similar team formation approaches may apply. Table 1 outlines some most common online learning conditions and purposes for team formation.

Table 1: Common online learning conditions and purposes for team formation

Online learning conditions	Considerations for purposeful teaming
Mode of implementation: **Hybrid or fully online**	Fully online or hybrid implementations will have an impact on team formation possibilities. In hybrid implementations face-to-face team formation activities for the offline group will be supplemented by online teaming activities for the online group.
Mode of online presence: **Asynchronous or synchronous**	Asynchronous or synchronous learning will set different criteria for team formation and online teamwork. In synchronous learning students are present online at the same time and effective teaming is often more flexible. In synchronous learning teacher-led, student-driven, or topic-driven team formation approaches apply. In asynchronous learning teaming depends on various students' progression and on individuals' own activity; high importance is needed on clear written guidance, including timing of group assignments. Teacher-led team formation often most effective.
Level of *human* interaction: **Automated or interactive implementations**	Automated implementations are mostly asynchronous and with little real-time human interaction. Teacher-led team formation applies. Due to a typically large no-show number of online enrolments, teams are optimally formed after a first assignment, confirming a students' activity. Large MOOCs (Massive Open Online Course) are an example of automated course and require special planning for group/teamwork. Study units involving same-time interaction between the educator and students enable more flexibility in team formation. Teacher-led, student-led or topic-driven team formation approaches apply.
Size of the online learning group: **Small vs. large number of students**	A study unit with a limited number of participating students offer more flexibility for team formation. However, with good planning, teacher-led, student-led or topic-driven team formation can be applied in large learning groups, too.
Set-up for the enrolments and progress: **Open vs. closed enrolments**	In automated and timely unframed study units, students do not progress in a similar tact. Teamwork is hardly purposeful. Group work, e.g. in a form of discussion threads may apply.
Timely scope of the learning assignment: **One-time task vs. a long-term project**	Collaborative learning activities taking place just once during an online session or long-term learning projects such as projects in cooperation with a work life partner require different levels of team commitment and bonding. Teacher-led, student-led or topic-driven team formation approaches apply.
Type of learning goal: **Deep competence or metacognitive knowledge vs. surface skills or factual knowledge**	The deeper the learning or higher the educational objective (e.g. Bloom's taxonomy [7]), the more warranted is an opportunity for collaborative and peer learning in teams. Teacher-led, student-led or topic-driven team formation approaches apply. For short-term assignments, quick ad-hoc group formation (e.g. break-out rooms with random division) is most sensible.
Type of learners: **Diverse learners and**	Diversity in teams is likely to increase diversity in perspectives and deeper learning. Heterogeneity of students can be an additional

benefiting of diverse perspectives	criterion for team formation, whether the activity is teacher-led or student-driven. Diversity factors are many, e.g. previous experience or knowledge with the topic, gender, age, native language, cultural background, maturity level (bachelor's or master's students; age), study status (degree student vs. open path students, full-time students vs. part-time students), and so on.

Besides the above online learning conditions, other social and motivational factors, technical resources or institutional policies and practices can affect which team formation mode is most purposeful or possible.

2.2.4 Team formation practices

Different team formation practices can affect team performance or a student's motivation and willingness to commit to collaborative learning. Thus, the educator needs to carefully consider what is the most purposeful way for forming online teams.

In **teacher-led teaming** the educator controls how, when and what kind of teams are formed. Teacher-led team design and assigning has many advantages such as time management or ensuring that all students are included. Similarly, teacher-led team formation best ensures diversity in teams [8]. Technology-assisted teaming can be considered as a form of teacher-led team formation where the educator considers randomity in team formation as one benefit.
Here are a few examples of teacher-led online teaming formation:

Image 3

- Forming teams in alphabetical name order; posting name lists on the learning platform
- Hand-picking or computer-assisted member selection for forming diverse teams; posting lists on the platform
- Randomly assigned, computer-assisted teams: Zoom or Teams break-out rooms

Student-led, self-selected teams have many benefits, such as student well-being [9]. Being able to team up with previously familiar peers may be a big comfort for introvert students. Being friends or knowing peers' working styles can also reduce the time needed for bonding and trust-building which can be crucial factors in fast-paced online learning.

Here are a few examples of student-led online team formation:

- If familiar with each other from earlier courses, students can propose their own team compositions.

- If not familiar with each other, students are asked to introduce themselves first (e.g. by creating short intro video clips). The following task is to start networking on an online discussion forum and form teams by the given criteria.

- An advanced online solution is to use networking software (e.g. wonder.me) where students can simulate real-life networking and form teams ba on room discussions.

Topic-driven teaming is a form of student-led teams where teams are created around a topic. Allowing students to focus on a topic area they are most interested in, or working on a team-based project with an external work-life partner they see most beneficial in considering future employment opportunities may improve commitment towards teamwork. In addition, a student is usually also able to find teammates among familiar peers. This is also the case in the following process description for a topic-driven team formation.

2.3 Topic-driven online team formation activity

Topic-driven online team formation is an integrator/expert level (B1/B2 proficiency level) digi-pedagogical activity for forming teams in an online learning implementation. It is designed to engage students to choose their team based on their interest in the given learning topics.

Image 4

Besides the actual team formation, it is utmost important to ensure a good start for virtual teamwork. In contrast to face-to-face teams, which have a better opportunity for meeting and bonding in class, online teams need to be supported effectively from the very beginning. Thus, the educator should reserve enough time and facilitate the team to agree on rules and practices immediately after the team formation. This flips the traditional Tuckman “norming” stage [10] to the beginning of the team building and performance process.

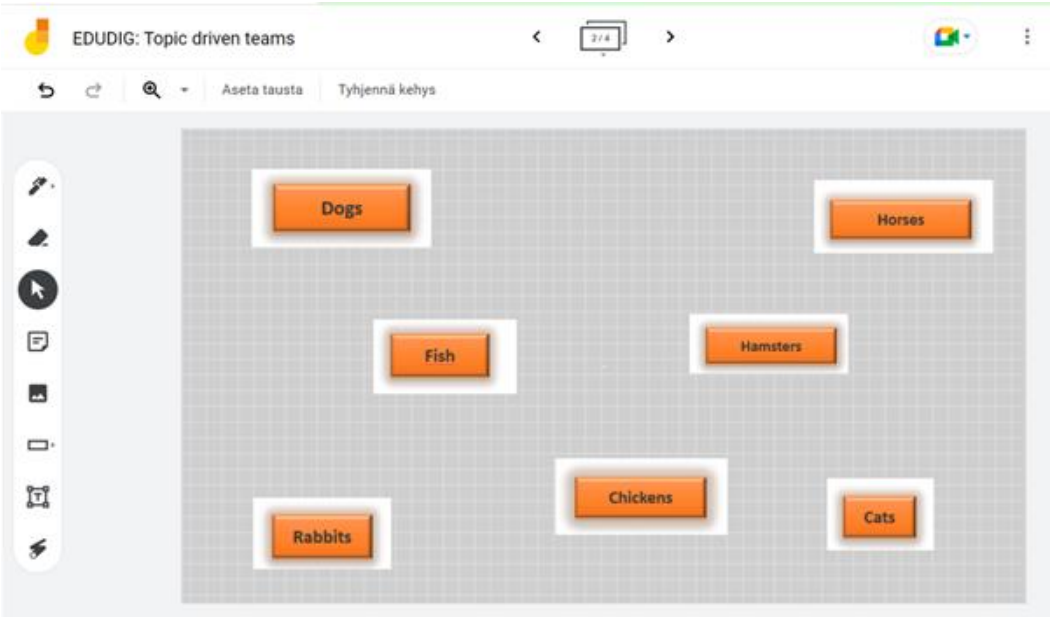
2.3.1 Target learners and technical requirements

Topic-driven online team formation can be applied with any online student group in higher education. The process is guided for synchronous online sessions but can also be modified to fit asynchronous online learning and many group sizes. Please consult Table 1 to consider the suitability for your online learning implementation.
Teaming takes place on a digital whiteboard. Platforms such as Google Jamboard, Miro, Mural, InVision, Padlet, Flinga, Zoom or Teams whiteboards are all good options. In principle, any cloud-based document allowing synchronous editing can be applied for this purpose.

2.3.2 Role of educator

The educator creates the platform in advance by posting topics on it. It is also possible to include empty topic fields and allow students to propose topics of their interest.
The educator needs to give access and editing rights for the prepared whiteboard. This happens slightly differently in various cloud-based environments. One common way is to copy the link with editing rights and paste it on the learning platform chat.

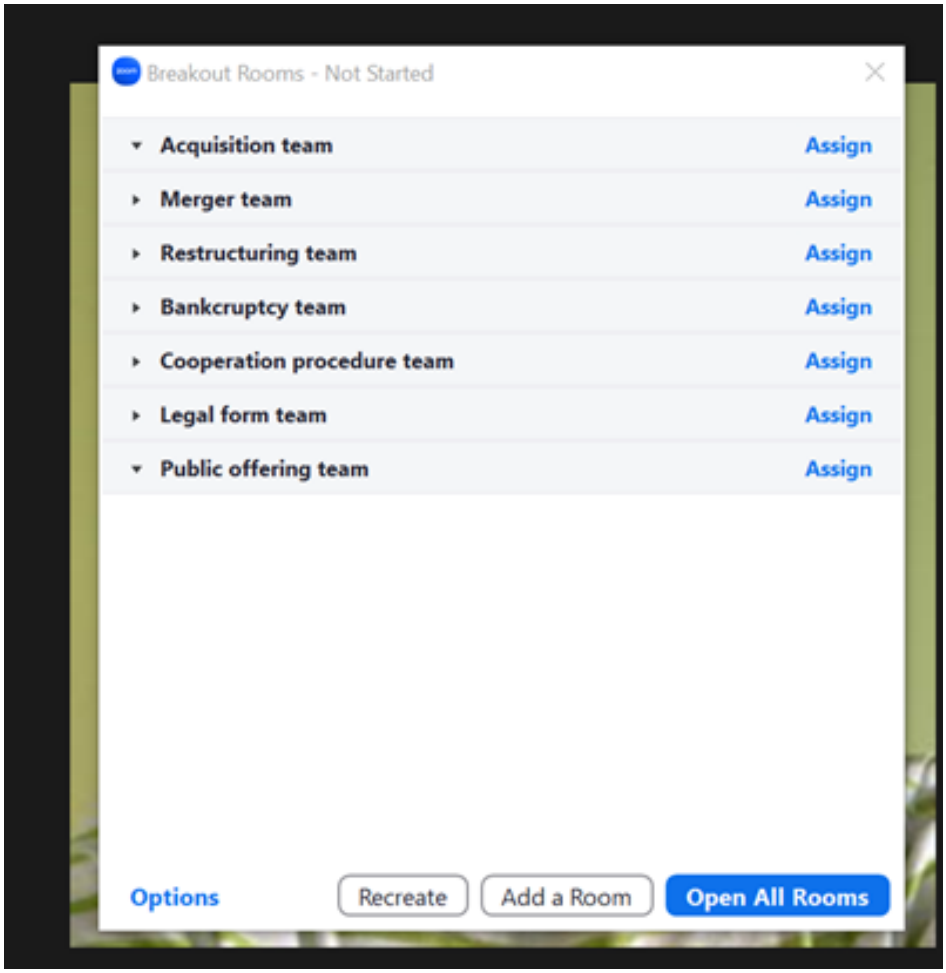
Example of proposed topics on a Google Jamboard:



Example of a Google Jamboard after students have dragged their names around the topic of their choice:

The educator should also prepare team networking spaces in advance for the new team members to meet and start to collaborate immediately after the team formation. For example, break-out rooms work well for a synchronous teaming session. Discussion boards or other LMS (learning management system) group spaces are other good alternatives.

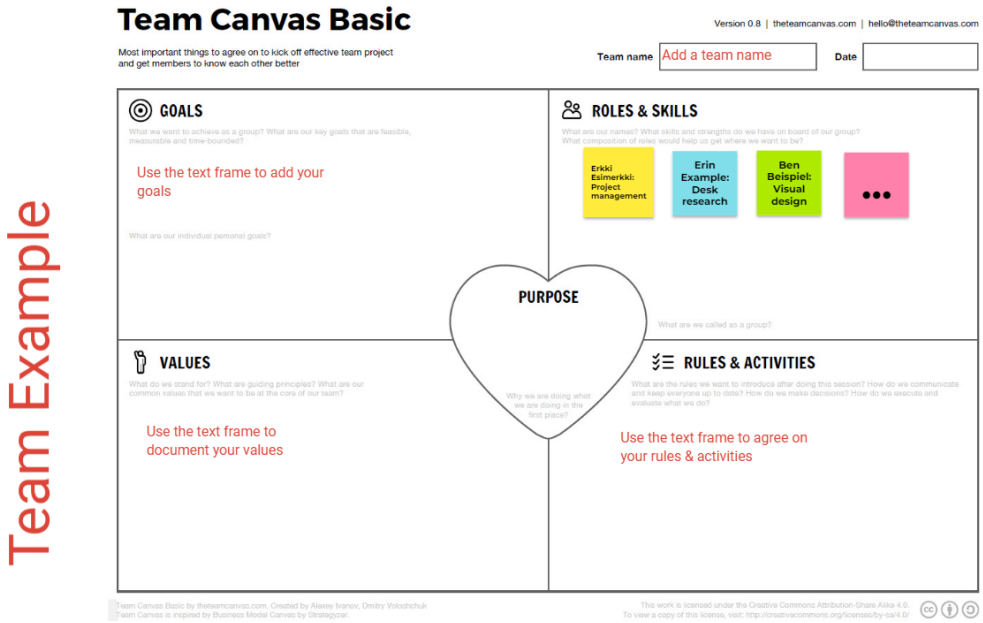
Example of prepared break-out rooms named after the team topics in Zoom:



It is important that the team building is further supported immediately after the formation of teams. The educator prepares the teamwork spaces and offers clear guidance for the teams to adopt effective teamwork practices, e.g. in the form of an online template.

The following example illustrates how students are facilitated to agree on their team rules and practices right after the team formation. It is important that no student disappears from online before the team has filled in the basic Team Canvas or any other similar agreement on the team's ways of working.

Example of a basic team template that the new team members can fill in together on Google Jamboard. (Different team template versions available at: theteamcanvas.com)



For enabling a good team to start for supporting successful on-going team performance, educators should consider investing time in different warm-up activities. It is very important that team members get to know each other well enough for enabling trust building and shared learning. Many traditional warm-up activities can be used in online settings as well (see section “Dig deeper”).

2.3.3 Guidelines

The **educator** steps are summarized here:

In advance:

1) Choose topics for the teamwork.
2) Select the appropriate platform and prepare the topic whiteboard.
3) Prepare a platform and template for teams to agree on rules and practices.
4) Provide access and editing rights, copy link to be shared for both steps 2 and 3.
5) Prepare break-out rooms (or similar spaces for initial team networking).
6) Prepare return box or place where students can return their team canvases.
7) Prepare written instruction (slides) for the teaming process.

During the online session (in asynchronous learning, guidance can be video recorded, and steps applied to fit a different time progression):

8) Explain the process for team formation and provide written guidance as well.

9) Share link and access to the whiteboard.

10) Ensure enough time for different steps. Make timing transparent for students.

11) Follow how students are joining different topic teams. Once ready, prompt them to move to meet each other (e.g. break-out rooms). Help students to find the right place, if needed.

12) Visit teams in the break-out rooms to provide further guidance (if needed) and to hear out how teams are starting their collaborative assignments.

13) Consider guiding additional team warm-up activities as needed.

After the session:

14) Continue supporting the online teams regularly and on a needs-basis.

15) Plan how to include students who were not present in the team formation session (if applicable).

Students are guided as follows (modify as suitable for your online learning implementation):

1) Access the Topic whiteboard via the given link.

2) Join one topic team: Fill in one post-it note with your name. Drag the note around the topic you would like to work with. (Special criteria can be given, e.g. maximum five students can join one topic.)

3) Once your topic is filled, move to your topic break-out room to meet your other team members (break-out rooms prepared in advance and named by the topics).

4) Start networking: introduce yourself by telling xxx and xxx [e.g. some relevant details of yourself or facts about the subject matter to be studied].

5) Agree on your team working goals and style by filling in the basic Team Canvas.

6) Return your Team Canvas in xxxx [e.g. to the relevant digital platform or return box].

7) Agree on your next team meeting (time and platform).

To fit the whole team formation process in your online session timeframe, time carefully each step and let students know it.

2.3.4 Assessing outcomes

To carry out a self-assessment of the achieved outcomes, the following steps can be taken:

- The Team Canvas (or rules and practices) are evaluated as a team performance, e.g., with the qualitative assessments “pass” or “to be completed”.
- Final team output is the topic-based assignment or project, evaluated with a grading rubric.
- Performance is evaluated as a team effort, all members getting the same grade.

2.4 Consolidation and intensification

2.4.1 Reflect

For finding the most purposeful approach for your online learning implementation, try to answer the following questions:

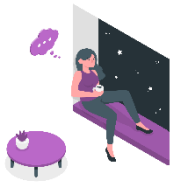


Image 5

- How can you facilitate collaborative learning during the online learning implementation?
- How can you best support virtual group and teamwork? Is group work enough or would the learning objectives of collaborative learning require committed teams?
- How can you enhance students’ commitment towards online teamwork and enable peer learning?

Consult Table 1 to reflect on the most purposeful team formation mode in your learning group:

- How might you best facilitate students’ learning by forming well-performing teams?
- Could a topic-driven team formation add your students’ motivation towards teamwork?
- How can you adjust the topic-driven team formation activity to suit your learning group needs?

2.4.2 Takeaways

Here you have some takeaways for forming teams online that may also serve as tips to get started:

Image 6

- Online teams do not always need to be formed by the educator.
- A topic-driven team formation enables students to direct their interest in topics they find most relevant or purposeful considering their future employment.
- A topic-driven team formation also enables teaming up with peers a student is familiar with.
- A topic-driven team formation enables collaborative learning and meeting new peers with diverse perspectives.

2.4.3 Dig deeper

Here you have some additional information and sources for digging further into the issue of forming teams online:

Various competence levels of digital educators

Online teams are being used exponentially in higher education and business because of the development of technologies and globalization (Hu 2015). However, a pedagogically justified approach does not mean a need to integrate many technologies. Based on the DigCompEdu Framework [11], inspiration is offered for advancing online team formation and team building support on several competence levels. With limited time, a vast range of course content, and educators' and students' inadequate proficiency or apprehension with technology a gradual approach is often most rewarding, for example, starting on A levels (newcomer; explorer), continuing to B levels (integrator; expert) .and finalizing on C levels (leader; pioneer).

Collaborative learning is based on peer learning and sharing. On A levels, teams can be formed by the educator and published on the digital learning platform. For example, the educator combines teams to include different nationalities. Typical actors on A levels are newcomers, who make little use of digital technologies, and explorers, who use digital technology to engage learners. Typical actors on B levels are integrators, who fosters learners' active use of digital technology, and experts, who use digital technology for actively engaging learners with the subject matter. Typical actors on B levels are leaders, who comprehensively and critically implement strategies for active learning, and pioneers, who innovates digital strategies for active learning.

Selection of warm-up activities (icebreakers)

Tips for exploration
(A levels)

Social space for students

Keeping web cameras on

Guidelines for group work

Find more
(B levels)

Inclusive space for students

Creating collaborative spaces

Collaborative tools

Many traditional warm-up activities can be applied for virtual team building. Here are a few examples abundantely available online:

Virtual networking

- 9 virtual icebreaker games for remote teams and meetings (Conceptboard)

Sense of community

- Icebreakers and Teambuilders (College of William & Mary)
- Fun Icebreaker Ideas and Activities

Enhance practice (C levels)

- Online icebreakers
- CF Icebreaker questions

Virtual networking

Selection of team building activities and templates

Team building activities

Fostering sense of community

- 10 Quick and easy team building activities (Part 1 & 2)

Collaborative tools

- Free team building games: Guide and tips
- Student guide to group work (York University)

Collaborative process analysis

Templates

- https://theteamcanvas.com/
- https://learningcommons.yorku.ca/groupwork

2.5 References

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Image 7

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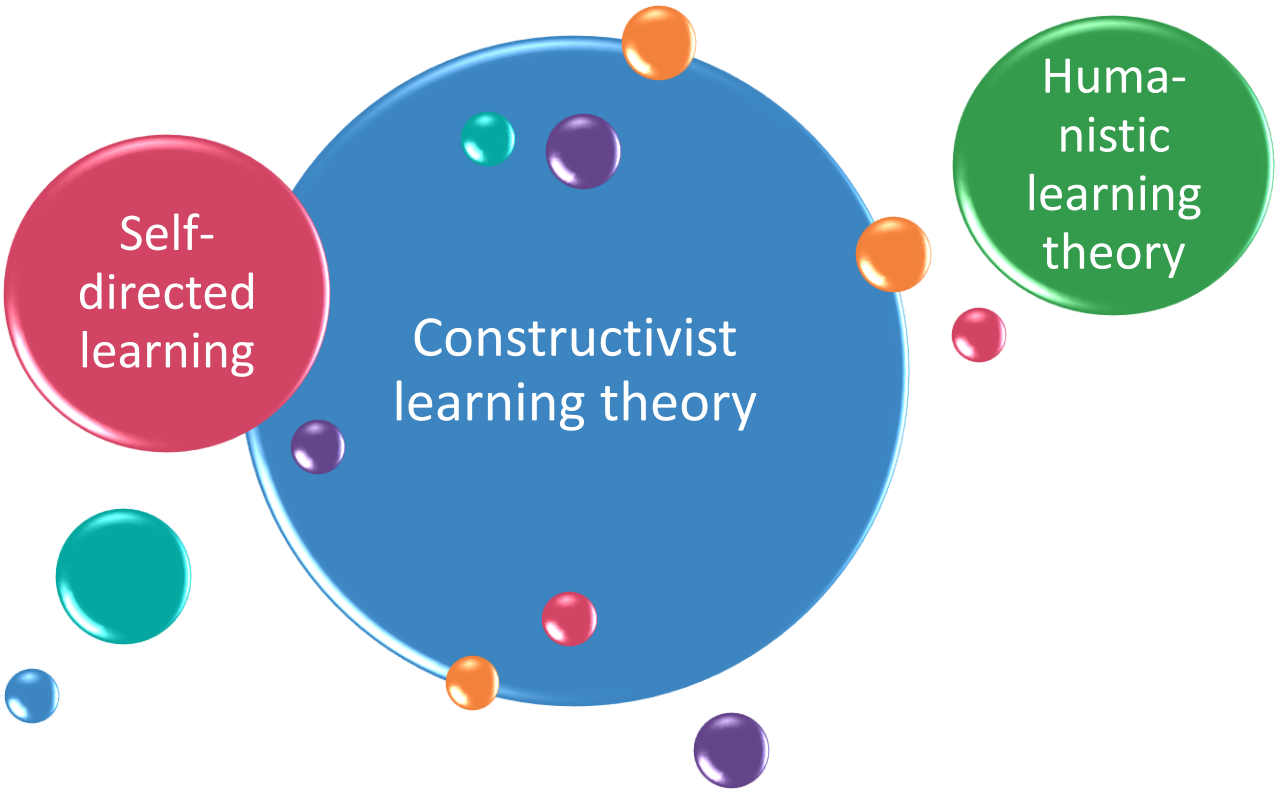
Self-directed learning
Constructivist learning theory
Huma-nistic learning theory

Chapter 3. Facilitating digitally enhanced collaborative learning

3.1 About this chapter

Collaborative learning settings not only offer the opportunity to share learning, but also to develop future skills that go beyond traditional knowledge acquisition. Reflection, critical thinking, self-development, teamwork and establishing connections between different areas of knowledge, are skills that are promoted. Through well-designed guidance, students can act independently without losing the learning objective. Promoting learning as a reflective and co-constructed process between students is the main goal of collaborative learning settings.

Image 1

In digitally enhanced collaborative learning settings, educators and students must deal not only with the learning task itself, but also with technical factors. Via synchronous and asynchronous sessions educators and students need to establish communication formats that enable active collaboration.

The use of collaborative online learning technologies is therefore both a prerequisite and the result of successful online collaboration.

There are many ways to design digitally enhanced collaborative learning settings. In the following, three possibilities are presented to implement this collaborative learning approach, namely gamification, digital escape room and podcasting.

The main goal of this chapter is to ensure that trainees can achieve the following **learning goals**:

- Design gamification for collaborative learning;
- Design a digital escape room for collaborative learning;
- Create a podcast for collaborative learning;
- Thus, promote collaborative learning as a reflective and co-constructed process between students.

Collaborative learning can be applied to an entire course, a single module or unit, or even a single activity. Although creating a collaborative learning environment can be time-consuming, once the structure is established, it can be easily replicated for other classes.

Image 2

The specific settings can require more time. For instance, the gamification preparation process consists of several phases. The first part of the gamification preparation is design. It involves the definition of learning objectives and the purpose of the activity or program. The next phase is development; it involves implementing the concept, defined in the design phase, into the activities for students. That means creating activities using

educational technology, e.g. available tools. And then can start the realisation, the course with gamified elements.

However, the positive aspect is that most of the elements and mechanics created during the first implementation of gamification can be reused for other units, courses, or topics. The length of the playtime depends on the activity and can range from 15-20 minutes to several days or even an entire semester.

3.2 Digitally enhanced collaborative learning

3.2.1 Definitional characteristics

Through digitally enhanced collaborative learning the students are actively engaged with the information and new input in synchronous and asynchronous activities to develop collaborative, communicational skills, as well as critical thinking and creativity. The holistic approach [1] attempts to shape a collaborative learning context, where all aspects and elements of this context work together to enable a successful learning experience. It starts with defining the goals that are to be achieved and goes on with thoroughly selecting topics that are to be included, describing the milestones of the learning process, and putting in the spotlight the collaboration, reflection, and feedback. This approach involves the perspective of students and highlights the importance of preparing the students for the collaborative work by explaining the reasons and benefits of their active participation.

Image 3

However, collaborative learning is a broad term that encompasses various methods, environments, and activities that encourage students to engage actively and use their intellectual abilities. It involves students working together in small groups of two or more to seek knowledge, solutions, or create a final product. Collaborative learning activities come in different forms but mainly focus on students exploring or applying the course material rather than relying solely on the teacher's presentation or explanation [2].

3.2.2 Benefits and challenges

Benefits

The benefits of implementing digitally enhanced collaborative learning settings can be summarized as follows:

1) In collaborative online learning settings students can actively participate in the learning and experiment with various online tools that support knowledge transfer.

2) Working with cooperative discussion formats such as podcasts helps to train transversal skills like attentive communication.

Image 4

3) In well-designed collaborative learning environments gathering knowledge is a process, that happens incidentally. The inclusion of playful elements gives learning a competitive and fun factor which has a motivating effect.

4) Digitally enhanced collaborative learning settings need a clear framework which supports group work performance and the development of teamwork skills such as cooperative behaviour.

5) In collaborative learning settings, the focus is neither on the learning material nor the teacher, but on the students. This student-centred learning helps students build a sense of responsibility for knowledge acquisition and development.

Challenges

On the one hand using collaborative learning can lead to improve communication, motivation, and engagement as well as interaction and cooperation among a group of students and thus help to achieve the learning goals effectively. On the other hand, there still can occur a range of challenges for the students themselves as well as for teachers. In general, challenges associated with collaborative learning in an online environment can be in the student, the teacher, the task itself or in technical factors:

Image 5

- Challenge **COMMUNICATION**: difficulties in communication with peers
- Challenge **COOPERATION & COLLABORATION**: problems within the group of students, no ability to compromise, lack of sense of community, cultural and social differences
- Challenge **LEADERSHIP**: poor leadership skills of the lecturer
- Challenge **FEEDBACK**: missing feedback from lecturer and colleagues
- Challenge **MOTIVATION**: because of insufficient cooperation and communication, feedback, personal attitudes, disagreement among student`s group, withdrawal of members, lack of common learning goals etc.
- Challenge **TECHNOLOGY & ADMINISTRATION**: technical or organisational problems (internet, tools, conflict in schedules etc.)

Find more
(B levels)

Challenges-in-collaborative-learning

3.2.3 Role of educator

Besides focusing on the content, the role of the educator in a collaborative setting reflects the need of support and constant guidance, monitoring, and coaching. The students' readiness to learn in a collaborative setting, where they undertake an active role, has an

important influence on the development of the learning context and its acceptance [1]. The supporting role of the educator is crucial and therefore the guidance with supporting strategy must be planned carefully.

Image 6

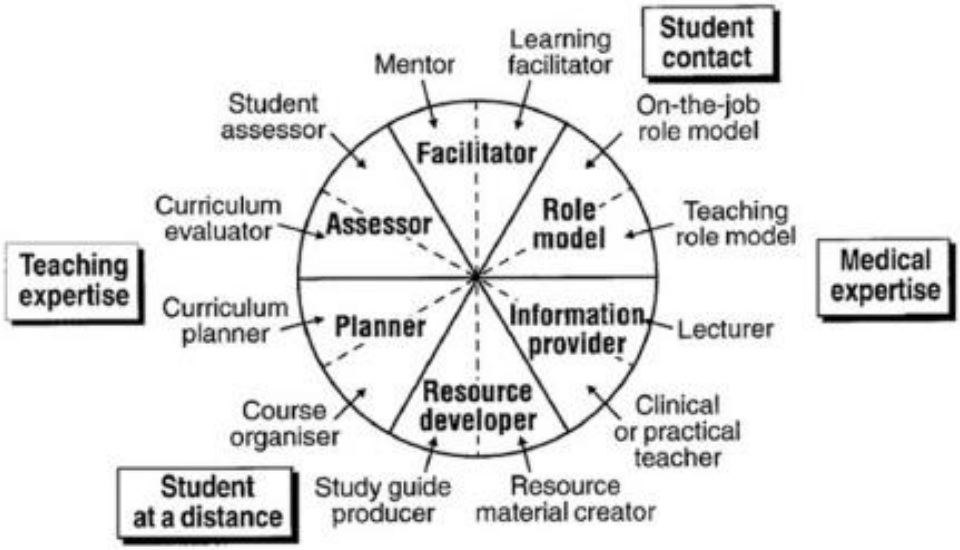

Figure 1: The 12 roles of the teacher, adopted from [3, p. e4].

To improve teaching with educational technology, educators must possess comprehensive knowledge of the available tools. The range of technological options is very vast.

In the **preparation phase**, the educator must carefully select appropriate tools for her/his idea of collaborative activity in the course or a unit. At the beginning s/he needs to have a deep understanding of possible tools, its features, and availability to apply the desired scenario effectively. The ideation of the setting must occur in parallel with the choice of technology.

In the **implementation or 'playing' phase**, the educator has to offer support and guidance whenever needed. Some settings may be self-explanatory, and the learners advance autonomously. Nevertheless, some situations need to be additionally explained.

In the programme **evaluation phase**, the educator analyses the whole process and improves the content or creates own templates for other courses applying similar mechanisms.

3.2.4 Guidelines

Here are a few guidelines for planning a holistic collaborative learning experience:

Enhance practice
(C levels)

- **Learning goals**

  Start with learning goals: what should the students be able to do by the end of the course/unit.

Grouping learners using virtual teaching assistant

- **Topics**

  What are the topics of this learning experience? How will the students get the input? What is the form of the input? Is delivery synchronous or asynchronous?

Find more
(B levels)

Collaborative learning

- **Milestones**

  What do you want to achieve with the activities? What are the benchmarks? What are the interim results? How will the process be documented and shared among groups? What are the deadlines?

Expectations and prior knowledge

Information and media literacy

- **Collaboration**

  What is the activity? How will students deal with the content? How will they collaborate? How much time will they have to complete the activities?

  Here are some tips for designing the collaborative strategy [4]:

Digital communication and collaboration

  - In this activity the students work in groups. An optional setting is to assign different roles in the group.
  - The formulation of the task is open-ended, and the educator may not be familiar with the outcome of the activity.
  - The activity takes into consideration the prior knowledge and experience of the students and invite them to actively use the resources.
  - The formulation of the activity engages the students to collaborate as well as to discuss the steps to develop the results, to critically question the information, formulate hypotheses, test them and draw conclusion.
  - The students are aware that documentation of the developing process and sharing with other groups is important. The documentation (e.g. reporting, summarizing or other form depending on the question or problem defined in the activity) can be done by using templates, tables, graphics, etc.

Tips for exploration
(A levels)

Collaborative files

Collaborative information search

- **Supporting and guidance**

  When you plan interactive and collaborative activity, your students may need more support then usually because they need to be actively engaged. As we already mentioned that the students' readiness plays an important role, to enhance it, it is advisable to plan how will you provide support and guidance for the students.

  - Offer clear instructions and explain why it is important.
  - Announce office hours where you are available for questions.
  - Give your students a guideline for electronic communication: When can you be reached? How can students contact you personally and through which channels?
  - Provide a supportive discussion forum.
  - Get the students familiar with the technology and tools that you are using.
  - Use the peer feedback activity: students give each other feedback.
  - You can facilitate joint work, e.g. by jointly creating a glossary – Moodle activity – (collection of terms, definitions and methods).

- Reflection

  At the end of the activity students will usually report on their findings in written and/or oral form.

  - The learning objectives are assessed using other appropriate methods as well.
  - You can include portfolios, learning evidence in your teaching. Students should document the planning and progress of their learning processes and outcomes.

Find more
(B levels)

Joint editing of documents

Guidance

Tips for exploration
(A levels)

Digital activity checklists

Find more
(B levels)

Peer interaction

Enhance practice
(C levels)

Online reflection + presenting team time for feedback

Peer observation

- **Feedback to students**

  Which are relevant features of the feedback to students? How will the students get the feedback?

  Find more (B levels)

  - ➢ Feedback evaluates students' work against the standards.
  - ➢ Feedback must be constructive (points out strengths and weaknesses), timely (while the work is still fresh) and meaningful (addresses a specific intended learning outcome).
  - ➢ Define the goal of the feedback: it can be either formative or summative. Formative feedback is given during the activity to enable students to improve by immediate consideration of the feedback. Summative feedback is given for the performed activity and can be constructively used only in a next activity.
  - ➢ Define the activities where you plan to give feedback: quiz, assignment, forum, group work, exercise, essay, etc. For some activities, such as quizzes, it is possible to create automatic feedback.
  - ➢ Decide when do you give feedback: during the activity, at the end of an activity, at the end of a block, at the end of the course.
  - ➢ Choose a tool for feedback.

  Define the feedback method: comment, audio, oral, summary, group feedback, template, rubric etc.

  Learning reflection and evidence – ePortfolio

  Self-assessment

  Providing feedback

  Rubrics

  Learner feedback

- **Feedback from students**

  How will you get feedback from students?

  - ➢ Prepare the questions for the teaching process where you want to receive feedback.
  - ➢ Offer the students multiple ways to express their meaning: a feedback template, open ended questions, different channels.
  - ➢ Define the time when do you want to receive feedback.

3.2.5 Evaluating Outcomes

Working in groups or teams for learners can be a challenging, motivating, disappointing, and fruitful experience at the same time. This is attributed to different personalities, assignment types, working conditions, and overall heterogeneity within a group. Importantly, learners are aware that their work and collaborative efforts will be evaluated.

Image 7

There are different points of view on the assessment and evaluation of group work, which can be divided into the following roles: instructor assessment, peer assessment, self-reflection.

To ensure a smooth start to group assignments, it is essential to clearly communicate expectations to students.

Find more
(B levels)

How to evaluate group work

- This entails **defining the purpose** of the group work and explaining the desired outcomes of the collaborative setting.
- **Setting clear standards and expectations** for group work is crucial. Additionally, providing a **rubric** that defines the criteria for assessment can help guide both learners and evaluators.
- It is equally important to establish how **feedback and reflections** will be provided throughout the assessment process.

Enhance practice
(C levels)

Rubrics

In the assessment of group work, several aspects should be addressed:

- First, **individual contributions** within the group should be evaluated to recognize the efforts and abilities of each team member.
- Secondly, the **overall performance of the group** as a cohesive unit should be assessed, considering their ability to work together effectively.
- The assessment should also consider the **process** employed by the group, including communication, organization, and problem-solving strategies.
- Lastly, the **results** achieved by the group should be evaluated, focusing on the quality and completeness of the outcome.

By considering these aspects when assessing group work, educators can provide a comprehensive assessment that recognises individual and collective efforts, the group's process and the results achieved. This approach promotes a fair and holistic assessment of learners' collaborative skills and encourages continuous improvement of future group work efforts.

3.2.6 Implementation – gamification

Gamification in education refers to the use of game design elements and principles in educational settings. It involves applying game-like features such as points, badges, leaderboards, challenges, and rewards to educational tasks and activities [5]. The purpose of gamification in education is to create a more immersive learning experience that motivates students to participate actively in the learning process, enhance their engagement, and help them develop a range of skills and competencies. It can be applied to various types of educational activities, including lectures, quizzes, homework assignments, and projects, among others.

Image 8

Collaborative learning can be enhanced by incorporating gamification mechanics into various activities, units, or modules. This approach boosts learners' curiosity about the content, encourages communication and collaboration, increases engagement, and creates a sense of belonging to the group. As a result, learners become enthusiastic and eager to participate.

Motivational mechanics
The mechanics are rules and settings provided by the technology. They define how participants are engaged in the course, how they receive feedback and progress in gamified learning. There are also elements (a set of strategies taken from the game and applied in the learning environment) such as progression, room for error, visible status, time constraints, surprise - elements of the unexpected.

Programme example [6]
The programme has five modules. Each module finishes with an assessment activity, for instance a quiz, to be able to continue. The modules form a learning path where the learners distinguish among content units, activity elements and challenges. The whole programme is enriched with points, badges for accomplished goals and optionally leader boards. The following content can have restricted access and assigned specific objectives that students must achieve to unlock it. For instance, to earn a certain number of points. Depending on the results of assignment activities, the learner earns points and can progress.

Image 9 (screenshot taken from [6] – Gamification for Motivation [Video])

The motivational mechanics mentioned are frequently independent of the content itself. This means that the gamification format can be implemented in a different course, content, or programme with the same mechanics, despite variations in the material being taught.

Cognitive gamification

The cognitive gamification reflects the content itself with a purpose to deeply engage the learner directly with the content. Those elements are unique for the content and cannot be reused and applied in topically different environments [7].

It is possible to adapt stories - concluding every chapter with a suspenseful moment. Consequently, learners become eager to discover what occurs afterwards and they seek the knowledge needed to access the next chapter. When curiosity is aroused, the satisfaction of it can be a reward [6].

Programme example

One example is a lab simulation. The practical part of the programme offers learners to get engaged with different possibilities to get the result. They can experiment with different techniques, observe the outcomes, formulate hypotheses regarding what went wrong, and attempt to apply their knowledge.

This learning approach allows students to explore multiple options and address challenges through trial and error, similar to a branching scenario.

Learners see the outcomes of various decisions, and the trial-and-error process is personalized to each individual. Each person brings their unique ideas to the content and progresses through their own path, discovering the ideal combination of techniques at their own pace. This personalized approach contributes to a more effective training experience [7].

Find more
(B levels)

Branching scenario

Designing gamification

3.2.7 Implementation – digital escape room

The escape room is an engaging collaborative activity where the students have to solve a mission in order to finish the game. The game consists of a challenging story, formulated as a mission that students need to achieve in a short time. During the mission, they solve various clues and puzzles that lead them to the final cle which is the exit of the game.

Image 10

This interesting, engaging, and collaborative activity can be used to introduce the new content, as an activity for reflection on the previously received input, or the assessment of knowledge or skills. The intention of the activity is to increase motivation, improve learning and develop collaboration [8].

Implementing a digital escape room, the following planning steps need to be considered:

Choose the setting
You can play the escape room in a synchronous or asynchronous setting. Playing the escape room synchronously the educator introduces the game at the beginning of the meeting and divides the students into breakout rooms. In the asynchronous approach, the educator can introduce the game with a brief video and explain the mission and process.

Define the target group
Consider the prior knowledge, skills and experience of your participants when planning this activity. Depending on the level of experience you define the duration, the complexity and the mode (collaboration or competition) of the game.

Design the content of the game
Define the learning goals and purpose of the game. Consider what kind of knowledge or skills you want students to develop. It is also important to decide which role the game will play within your lectures. Choose whether to use it as an introductory activity, supporting measure or as an assessment tool.

Create puzzles
Puzzles (questions) and clues (answers) define the content framework of the digital escape room. Puzzles can be multiple-choice questions, crosswords, drag and drop, and many more. After solving the puzzle, as a result, the students receive a code. The codes are based on a short sequence of numbers and/or letters.

Depending on the design of the game, the codes are either a trigger for the next puzzle (sequential structure) or an element to fill in the meta-puzzle (open structure).

Write a background story
The escape room needs an exciting background story. The story must immerse players into the role of a detective or a rescuer that takes them through the whole mission during the game. The story with an exciting mission can be adapted to the content you are teaching.

Find more
(B levels)

Planning steps

Video tutorial

Digital escape room

Online quizzes

Visual content

Enhance practice
(C levels)

Learner-driven approaches: Develop escape room jointly with the students

Extended reality: i.e. use virtual reality workspaces to implement the escape room

Develop the game
There are a lot of different possibilities and environments to implement the escape room. Consider the following aspects:

- Shareable game environment – i.e. website
- Countdown time
- Images for puzzles
- Tools to create the puzzles – i.e. Google Forms

Test the game
Test the game with colleagues to check whether the game is too complex or simple.

3.2.8 Implementation – creating podcast

A podcast is a series of audio(video) episodes posted on podcast hosting platforms and available on-demand. There is no pre-determined format or length, it can be created in a flexible form on different topics as a talk, discussion, or an interview [9].

Image 11

Using podcast in education is a good way to involve students into problem solving, collaboration and deeper understanding of content. Students can produce mini units on a certain topic or make interviews.
Using podcasts as a learning tool helps to train competencies and skills such as idea creation, topic research, communication and of course technical skills which are necessary for the podcast production.

When producing a podcast, students take on several roles:

Image 12

- **Storyteller** – they must develop an interesting story worth talking about in a podcast. ElementsTechniquesEffectiveStorytellingLN.pdf (nyt.com)
- **Interviewer** – they train active listening and asking the right question.
- **Producer** – they are involved in the whole production process. Starting with creating a suitable recording setting and ending with editing the recorded material.

Planing steps

When you use a podcast as a learning element, you have to consider following steps:

- **Define the topic of the podcast**: decide if the topic of the podcast is defined by you or developed together with the students.
- **Define the criteria and framework**: expectations, technologies used, podcast rubric and title, duration of the podcast, etc. – provide your students with a common framework for the development of the podcast.

Find more
(B levels)

Find a detailed planning guide **here**

Students creating podcasts

Digital content creation

Sharing digital content online

Enhance practice (C levels)

Making series

- **Offer technical instructions:** provide detailed instructions for the technical use of the tools you suggest for creating podcasts.
- **Define preparation steps:** give students an idea what they need to prepare before starting the podcast recording – i.e. design an invitation/information flyer or prepare a consent form for publication.
- **Choose podcast channel:** choose a platform where you want to host the podcast and create a channel where you will publish your podcast series.

3.3 Consolidation and intensification

3.3.1 Reflect

For making the most of your activities for facilitating digitally enhanced collaborative learning, try to answer the following questions:

Image 13

- To what extent do the collaborative learning approaches mentioned above help you to turn students into active participants and problem solvers?

  You may answer this on a scale from 1 to 10 (1 = low support >> 10= very strong support)

- If you had to choose one of the above approaches, which one would help you best to activate the students and get them present not only physically but socially?

  You may select among the options of the following list:
  - Playful elements such as points, badges for goals achieved or leader boards to actively engage and motivate students.
  - Digital escape room activity where the students must solve a mission to finish the game.
  - Podcasts to train competencies and skills such as idea creation, topic research, communication, or technical skills.

- For you as an educator, what are the critical competencies that learners develop when collaborating?

  You may select the 3 most important skills from the following list:
  - Communication skills
  - Teamwork skills
  - Research skills
  - Brainstorming skills
  - Technical skills

- Negotiation skills
- Visualisation skills
- Time management skills
- Project management skills
- Feedback skills
- Ability to act flexibly
- Problem-solving skills

- How important are technologies in the development of these competencies in your view?

  You may answer this on a scale from 1 to 10 (1 = no relevance >> 10= very high relevance)

3.3.2 Takeaways

Here you have some takeaways for organising COIL that may also serve as tips to get started:

1) The use of gamification elements is a helpful approach to increase student motivation and participation.

2) In collaborative learning settings reflection loops and guidance are important measures to keep students actively engaged and to reach the defined learning goal.

Image 14

3) Developing a collaborative learning setting can take a lot of time, but once the structure is implemented, you can easily reuse the collaborative framework for other lectures.

3.3.3 Dig deeper

Here you have some sources where you may find more practical information:

- In the EDUdig Collection of didactical and digital approaches and tools for educators
- YouTube Channel that offers information about using design techniques from games to improve learning outcomes, created by Marie-Jo Leroux
- YouTube Playlist on Educational Escape Rooms, created by The Skeptical Educator

Here you have some references for further information:

Clarke, S., Peel, D.J., Arnab, S., Morini, L., Keegan, H., & Wood, O. (2017). EscapED: A framework for creating educational escape rooms and interactive games for higher/further education. *International Journal of Serious Games*, 4(3), 73–86.

Bideau, Y.M., & Kearns, T. (2022). A European approach to micro-credentials for lifelong learning and employability. *Journal of European CME*, 11(1), 2147288.

Ellis, B. (2021). A simple process and template for student podcasting. Technotes blog.

Haiken, M. (2021). Get your students creating their own podcasts.

Hicks, J., Winnick, L., & Gonchar, M. (2019). Project audio: Teaching students how to produce their own podcasts. *The New York Times*.

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Muuro, M., Wagacha, W., Kihoro, J., & Oboko, R. (2014). Students' perceived challenges in an online collaborative learning environment: A case of higher learning institutions in Nairobi, Kenya. *International Review of Research in Open and Distributed Learning*, 15(6), 132–161.

Neumann, K.L., Alvarado-Albertorio, F., & Ramírez-Salgado, A. (2020). Online approaches for implementing a digital escape room with preservice teachers. *Journal of Technology and Teacher Education*, 28(2), 415–424.

Somova, E., & Gachkova, M. (2016). An attempt for gamification of learning in Moodle. *International Conference on e-Learning, 16,* 6 pages.

Wu, Y. (2015). Designing gamification for collaborative learning in group work. Master's Thesis. Lappeenranta: Technical University Lappeenranta.

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Image 15

[3] Karakitsiou, D.E., Markou, A., Kyriakou, P., Pieri, M., Abuaita, M., Bourousis, E., Hido, T., Tsatsaragkou, A., Boukali, A., Burbure, C. De, & Dimoliatis, I.D.K. (2012). The good student is more than a listener–The 12+ 1 roles of the medical student. *Medical teacher*, 34(1), e1–e8.

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[5] EduTrends (2016). *EduTrends Gamificación*.

[6] Leroux, M.-J. (2022a). Gamification for motivation [video].

[7] Leroux, M.-J. (2022b). Motivational vs. cognitive gamification [video].

[8] Veldkamp, A., van de Grint, L., Knippels, M.C.P., & van Joolingen, W.R. (2020). Escape education: A systematic review on escape rooms in education. *Educational Research Review*, 31, 100364.

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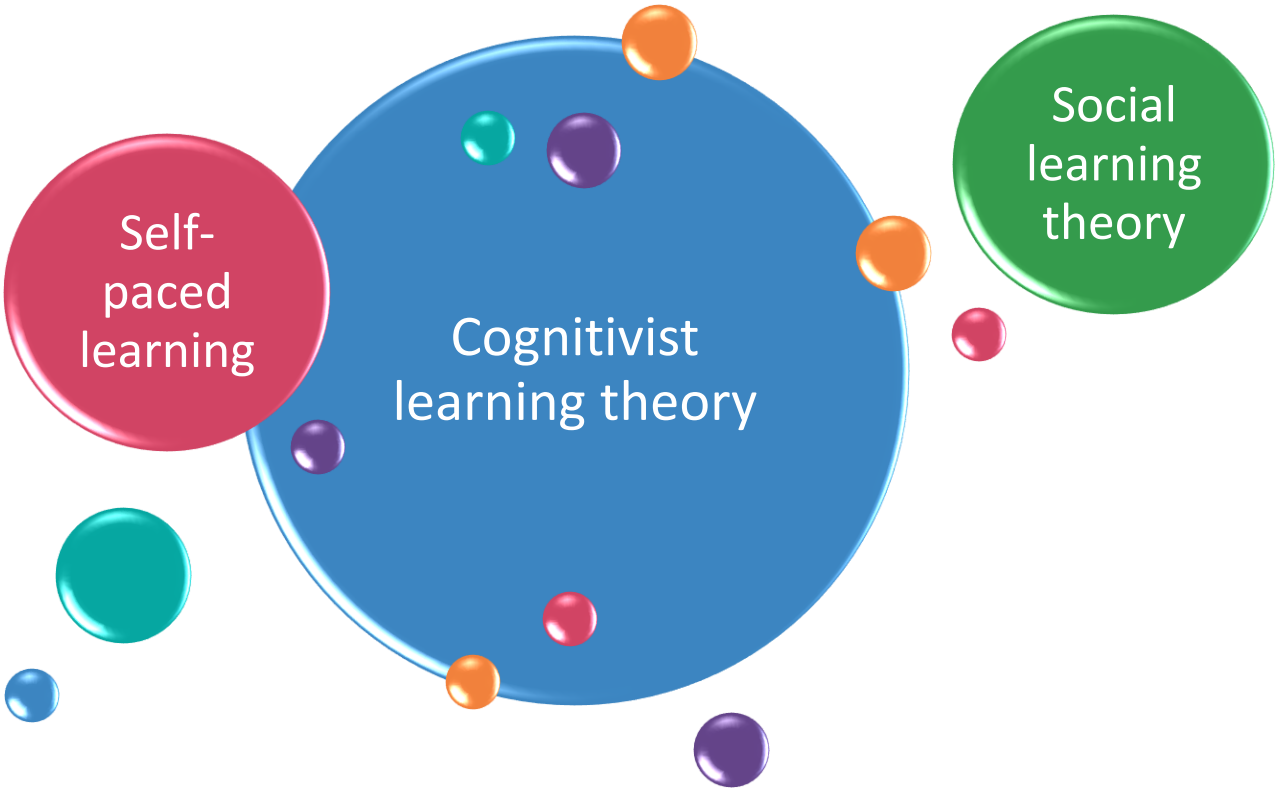
Self-paced learning
Cognitivist learning theory
Social learning theory

Chapter 4. Collaborative Online International Learning (COIL)

4.1 About this chapter

Collaborative Online International Learning (COIL) is a type of online educational collaboration that involves students and educators from different countries working together on joint projects, assignments, or courses. COIL uses digital technologies to facilitate cross-cultural and intercultural communication and collaboration, allowing students to learn, while considering the perspectives of other cultures and also developing their digital and intercultural competencies.

Image 1

COIL can take many different forms, including virtual exchanges, joint online courses, and project-based collaborations. COIL collaborations can be integrated into traditional classroom settings or delivered as standalone online courses. The aim of COIL is to provide students with an international and intercultural learning experience that helps them to develop the competencies and knowledge needed to succeed in a globalized world.

In this chapter, the concept of Collaborative Online International Learning (COIL) and its implications are explained, highlighting COIL benefits for the learning process. Besides, a brief overview of the main phases that compose the life cycle of a COIL project will also be presented; thus, providing practical guidelines for their design and operationalisation.

The main goal of this chapter is to ensure that trainees can achieve the following **learning goals**:

- Identify the benefits and main constraints of COIL;
- Describe the life cycle of COIL projects;
- Design a COIL project.

The design and creation of a COIL project depends on the level of affinity and familiarity with the COIL project partner, as this work is intended to be collaborative. Ideally, the design process can be broken down into a shared document in a 2h joint session, in which partners will provide further input over 1 week at their own pace. The process ends with the stabilization of the COIL project's guidelines, which are to be shared (and eventually negotiated) with the students after the presentation of the project.

4.2 What is Collaborative Online International Learning (COIL)?

4.2.1 Definitional characteristics

COIL stands for **Collaborative Online International Learning**, which refers to "online learning in an international setting, with interactive involvement of students and faculty from different international and intercultural backgrounds in and outside the classroom" [1, p. 188].

COIL projects are based on the involvement of teachers and students, with different geographical origins, language and culture, for the development of collaborative teaching and learning processes using online communication tools. These projects are an accessible alternative to democratise the experiences of internationalisation (at home) of students and teachers, as well as an opportunity to enrich the process of building individual and collective knowledge, offering challenging dynamics of working in heterogeneous teams.

The main purpose of COIL initiatives is to promote learning experiences in international context within the courses. Thus, it represents an additional opportunity to complement the development of technical and scientific competencies, as well as soft skills. Summarizing, among the key issues of COIL are the following: global learning, intercultural communication, internationalization of education, multinational teams, international partnerships.

[video] COIL - Collaborative Online International Learning (2021)

4.2.2 Benefits of COIL

Tips for exploration (A levels)

Recognition of digital competence levels

Online tutorials

COIL projects involve a **partnership between teachers from different countries** to provide **students with the opportunity to collaborate in online environment** [2]. Students are organised into **multinational teams** to develop predefined activities that combine synchronous and asynchronous work moments. These activities can take different formats, if they fit within the learning outcomes and the assessment methods designed for the courses involved. COIL projects may be short-term or extend throughout the semester.

International studies show that COIL has a relevant impact on the personal and academic development of participants and is valued by various stakeholders, including teachers, students, and employers. Participation in these projects promotes the development of various competencies and skills, e.g. communication, language, multidisciplinary teamwork, intercultural awareness and sensitivity, autonomy and time management [3].

Image 2 (adaptation)

In addition, the involvement in COIL projects enables teachers to: establish or strengthen international partnerships, integrate innovative and challenging practices into their courses, convey an international dimension to learning, collaborate with peers, increase class dynamism, and improve student interest and satisfaction rates.

4.2.3 Life cycle of a COIL project

The starting point will be to identify a partner. The possibilities to be considered should not be limited to courses with identical syllabuses, but also to those with potential for creating synergies in teaching and learning processes. Thus, courses from different academic years, and even from different scientific areas, can be considered, if it is possible to design a joint project, in which the students of each higher education institution can work collaboratively. Although the design of COIL projects is apparently easier to materialise in two courses with similar pre-defined activities, in the case of multidisciplinary partnerships, learning may be particularly interesting and closer to real contexts – in which professionals from different areas articulate themselves to accomplish activities [4].

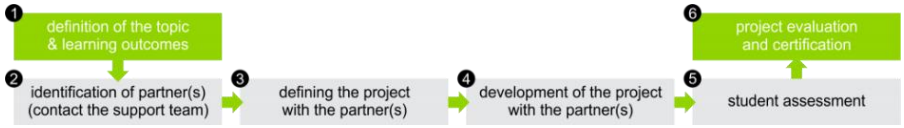

Image 3

1. The process starts with the definition, by the teacher(s) involved, of the theme and objectives of the project, which will ground the design of the learning strategy.

Find more (B levels)
Learning outcomes
Collaborative brainstorming
Enhance practice (C levels)
Defining learning criteria
Digital collaboration tools
Tips for exploration (A levels)
Assessment activities
Guidelines for group work
e-communication policy

2. The second step is to interact with potential partners to identify one (or more) for the project. It will always be advantageous for teachers to explore possibilities with personal international contacts or others they may find interesting.

3. Once the partner(s) have been identified, the project should be defined.

4. The development of the project should be based on common guidelines for the courses involved, listing in detail

    - The duration of the project, the number of international teams and elements per team (per partner);

    - The activities and tasks that students should carry out (presentation, regularity of (as)synchronous contacts, learning outcomes, deadlines, among others);

    - The dates of the periodic meetings for monitoring and evaluating the project;

    - Assessment activities.

5. The project ends with the assessment of the work developed by the students involved in the multinational teams.

6. Finally, the project ends with an evaluation where both teachers and students can share their experience and get a certificate.

Find more
(B levels)

Effective interaction

Creating interactive learning activities

Enhance practice
(C levels)

Collaborative and cooperative learning

Intercultural communication

The success of a COIL project depends on a good communication and interaction between the partners (teachers and students). It will be up to each teacher to identify needs and ensure the active participation of students in the project.

The development of the COIL project should be based on **common guidelines** for the courses involved and it should end with the **evaluation (weaknesses & strengths)** of the work developed by teachers and students.

Image 4 (own compilation)

4.3 Consolidaton and intensification

4.3.1 Reflect

For making the most of your COIL activities, try to answer the following questions:

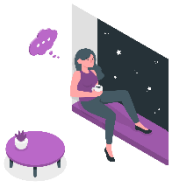

Image 5

- Can I **select** one of my own courses/ modules that would benefit from a COIL project?
- Can I **identify** the learning outcome(s) that could benefit from international teamwork, as well as the partner's core study area?
- Can I **describe** how would I embed the development of intercultural competence into the course syllabus?
- Can I **outline** of the main activities of the COIL project, considering the facilitation, interaction, monitoring, and reflexion phases?

4.3.2 Takeaways

Here you have some takeaways for organising COIL that may also serve as tips to get started:

Image 6

- Identify potential COIL partners from your personal (or research) network, given that these relationships will be the easiest to build upon. Consider your visiting faculty from abroad;
- Schedule synchronous interaction between teachers and between students, over a sustained period of time, to support and promote more effective asynchronous communication;
- Organise an ice-breaker session so that participants start interacting and everyone is on the same page;
- Resort to a diversified set of assessment tools and methods to ensure participants reach the learning outcomes;
- Intertwine in-person and online activities to monitor and enhance the participants' experience.

4.3.3 Dig deeper

Here you have some sources for further digging into the issue of COIL:

Balula, A. (2022). Drifts of Collaborative Online International Learning (COIL) towards pedagogical innovation: A foretelling bibliometric analysis. In A. Reis, J. Barroso, P. Martins, A. Jimoyiannis, R.Y.-M. Huang, & R. Henriques (Eds). *Technology and Innovation in Learning, Teaching and Education. TECH-EDU 2022. Communications in Computer and Information Science*, vol 1720. Cham: Springer.

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University of Aveiro (2020). *COIL@UA*.

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Image 7

Check-out from e-handbook

Takeaway

Now, that you have gone through the e-handbook, you should have an understanding and overview of an educator's digital competencies on an up-to-date B level or integrator level referring to the requirements, benefits and challenges of digitally enhanced collaborative learning including COIL (Collaborative International Online Learning). In other words, you should be able to use and experiment with digital tools for a range of purposes of collaborative online learning, trying to understand which digital strategies work best in which contexts.

Image 1

If you want to identify your proficiency level you may use this self-assessment tool based on the DigComEdu framework.

In case your self-assessment using this DigComEdu tool or another procedure motivates you for further improvement of your digital competencies in education, you may decide to go back to the e-handbook to further exploit its potential or directly continue your exploration at EDUdig's Collection of didactical and digital approaches and tools for educators.

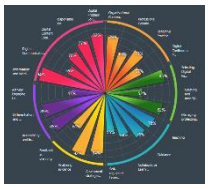


Image 2

As you already know, there you may find practical content of educators' and learners' digital competencies, including didactic concepts for online lectures, e-learning tools, and recommendations, which are covering educators' professional and pedagogic competencies as well as learners' competencies in the areas of

- Professional Engagement;
- Digital Resources;
- Teaching and Learning;
- Assessment;
- Empowering Learners;
- Facilitating Learners' Digital Competencies.

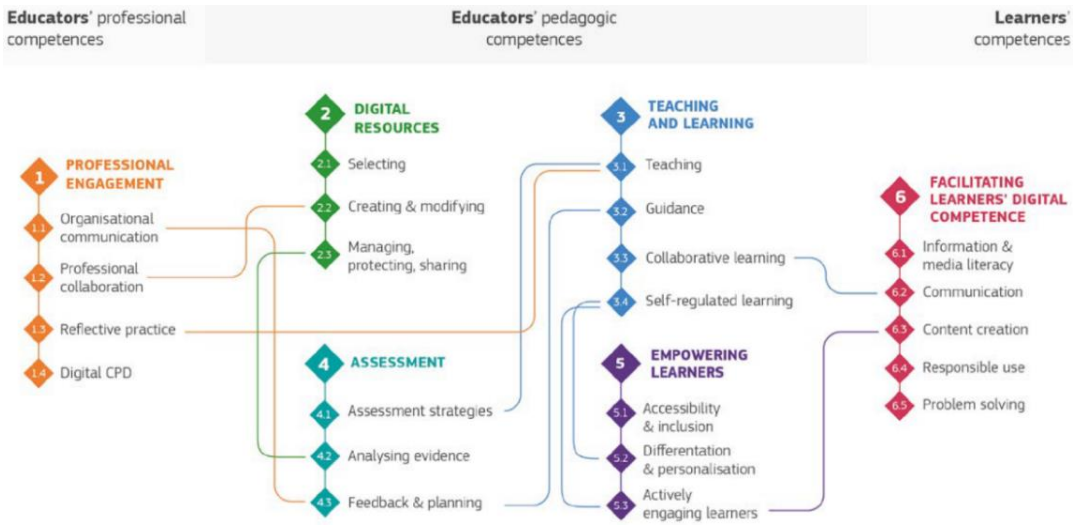


Image 3 (DigCompEdu screenshot, p. 16)

Reflective questions

A few reflective questions may serve as an attunement to tomorrow and the far future:

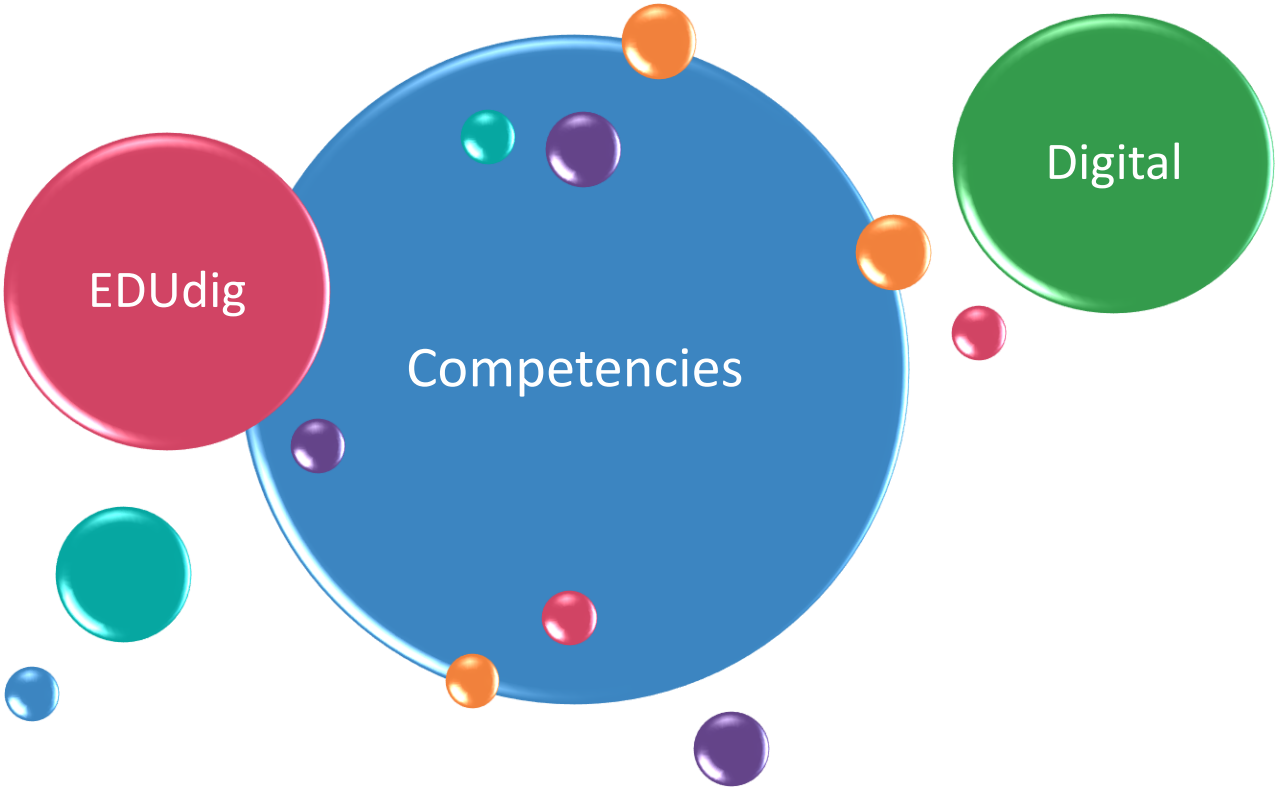
Image 4

- What are the characteristics of digitally enhanced learning and teaching as compared to learning and teaching in a non-digitalised world?
- What do I expect from digitally enhanced learning and teaching in the near and far future?
- Do my digital education activities facilitate more personalised, flexible, and student-centred teaching as they should according to the recent Digital Education Action Plan (2021–2027) of the European Commission.
- Which are the gateways, benefits, and challenges of artificial intelligence in learning and teaching? (You may like to watch, for example, "What if your teacher were AI?")

Image 5 (screenshot)

Acknowledgment

The creation of these resources has been co-funded by the ERASMUS+ grant program of the European Union under grant no. 2020-1-AT01-KA226-092677. Neither the European Commission nor the project's national funding agency are responsible for the content or liable for any losses or damage resulting of the use of these resources.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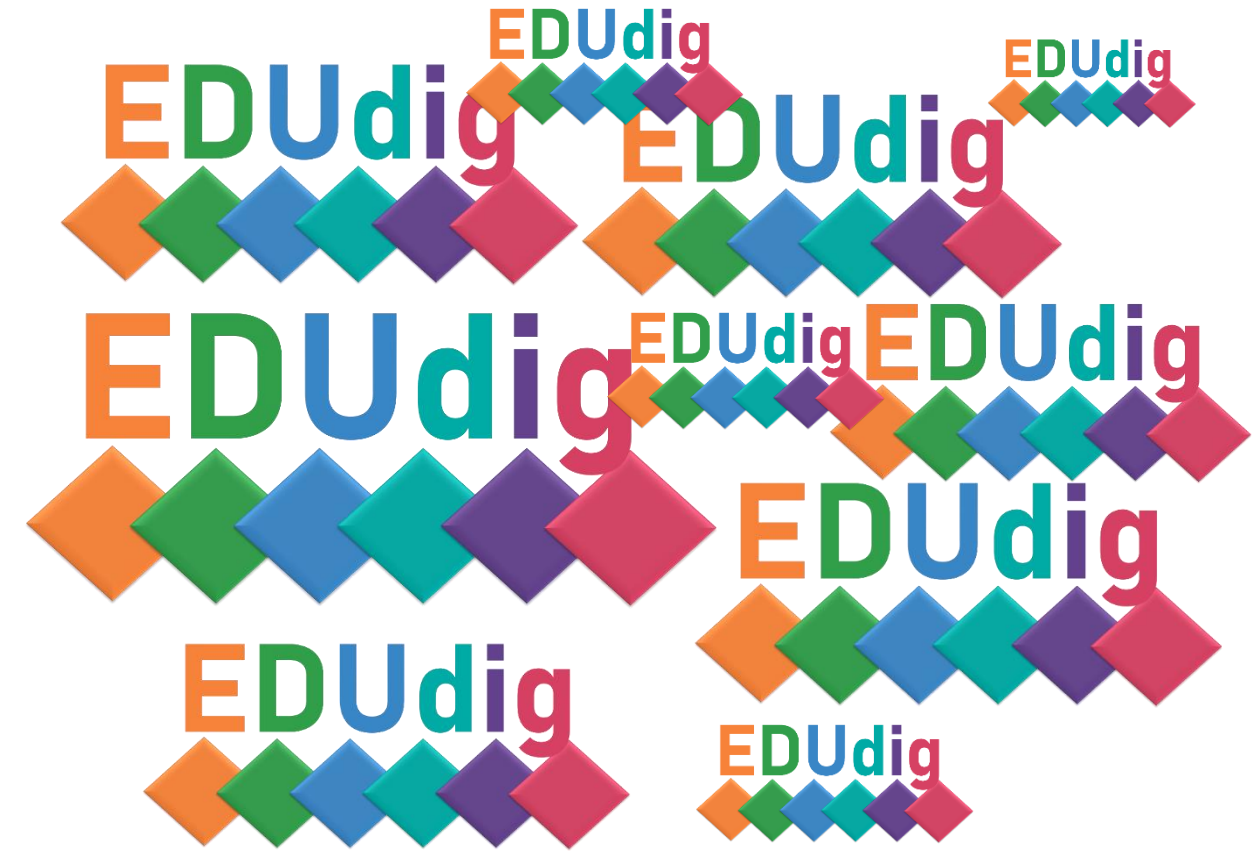
Laurea University of Applied Sciences, Ratatie 22, 01300 Vantaa, Finland

University of Aveiro, Campus Universitário de Santiago, 3810-193 Aveiro, Portugal

Evaluation Agency Baden-Wuerttemberg, Am Kaiserring 10-16, 68161 Mannheim, Germany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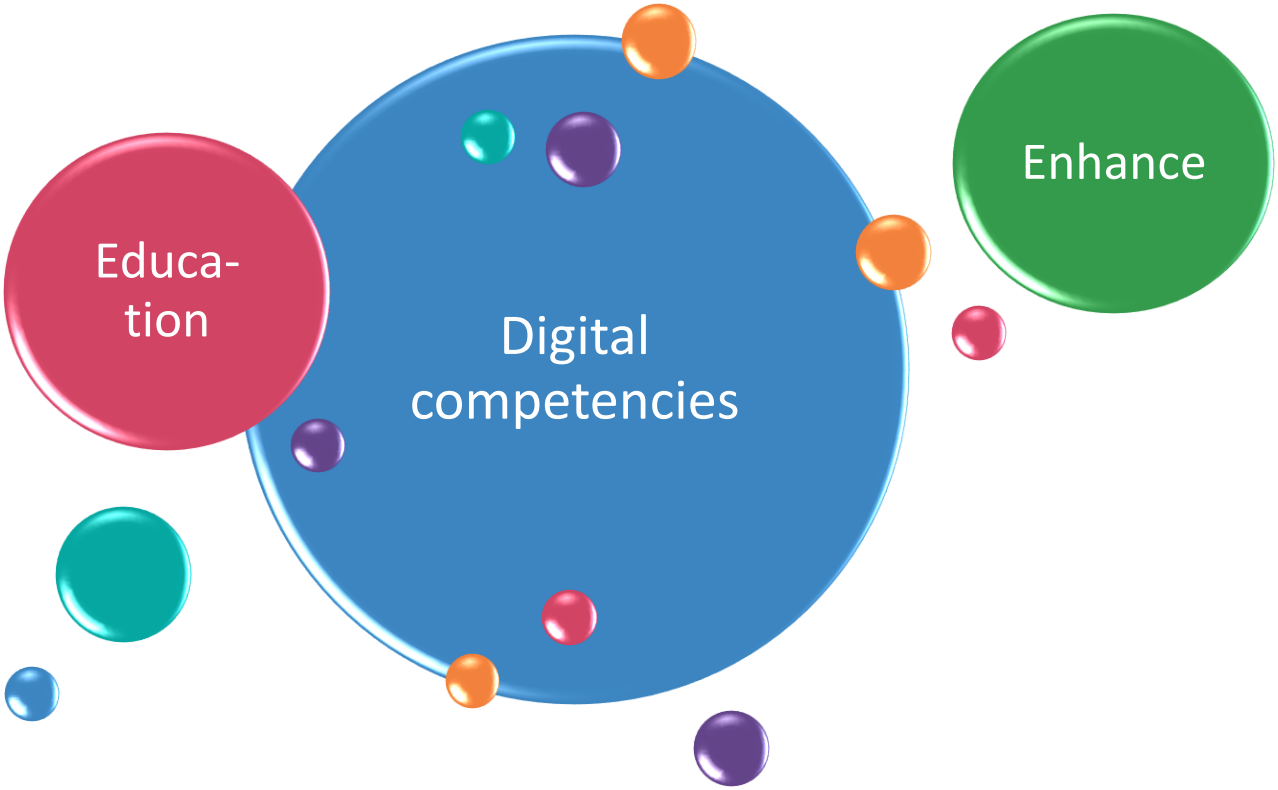
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