CHARM-EU (CHALLENGE-DRIVEN, ACCESSIBLE, RESEARCH-BASED AND MOBILE EUROPEAN UNIVERSITY)

DELIVERABLE D4.1 – CHARM-EU: PEDAGOGICAL GUIDELINES

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Authors (Main Beneficiary)	Jan Haarhuis and Sanne Van Vugt (Utrecht University)
Other Contributors	Silvia Gallagher (Trinity College Dublin), Gemma O'Sullivan (Trinity College Dublin), Patricia Cucchi (University of

	Montpellier), Gloria Rubert Adelantado (University of Barcelona), Nora Tartsay Nemeth (Eötvös Loránd University), Aleid de Jong (Utrecht University), Daniel Griffin (Trinity College Dublin), Brigitte Lundin (University of Montpellier), Krisztina Lénárt (Eötvös Loránd University), Bernadette Somody (Eötvös Loránd University), Mária Hercz (Eötvös Loránd University), Gabriel Hervas Nicolas (University of Barcelona), Alex Lodder (Utrecht University), Jake Byrne (Trinity College Dublin), Antonie van Harteveld (Utrecht University), Dimitra Mousa (Utrecht University), Marjanneke Vijge (Utrecht University), Annet van der Riet (Utrecht University).

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CHARM-EU Pedagogical Guidelines:

Theoretical Background to the CHARM-EU Educational Principles

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Executive summary

The CHARM-EU educational approach is guided by ten principles, and in this resource, we define these principles and explore the theory behind them. This will help you gain an understanding of why these principles were chosen and how they relate to teaching and learning in a CHARM-EU program. A background understanding of these principles is important when designing CHARM-EU modules, teaching CHARM-EU students, and working with other CHARM-EU stakeholders. These guidelines describe CHARM-EU teaching and learning practices at a high level, focusing on theory, definitions, benefits, challenges and best practices[1] and provide practical implementation tips for your teaching practice.

The ten educational concepts that are described in this resource are: Challenge Based Learning (CBL), Research-led and Research-based Education (RBE), Sustainability in Education, Technology Enhanced Learning (TEL), Student Centred Learning and Teaching (SCLT), Situated Learning, Transversal Skills, Transdisciplinarity in Education, Transnational and Intercultural Learning, and Inclusive Education.

[1] For information about practical implementation consult the Teaching and Learning Handbook.

1. Welcome to the CHARM-EU Pedagogical Guidelines

Welcome to the pedagogical guidelines resource created by CHARM-EU; an initiative that seeks to reconcile humanity with the planet by creating the university of the future.

1.1. What is the aim of this resource?

The CHARM-EU educational approach is guided by ten principles, and in this resource, we define these principles and explore the theory behind them. This will help you gain an understanding of why these principles were chosen and how they relate to teaching and learning in a CHARM-EU program. A background understanding of these principles is important when designing CHARM-EU modules, teaching CHARM-EU students, and working with other CHARM-EU stakeholders. These guidelines describe CHARM-EU teaching and learning practices at a high level, focusing on theory, definitions, benefits, challenges and best practices[2] and provide practical implementation tips for your teaching practice.

1.2. Who is this resource for?

This resource is for any CHARM-EU educational advisor, teacher, student or stakeholder seeking to understand key insights and theoretical background of the CHARM-EU Educational Principles.

1.3. How should I use this resource?

This resource can be used as a reference guide when planning, designing, implementing and evaluating a CHARM-EU module. It will help you align your teaching with the 10 CHARM-EU Educational Principles.

1.4. Translating educational principles into pedagogical guidelines

Ten CHARM-EU educational principles form the fundamentals for the CHARM-EU curriculum, educational philosophy, mission and values; challenge driven learning,

[2] For information about practical implementation consult the Teaching and Learning Handbook.

transdisciplinarity, research-led and research-based, sustainability, student-centred, inclusivity in education, transversal skills, transnational and intercultural learning, technology enhanced, and authentic and situated learning. They give direction to teaching and learning strategies and activities (Figure 1).

For these pedagogical guidelines, some educational principles were 'translated' to pedagogical approaches to contextualize them in terms of a teaching and learning perspective. For example, the educational principle 'sustainability', has been translated to 'sustainability in education', 'inclusivity' to 'inclusivity in education', and challenge driven to Challenge Based Learning (CBL). Translating the educational principles in this way gave direction to literature searches and form the basis for this resource. The authors and expert reviewers of each section of this resource iteratively discussed the optimum term to be used.

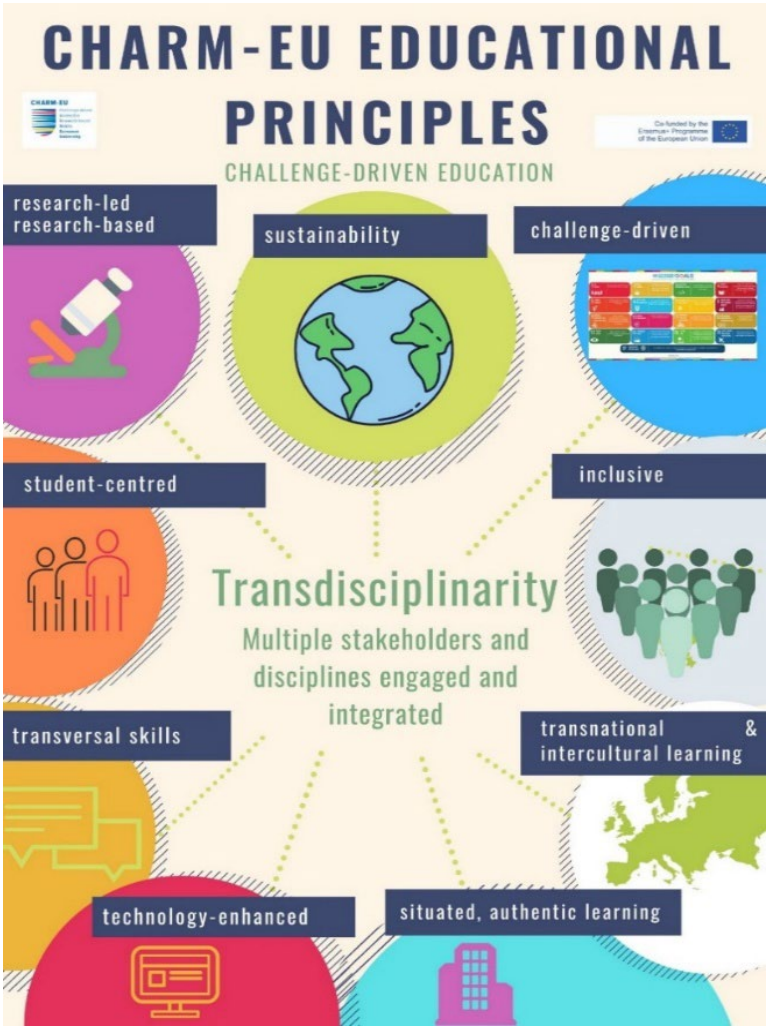

Figure 1 CHARM-EU educational principles

The next sections describe each **pedagogical guideline**, and provides their description, definition, benefits, challenges, and key readings. For ease of access, you can CTRL + click on each pedagogical guideline below to access the section within the document.

- **Challenge Based Learning (CBL)**
- **Research-led and Research-based Education (RBE)**
- **Sustainability in Education**
- **Technology Enhanced Learning (TEL)**
- **Student Centred Learning and Teaching (SCLT)**
- **Situated Learning**
- **Transversal Skills**
- **Transdisciplinarity in Education**
- **Transnational and Intercultural Learning**
- **Inclusive Education**

2. Pedagogical Guidelines

2.1. Challenge Based Learning (CBL)

2.1.1. Description and definition

Challenge based learning (CBL) is an educational approach which frames learning around global, real-world, authentic challenges. These challenges are co-developed, investigated and acted upon by students and multidisciplinary stakeholders, including academic, enterprise and community participants. Throughout the CBL process, creative, problem solving, and innovative thinking is encouraged to broaden perspectives, create new processes, ideas and solutions, and stimulate motivation. Although there are many different ways CBL can be implemented in teaching, the key features of all CBL approaches usually include (see Figure 2):

- Global themes
- Real world challenges
- Collaboration
- Technology
- Flexibility
- Multi-disciplinarity
- Innovation and creativity
- A defined challenge

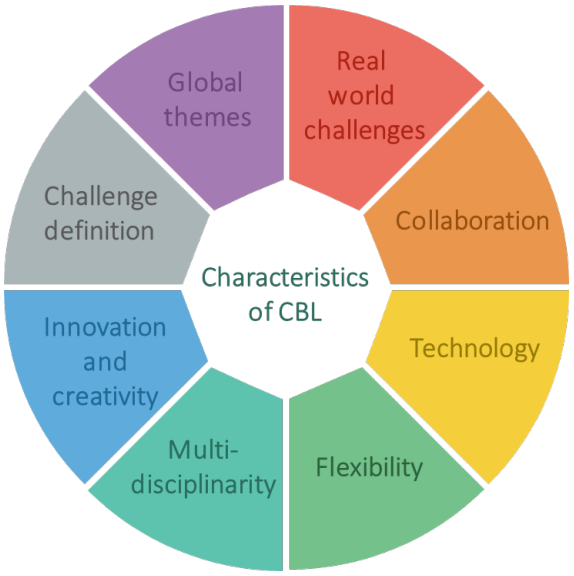

Figure 2 Key features of CBL approaches (Gallagher and Savage, 2020)

The most common CBL framework used in higher education was developed by Apple in its Apple Classrooms of Tomorrow— Today initiative (see Figure 3). This framework uses three phases, Engage, Investigate and Act, and within this, students move from formulating a 'big question' to implementing solutions to this challenge. There are some similarities with other approaches such as Problem Based Learning, Project Based Learning, and Experiential

Learning, but CBL builds upon these approaches and is now understood as an educational approach in its own right.

Figure 3 Challenge based learning approach (Nichols et al., 2016)

A key feature of CBL is its flexibility; it can be used as a guiding approach or as a formal structure, and interventions can be small or large scale. For example, teachers may use a mini-challenge to start the module and motivate students about the topic they will be learning about; or they may use CBL as the approach around an entire programme. Alternatively, teachers may use the first phase of the Apple CBL approach to develop a challenge, but then integrate a different approach for another part of their module (e.g. design thinking). In this way, CBL can be very beneficial to academic teachers seeking to use CBL in their teaching but may not wish to make radical sudden changes.

2.1.2. Benefits

There are many benefits to using a CBL approach reported in research literature from case studies. Students access industry and community contacts which can support post course

employment; innovative thinking and problem solving skills are refined and improved; experience of discipline specific technical skills are gained in a real world environment; working with other students, academics, and other stakeholders gives experience with multidisciplinary teamwork; and addressing global challenges provides students a deeper understanding of sustainability and its solutions (Cheung, Cohen, Lo, & Elia, 2011; Conde, García-Peñalvo, Fidalgo-Blanco, & Sein-Echaluce, 2017; Gama, Alencar, Calegario, Neves, & Alessio, 2019; Kohn Rådberg, Lundqvist, Malmqvist, & Hagvall Svensson, 2018).

For academic teachers and industry, benefits include improving research and innovation partnerships, fostering teaching innovation, and potential commercial products (Membrillo-Hernández et al., 2019).

2.1.3. Challenges

Challenges with implementing CBL in universities include a high level of uncertainty emerging from the challenges (Membrillo-Hernández et al., 2019); a need for flexibility when working with industry partners (Mora-Salinas, Torres, Castillo, Gijón, & Rodriguez-Paz, 2019); educator and student resistance to technology or non-traditional ways of teaching (Félix-Herrán, Rendon-Nava, & Nieto Jalil, 2019; Lam, 2016; Lin & Chen, 2018); additional time needed by academics and students working, guiding, and assessing the challenge (Detoni, Sales, Chanin, Villwock, & Santos, 2019; Díaz Martínez, 2019), and the need for student support and additional technical resources during the transition to CBL teaching (Dornfeld Tissenbaum & Jona, 2018).

2.1.4. Key readings and resources

Chanin, R., et al. (2018). Challenge based start-up learning: a framework to teach software startup. Proceedings of the 23rd Annual ACM Conference on Innovation and Technology in Computer Science Education. Larnaca, Cyprus, Association for Computing Machinery: 266–271.

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Lam, A. H. Y. (2016). Exploring the flexibility of challenge based learning in health promotion training. Paper presented at the 13th International Conference on Nursing Informatics, NI 2016, Geneva, Switzerland.

Lin, J., & Chen, C. (2018). A study on the course types of challenge-based learning - Based on the relevant courses in Tsinghua University. Paper presented at the 7th World Engineering Education Forum, WEEF 2017.

Membrillo-Hernández, J., J. Ramírez-Cadena, M., Martínez-Acosta, M., Cruz-Gómez, E., Muñoz-Díaz, E., & Elizalde, H. (2019). Challenge based learning: the importance of world-

leading companies as training partners. International Journal on Interactive Design and Manufacturing, 13(3), 1103-1113. doi:10.1007/s12008-019-00569-4

Mora-Salinas, R., Torres, C. R., Castillo, D. H., Gijón, C. R. R., & Rodriguez-Paz, M. X. (2019). The i-semester experience: Undergraduate challenge based learning within the automotive industry. Paper presented at the 10th IEEE Global Engineering Education Conference, EDUCON 2019.

Nichols, M., et al. (2016). Challenge based learner user guide. Redwood City, CA, Digital Promise: https://www.challengebasedlearning.org/wp-content/uploads/2019/2002/CBL_Guide2016.pdf.

2.2. Research-led and Research-based Education (RBE)

2.2.1. Description and definition

Research-based and research-led education are *approaches* aiming at finding balance in the teaching-research nexus (Dekker & Wolff, 2016). The difference between the two is distinct:

- In **research-led** education relevant research findings from teaching staff are integrated into the curriculum content, focusing on learning disciplinary content.
- **Research-based** education, on the other hand, invites and encourages students to perform research themselves, focusing on learning about the research process. Whereas students fulfil a role as 'audience' within research-led education, they are active and engaged within research-based education (inquiry based learning) (Healey, 2005).

2.2.2. The teaching-research nexus

Several researchers have tried to categorize the teaching-research nexus such as Neumann (1992), Hodson (1992), Griffiths (2004) and Jenkins and Healey (2005). The nexus takes shape in various forms (Dekker & Wolff, 2016). Hodson (1992) identified three categories:

1) learning **from** research (acquiring knowledge about important theories and research in a disciplinary field),
2) learning **about** research (gaining knowledge of research methods and techniques, for instance at research labs) and
3) learning **through** research (acquiring knowledge about a discipline by performing research themselves).

Another important model in literature was created by Jenkins and Healey (2005) (Figure 4). Within this model education is divided into four quadrants. One spectrum of this model is the role of the student (from observer to participant) and another spectrum is content and process (from focus on content, to focus on research process). Healey (2005) suggests

universities to integrate the upper two quadrants more into the curriculum, rather than focusing on the bottom left only. These have more beneficial outcomes for students' learning.

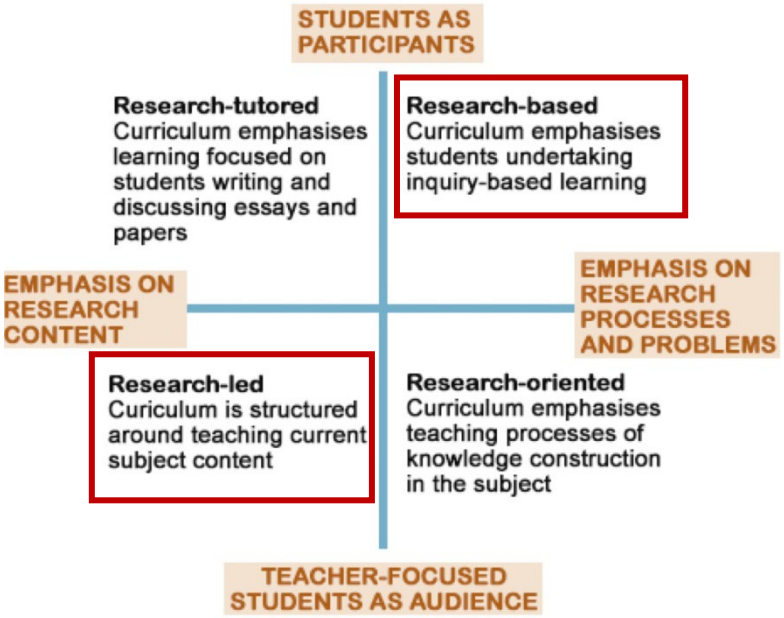

Figure 4 The educational research model by Jenkins and Healey (2005), with research-led an research-based framed for this resource.

2.2.3. Benefits

Research-based education helps students to understand what it actually entails to work as a scientific researcher in the field and therefore stimulates scientific development (Hunter, Laursen, & Seymour, 2007). It also instigates student's enthusiasm, motivation (De Silva, 2014; Healey, Jordan, Pell, & Short, 2010), critical thinking (De Silva, 2014), independency and collaborative skills (Hunter et al., 2007).

Another important benefit for teachers, who are also researchers, is that students can generate new ideas and insights that can be used for teachers' research when education is finished (Seymour, Hunter, Laursen, & DeAntoni, 2004). Students and teachers can become, eventually, co-learners in research (Heron, Baker, & McEwen, 2006).

2.2.4. Challenges

The teaching-research nexus raises complex considerations for universities. It is a challenge for them to implement effective interconnection between teaching and research (Visser-Wijnveen, Van Driel, Van der Rijst, Verloop, & Visser, 2010). First, there can be a potential tension for research staff being less engaged with teaching research and spending not enough time with their students (Healey et al., 2010). This lack of availability is a thread for students' learning (Turner, Wuetherick, & Healey, 2008). In the Trend Report Learning and Teaching (2015), results from a questionnaire among different European countries was published, and it was found that "research plays a more important role than teaching in the career development of young academics". The majority of teachers acknowledged this statement (Sursock, 2015).

Another important challenge is the pedagogical demands from teachers to implement research-based education (Dekker & Wolff, 2016). It has been found that good researchers are not always good teachers (Marsh & Hattie, 2002). It is important that universities offer training to researcher-teachers in order for them to become able of good teachers in research (Dekker & Wolff, 2016).

2.2.5. Key readings

Neumann, R. (1992). Perceptions of the teaching-research nexus: A framework for analysis. Higher Education, 23, 159–171.

Griffiths, R. (2004). Knowledge production and the research–teaching nexus: The case of the built environment disciplines. Studies in Higher education, 29(6), 709-726.

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Jenkins, A., & Healey, M. (2005). Institutional strategies to link teaching and research. York:

Higher Education Academy.

2.2.6. Additional resources

De Silva, E. (2014). Cases on Research-Based Teaching Methods in Science Education: IGI Global.

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Heron, R. L., Baker, R., & McEwen, L. (2006). Co-learning: Re-linking research and teaching in geography. Journal of Geography in Higher Education, 30(1), 77-87.

Hodson, D. (1992). In search of a meaningful relationship: an exploration of some issues relating to integration in science and science education. International Journal of science education, 14(5), 541-562.

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Visser-Wijnveen, G. J., Van Driel, J. H., Van der Rijst, R. M., Verloop, N., & Visser, A. (2010). The ideal research-teaching nexus in the eyes of academics: building profiles. *Higher Education Research & Development, 29*(2), 195-210. doi:10.1080/07294360903532016

2.3. Sustainability in Education

2.3.1. Description and definition

CHARM-EU uses the broad term, **sustainability**, as an educational principle, defined as the goal to be achieved through sustainable development (Brundtland, 1987). **Sustainable development** was first described as "a development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (Brundtland, 1987). In September 2015, the United Nations adopted an agenda to achieve sustainability by 2030 through the 17 Sustainable Development Goals (SDGs)(Figure 5). The SDGs "address a range of social needs including education, health, social protection and job opportunities while tackling climate change and environmental protection (…) and key systemic barriers to sustainable development such as inequality, unsustainable consumption patterns, weak institutional capacity and environmental degradation." (UNESCO, 2017).

Figure 5 The 17 Sustainable Development Goals (UNESCO (http://www.globalgoals.org/resources))

Within the context of teaching and learning, sustainability can be interpreted and defined in different ways.

2.3.2. Teaching sustainability versus sustainability learning

Three key, interrelated terms, education for sustainable development (ESD), education for sustainability (ES), and sustainability learning (SL) describe understandings of education in

this space. The distinction between these terms is not always clear and is open to multiple interpretations (Chang et al., 2020). Table 1 provides definitions of these terms, however, it is important to note how and why they emerged to understand this educational landscape.

Education for Sustainable Development (ESD)	**Education for Sustainability (EfS)**	**Sustainability Learning (SL)**
"Aims to empower learners to take informed decisions and responsible actions for environmental integrity, economic viability and a just society, for present and future generations." This definition come from UNESCO (UNESCO, 2017)	"A transforming learning process to achieve sustainability" (Chang et al., 2020).	"Learning for all, teaching that matters and learning that lasts. Its foundation is effective classroom practice, and its goal is to provide for the learning needs of all students throughout their school years and into lifelong learning" (Graham et al., 2015).

Table 1 Defining Education for Sustainable Development (ESD), Education for Sustainability (EfS) and Sustainability Learning (SL)

Education for Sustainable Development (ESD)

As societal transformations towards sustainability require comprehensive individual and collective learning processes, ESD is considered a key component in achieving the SDGs (UNESCO, 2020). Introduced as part of the Agenda 21 and promoted through several large UN programs, ESD is an education concept that aims to foster competencies, knowledge, values and attitudes which enable people to contribute to a sustainable future. As such, it aims to "empower learners to take informed decisions and responsible actions for environmental integrity, economic viability and a just society, for present and future generations" (UNESCO, 2017). As a holistic concept, it addresses the "learning content and outcomes, pedagogy and the learning environment" (UNESCO, 2014). Ultimately, it

"achieves its purpose by transforming society" (ibid.).

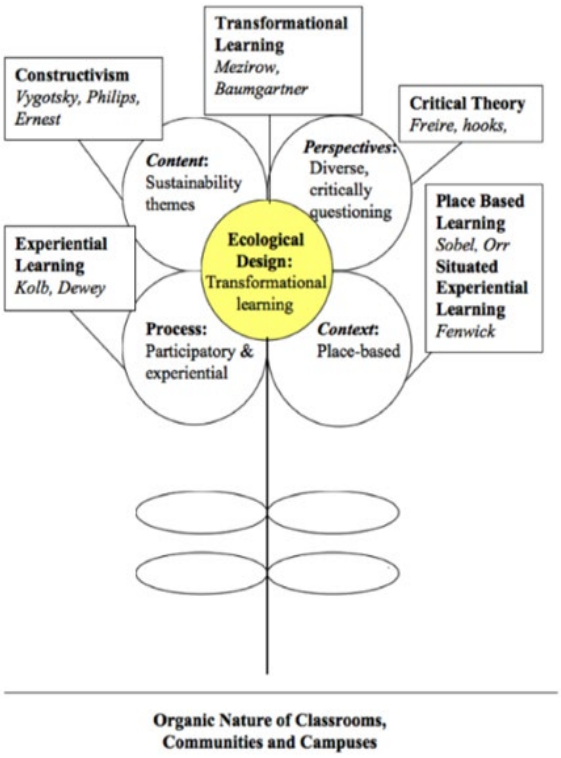

Figure 6 The Burns model of Sustainability Pedagogy and Learning Theories (Burns, 2013)

Education for Sustainability (EfS)

Traditional teaching methods were often identified as an inadequate means for teaching ESD. In addition, accessibility and understanding of ESD was not shared by all (Firth & Smith, 2017; UNECE, 2016). This led to the rise of Education for Sustainability (EfS) whereby sustainability actors proposed that education for sustainable development must be totally transforming and transformed. This profound transformation in the way of teaching has become necessary to face the challenges of the 21st Century and to adapt to the profile of new generations (Y, Z, alpha) for all disciplinary fields not only ESD. Burns proposed a model in 2009, and improved it after testing it in two ESD courses at Portland University (Burns, 2013).

This model (Figure 6) highlighted the importance of Education for Sustainability. It calls for a transdisciplinary approach, development of transversal skills, active pedagogy, and must be as inclusive as possible.

Sustainability Learning (SL)

ESD has thus evolved to become part of a larger framework that has also allowed for its emergence: Sustainability Learning (SL). SL encompasses ESD and EfS to which it adds the inclusion of all types of learners, thus responding to the fourth sustainable development goal or SDG4 (Ferguson et al., 2019) and to GCED: Global Citizenship Education priority of

the UN (United Nations). Three key elements identified by Graham et al.'s Sustainability Learning concept scaffold the CHARM-EU sustainability educational principle.

1) **Learning for all:** This means having the structure, tools, resources and well-trained teachers to have a practice that is sufficiently diversified and that makes quality education accessible to every learner and throughout his or her life (e.g. LifeLong Learning). In short, it combines EfS and inclusiveness in all its forms. It is therefore necessary to consider and train teachers in the different types of disabilities (visible and non-visible disabilities), socio-cultural differences (religion, belief, customs, customs, financial means, social environment, available time...), level of knowledge, intellectual and cognitive abilities, and in the fight against discrimination (racial, gender, sexual preference: LGBTQI+).

2) **Teaching that matters:** This teaching must use practical applications in the daily life of the learner. Case studies or challenge-based learning applied to their real lives, for example, is therefore essential. ESD using SDGs applied to the local context is therefore essential to pursue this objective. The pedagogy used for these courses will also help to develop transversal skills: collaborative decision-making, communication, problem solving, creativity and critical thinking but also values and proactivity in peaceful, tolerant, inclusive and sustainable world (UNESCO, 2016).

3) **Learning that lasts:** Teaching concrete skills that will help in students' personal and professional life and adapted to their personality will make them sustainable. This also concerns the way in which these competencies are validated and requires a pedagogical alignment between competencies and assessments. Pedagogical assessment techniques and modalities will also be decisive, giving priority to those that are adapted to memory capacities by

combining knowledge in cognitive sciences, neurosciences and psychology for example (Medjad et al., 2017).

2.3.3. Benefits

Modules that integrate sustainability into their teaching and learning practices help develop transversal skills such as collaborative decision-making, communication, problem solving, creativity and critical thinking but also values and proactivity to foster a peaceful, tolerant, inclusive and sustainable world (UNESCO, 2016).

2.3.4. Challenges

The most challenging part is EfS. Even in countries with incentive policy for the development of active pedagogy and ESD, many teachers have a vague idea of what sustainable learning is.

Another key issue is to consider the 5 dimensions of human functioning: Physical-Biological, Cognitive, Cultural, Intrapersonal, Interpersonal and to develop the ATRiUM of capacities that results from this: "Active learning, Thinking, Relating to others, Using language symbols and ICT, Managing self" (Graham et al. 2015).

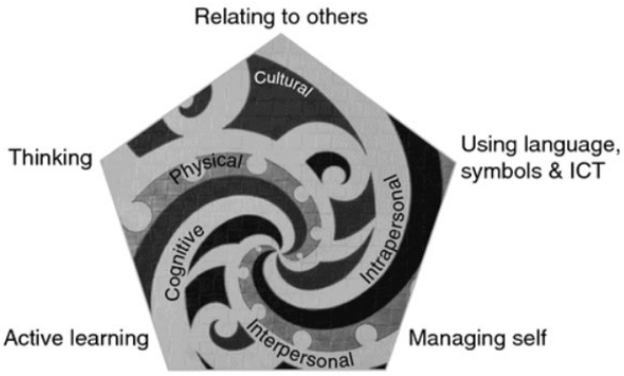

Figure 7 The ATRiUM (Graham et al., 2015)

Many teachers develop only certain aspects limited to their disciplinary field. One of the challenges will therefore also be to create a transdisciplinary dynamic to allow the co-construction of new practices, which will make it possible to overcome resistance to change. Teachers will thus see their practice enriched by co-constructing from the skills they share and not by having the feeling of having to make a clean slate of their experience and transform themselves. The psychological aspects that underlie behaviour in collaborative

group work will have to be mastered by the teachers and transmitted to the students (Gulikers & Oonk, 2019).

2.3.5. Key readings

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2.4. Technology Enhanced Learning (TEL)

2.4.1. Description and definition

In higher education, the term technology-enhanced learning (TEL) is often used to describe the interface between digital technology and higher education teaching and the application and effectiveness of ICT (Kirkwood et al. 2014, Bayne 2014). Or, in simpler words: enhancing learning and teaching in higher education through the use of technology. However, to some the term TEL covers a wider scope, reflecting a branch of research that includes all types of socio-technical innovations for learning practices, regarding individuals and organizations (Westera 2010). Examples of technology enhances learning and teaching are:

- Learning analytics in education;
- Educational videos;
- Digital platforms where students can have online discussions, collaborate on (group) assignments or give feedback on each other's work;
- Augmented, virtual and mixed reality, simulations, virtual teaching assistant, remote labs and serious games.

2.4.2. From 'instructional technology' to 'technology-enhanced learning'

Formerly used terms 'instructional technology' and 'educational technology' merely indicated a one-way information transfer by means of technology (Reiser R. A. 1987). Technology enhanced learning, on the other hand, is not only instructional but indicates interaction and knowledge construction through the use of digital technology in education (Westera 2010).

Research from Fossland (2016) suggests that technology-enhancement is linked to nine educational key characteristics: different educational models, authenticity, pedagogical added values, meaningful student activities, changing approaches to feedback, assessment and connection with the outside world, as well as holistic planning, supportive leaders and strong micro-cultures. This research shows that technology-enhancement is not only about

the effective use of technology in education, but that it should be understood as a relational and complex educational phenomenon.

2.4.3. Different degrees of technology-enhancement: web-facilitated, blended and online

Technology-enhancement in education can take place in different degrees. In the case of education in which 1 to 29% of a course is facilitated through web-based technology we speak of a 'web-facilitated' course. When 30 to 79% of a course takes place online, or is facilitated through digital technology, we call this a 'blended' course. And a course where more than 80% of the content is delivered online is called an 'online' course. In an online course the interaction also takes place in an online environment. In the model below by Mustafa Caner you can see these different varieties of technology enhancement in education (Caner 2012)(Table 2).

Table 2 Caner's (2012) Classifications of Blended Learning

Proportion of Content Delivered Online	Type of Course	Typical Description
0%	Traditional	Course with no online technology used —content is delivered in writing or orally.
1 to 29%	Web Facilitated	Course, which uses Web-based technology to facilitate what is essentially a face-to-face course. Uses a course management system (CMS) or Web pages to post the syllabus and assignments, for example.
30 to 79%	Blended	Course that blends online and face-to-face delivery. Substantial proportion of the content is delivered online, typically uses online discussions, and typically has some face-to face meetings.
80+ %	Online	A course where most or all of the content is delivered online. Typically have no face-to-face meetings.

Nowadays, almost all education is at least web facilitated as most higher education courses make use of Learning Management Systems like Blackboard, Brightspace or Moodle. However, in the case of blended and online education technology-enhancement is a more integral part of the course and its very design (Arinto 2013; Gurley 2018; Sullivan et al. 2019).

2.4.4. Blended education

The definition of blended education is the integration of digital technology and online education in on-campus education (Horn and Stalker 2010; Boelens et al. 2017; Diep et al. 2017), with the aim of both strengthening and complementing each other (Garison and Vaughan 2008; Spanjers et al. 2015). This definition shows that blended learning is not merely about using digital technology in on-campus education, but that it's specifically about effectively *integrating* this technology in education – which can be done with the help of the right course design. The same goes for fully online education, which also requires a course design to make sure that the online content is effectively delivered, and that interaction is sufficiently present in the course (Baldwin 2019; Martin et al. 2019; Meyer & McNeal, 2011; Peacock & Cowan, 2019; Trammell & LaForge, 2017).

2.4.5. Hybrid learning

A new form of blended learning is synchronous blended learning, also known in literature as *hybrid* learning. This type of learning mixes the two approaches of students following on-campus education and others following this real-time education online – either from another campus or at home (Raes, Vanneste, Pieters, Windey, Van Den Noortgate, & Depaepe, 2020). This way, on-site and remote students engage in education at the same time (Raes, Detienne, Windey, & Depaepe, 2019).

Figure 8 Example of a hybrid classroom. Retrieved from Raes et al. 2019

2.4.6. Designing blended and online education

There are many educational models that can be used for (re)designing blended and online education. TPACK (which stands for Technological, Pedagogical Content Knowledge) is a commonly used model (Mishra & Koehler, 2006) (Figure 9). TPACK is a useful model for educators as they begin to use digital tools and strategies to support teaching and learning. This model is designed around the idea that content (what you teach) and pedagogy (how you teach) must be the basis for any technology that you plan to use in your classroom to enhance learning.

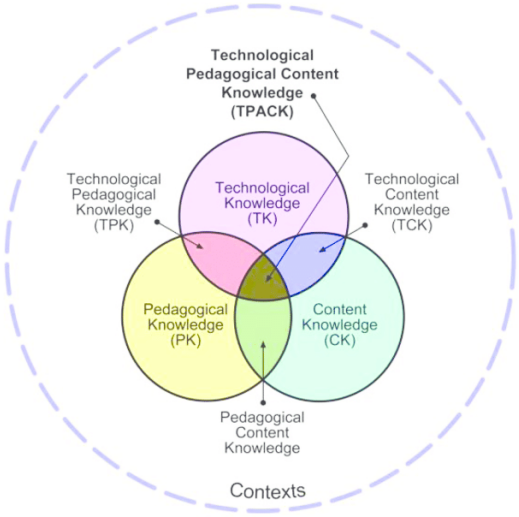

Figure 9 The TPACK Model from Mishra & Koehler (2006).

2.4.7. Benefits

According to (Kirkwood et al. 2014) technology-enhanced learning could bring:

1) Operational improvement in teaching and learning: Increased flexibility;
2) Quantitative change in learning: Increased time spent on collaborative tasks, assessment possibilities;
3) Qualitative change in learning: For example, improved reflection on learning and practice, deeper engagement or richer understanding.

In addition, (Fossland 2016) identifies three levels of potential benefits that technology-enhanced learning might bring:

1) Efficiency: Existing processes carried out in a more cost-effective, time effective, sustainable or scalable manner;

2) Enhancement: Improving existing processes and outcomes;
3) Transformation: Radical, positive change in existing processes of teaching and learning, allowing students to have an improved learning experience and teachers to time to guide and support all the different students.

2.4.8. Challenges

The challenge of TEL is to ensure new educational technologies are being adopted by both teachers and students. Therefore, it is important to focus on technologies not simply as a way to innovate, but to do this on the basis of the intrinsic motives of teachers. This process can be viewed through the innovation curve (Rogers, 2010). Early adaptors (intrinsically motivated professionals) engaged in applying new technologies will stimulate colleagues that are less motivated. Adoption of technology into education makes it possible to provide educational practitioners with innovations that have actual added value for their own educational practice and pedagogy (Westera 2010).

Another challenge is that the use of ICT in education relies on teachers' and students' digital competences. The use of technology cannot 'enhance' learning or ensure that learning is taking place just because technology is involved. Rather, hard work, planning, dedicated and digitally competent teachers and students are required (Fossland 2016). Therefore, institutions will have to invest in educational development and leadership programmes for academic teachers and students. Practical, technical and didactical support is also an essential part when implementing new technology in education.

From a teacher's perspective, it could be a challenge to make time available to (re)design a course into a blended or online one, and to adapt one's teaching approach to the technology being used. It is important to make a clear planning, and to divide tasks between everyone involved.

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2.5. Student Centred Learning and Teaching (SCLT)

2.5.1. Description and definition

Student-centred learning and teaching (SCLT) is an approach to designing higher education processes (Klemenčič, Pupinis, Kirdulytė 2020). Emerging from constructivist[3] learning theory, in which the learner is seen as an active sense maker, many student-centred approaches have been initiated in higher education (Hannafin, Hill, & Land 1997). SCLT means that students participate in, influence and take responsibility for their learning paths and environments. The end result is to achieve deeper and more meaningful learning outcomes (Klemenčič, Pupinis, & Kirdulytė, 2020).

2.5.2. Students as responsible and active learners

SCLT builds on the concept of student agency, which can be defined as "the capability of students to intervene and influence their learning environments and pathways". It also links with inclusive education, aligning personal and learning needs, preferences and abilities with the educational program (Klemenčič, et al., 2020). SCLT moves away from a teacher-centred approach, and views students as active, reflective and independent learners (Dochy, Segers, Gijbels, & Van den Bossche, 2002).

2.5.3. Focus on learning instead of teaching

SCLT differs from the teacher-centred approach where students are seen as passive learners, "consuming" taught content (Klemenčič et al., 2020). Within SCLT the teacher has a more facilitating or coaching role, instead of a lecturing role (Dochy et al., 2002). There is a shift from what teachers teach, to what learners learn (Huba & Freed, 2000; Klemenčič et al., 2020). In this way, knowledge is viewed as an important tool, rather than an end result or aim on itself (Dochy et al., 2002). Subsequently, the focus is to move away from testing and grades (Weimer, 2002). Formative assessment (process oriented, feedback) is

[3] Constructivism is 'an approach to learning that holds that people actively construct or make their own knowledge and that reality is determined by the experiences of the learner' (Elliott et al., 2000, p. 256).

commonly used in SCLT, usually more often than summative assessment (output oriented) (O'Neill & McMahon, 2005).

2.5.4. Self-directed learning and self-regulated learning

There is a lot of confusion about what student-centred learning actually is (Lea, Stephenson, & Troy, 2003). "Without clarity as to its meaning and specific set of indicators to assess institutional practices, almost anything can be 'sold' as student-centred learning." (Klemenčič, 2017). SCLT is also found in literature as the *learner-centred approach*. Furthermore, SCLT relates to *self-regulated learning* and *self-directed learning*, and seems to link most with the latter. A key characteristic of self-directed learning is that the task is always defined by the learner. "A self-directed learner should be able to define what needs to be learned" (Candy, 1991). This matches with the CHARM-EU approach, where the learner is seen as the director of his/her own learning (CHARM-EU Application). With self-regulated learning the task can be set by a teacher, and learners usually have flexibility and freedom in choosing personal learning strategies or subsequent steps in the learning process (Loyens, Magda, & Rikers, 2008).

2.5.5. Benefits

A student-centred teaching approach can be beneficial for stimulation of self-regulated skills (Matsuyama et al., 2019), and can lead to an enhanced application of diversity into the classroom and improved access to (and within) higher education. Possible ways to achieve this are flexible learning pathways and inclusive learning spaces. As mentioned before, SCLT is strongly interconnected with and beneficial for student agency. This is particular important, because through application of a teacher-centred approach, only student satisfaction and student engagement can be achieved (Klemenčič et al., 2020).

2.5.6. Challenges

"The main critique on student-centred learning is its focus on the individual" (O'Neill & McMahon, 2005). The emphasis on the individual learner could take focus away from the 'whole class' and it can become challenging to implement general, overarching pedagogies

that might work for the majority of the learners (O'Neill & McMahon, 2005). Also, students might have concerns about being 'isolated' (Lea et al., 2003).

A second challenge is the complexity of implementing student-centred learning, mainly because of difference in beliefs and unclarity or unfamiliarity with the term (O'Neill & McMahon, 2005). Beliefs from staff could be that students should accommodate knowledge or, contrary to this belief, develop their conceptions and understanding (Prosser & Trigwell, 2002). Even students can be resistant to this type of learning, because it moves away from the "lecture paradigm" which is mostly expected by students in higher education (Allan, 1999).

A third important challenge is that teachers should be great content experts, able to provide guidance in selecting significant learning content, since students don't know what they don't know (Sparrow, Sparrow, & Swan, 2000).

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2.6. Situated Learning

2.6.1. Description and definition

Situated learning is a *theory of learning*. It has roots tracing back to experiential learning (Dewey, 1938) and situated cognition (Brown, Collins & Duguid, 1989). The core of situated cognition is that knowledge is a product of the activity, context, and culture in which it is developed (Brown, Collins & Duguid, 1989). Situated learning builds on this idea, describing that what people learn, see, and do is situated in their role as a member of a network or community. Situated learning is more than "learning by doing" and "learning in situations" (Lave & Wenger, 1991).

2.6.2. Social practice: networks and communities

Situated learning theory is based on the core belief that meaningful learning takes place through social practice and interaction (Lave & Wenger, 1991; Woolf, 2010). Learning occurs in realistic, authentic contexts and is therefore part of everyday activities (Woolf, 2010). Every day (learning) activities take place in networks and/or communities, for example the workplace, family, but also other social settings like a sports community (Handley, 2007; Brown and Duguid, 2002). Here, learning occurs usually unintentional rather than deliberate (Woolf, 2010). It is considered as something that does not have a beginning and end and is not something that is a result of teaching (Wenger 1998). Learning is in that sense not moderated or steered: It depends on available opportunities within the network/community to observe, adapt and experiment (Handley et al, 2007).

2.6.3. Identity

Learning includes not only 'knowing' in practice, but also the search towards understanding who we are and what potential we have (Lave, 2004). Therefore, identity is a second inseparable element of situated learning (Lave & Wenger, 1991). Learning is an ongoing process, and so is constructing an identity -although not always recognized in that way- (Lave 1993). Identities are built by being part of the different networks and communities; 'newcomers' in networks/communities learn not only knowledge and skills, but also beliefs

and behaviours (Woolf, 2010). Each network/community has different norms of belonging, which sometime leads to identity conflicts (Handley, 2006). For example: A medical doctor who is both part of the professional group of cardiologists as well as medical doctors in general.

2.6.4. Apprenticeships and participation

Participating in the networks/communities is not simply an event; as time passes individuals learn and understand about the social norms, behaviours and values (Handley et al., 2007). A process of engagement occurs: Gradually the 'newcomer' or novice enculturates into authentic practices through activity and interaction and finally becomes a so called 'old-timer' or expert (Brown, Collins and Duguid, 1989; Woolf, 2010). This process is called: *legitimate peripheral participation* (Lave and Wenger, 1991). In short it is the process from observer to fully functioning agent. The novice gradually learns about the culture of the group and what it means to be a member (Lave and Wenger, 1991).

2.6.5. Benefits

Situated learning is strongly linked to 'life in general' and takes place in a relevant context. It offers ways to bridge the gap between the theoretical learning in the formal instruction of the classroom and the real-life application of the knowledge in the work environment (Resnick, 1987). It prevents that abstract knowledge is learned with little use (Brown, Collins and Dugid, 1989) and takes the focus away from teaching while emphasizing the importance of learning (Lave & Wenger, 1991). Brown & Duguid (1991) even state that there is no abstract knowledge to learn, since learning is by definition always situated. This possibly taps into the importance of learning transversal skills.

Because situated learning is often meaningful, it strengthens the engagement of learners. Learned content is usually considered relevant and valuable for practice. Integration of learning with 'life' increases the likelihood of application in similar other contexts (Lave & Wenger, 1991). Situated learning offers potential for applying learner's prior knowledge

(Lave & Wenger, 1991).

2.6.6. Challenges

Situated learning is a *theory of learning* rather than an educational form or pedagogical strategy (Lave & Wenger, 1991). This poses problems to implement the ideas from situated learning in instructional settings (Herington & Oliver, 1995). If novices are supposed to learn from experts in the practice of their trade, they should be exposed to them (Tripp, 1993). The classroom context is never situated; formal learning (classroom instruction, planned training) is often very different from the authentic activity or 'the ordinary practices of culture' (Brown, Collins and Duguid (1989), p. 34).

It is unclear if situated learning always takes place in the *physical context.* Although instructional designers have tried to implement situated learning through electronic media, this is an important step away from the original theory with focus on an authentic learning context (Hummel, 1993, p. 15). According to McLellan (1994) the context can be: 1) the actual work setting; 2) a highly realistic or 'virtual' surrogate of the actual work environment; or 3) an anchoring context such as a video or multimedia program (p. 8).

Another critical argument is that results of situated learning cannot be measured, registered or retrieved and therefore 'do not exist' (Clancey, 1995). However, Suchman (1987) poses that the community rather than the individual define what it means to complete a piece of work successfully.

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2.7. Transversal Skills

2.7.1. Description and definition

Transversal skills are the non-specific competences of a degree, necessary for integral development as a person, as a professional and as a citizen. Following the UNESCO (2016) definition, transversal skills are those typically considered as not specifically related to a particular job, task, academic discipline or area of knowledge that can be used in a wide variety of situations and work settings. These skills are increasingly in high demand for learners to successfully adapt to changes and to lead meaningful and productive lives in global society.

Examples of transversal skills include:

- Critical and innovative thinking (creativity, entrepreneurship, reflective thinking, reasoned decision-making, problem-solving, etc.);
- Inter-personal skills (presentation and communication skills, organizational skills, teamwork, etc.);
- Intra-personal skills (self-discipline, ability to show/express enthusiasm, perseverance, self-motivation, etc.);
- Global citizenship (tolerance, openness, respect in general, intercultural understanding, sustainability awareness and practice, etc.);
- Media and information literacy (the ability to locate and access information, as well as to analyse and evaluate media content, etc.);
- Others (This domain was created to include competences, such as physical health or religious values)

2.7.2. Benefits

Students go through a learning process in which they acquire both the learning content and the transversal competences that complement and contextualize the subject matter (and

vice versa). Thus, it also involves learning procedures and attitudes that are fundamental to critical, ethical and competent exercise of 21st century professions.
Competences, when considered as a source of learning, imply an approach that seeks to respond to the functionality of learning, as well as learning in a meaningful way for the student, making it deeper and longer lasting.

Students develop the transversal skills and competences necessary for participation in the 21st century and society in general will hopefully benefit from this through improved quality and productivity.

Teachers will have the opportunity to try innovative methods and learning tools in order to optimise their time and help their students develop transversal skills and where reasonable, offer further access to supportive materials and educational sources.

Teachers are also likely to enhance and develop their own transversal skills when working in this way.

2.7.3. Challenges

There can be a lack of pedagogical training for many teachers in higher education in how to teach transversal skills and competences. Universities need to offer training and support, like materials, teaching guides and advisors.

Institutions may lack clear incentives for teachers to go through the training process and introduce the transversal skills and competences approach into their classes.
Some systemic problems like large class size, rigid or overloaded curricula, pressure to achieve academic success and lack of adequate assessment methods hinders educator engagement.

It is important that students have a clear overview of their transversal skills and qualifications. Transversal skills and competences should be validated to support students professional development and record of qualifications.

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2.8. Transdisciplinarity in Education

2.8.1. Description and definition

Transdisciplinarity has been defined as "the mobilization of a range of theoretical perspectives and practical methodologies to solve problems" (Nowotny et al 2003, p. 186). It seeks to engage external stakeholders in education and research; to solve problems that are defined in collaboration with external stakeholders; to teach students how to situate and contextualise the knowledge they learn; and to draw connections between and above disciplinary knowledge. The term transdisciplinarity can be traced to the Seminar on Interdisciplinarity in Universities organised by the OECD Centre for Educational Research and Innovation (CERI) in collaboration with the French Ministry of Education at the University of Nice (France) September 1970.

Definitions of inter- and transdisciplinarity proliferate and at times contradict each other. The National Academy of Sciences (2005, p.188), categorises transdisciplinarity as a sub-set of interdisciplinarity. Franks et all (2007) synthesised the broad variety of definitions of interdisciplinarity into the following definition: Interdisciplinarity "unifies and integrates knowledge and must include an interaction, overlap, sharing of insights or bridging of disciplines among two or more disciplines from a theoretical, practical-outcome or problem-oriented approach" (ibid, p. 171). To Heckhausen (1972, cited in Lyall, 2014, p. 14), interdisciplinarity can be framed in levels of interaction ranging from: "simple communication of ideas to the mutual integration of organising concepts, methodology, procedures, epistemology, terminology, data, and organisation of research and education in a fairly large field."

2.8.2. What is the difference between interdisciplinarity and transdisciplinarity?

The first key difference between inter- and transdisciplinarity is that transdisciplinarity begins not with disciplines and their interplay but with a problem, challenge or research question identified in collaboration with extra-academic actors i.e. groups or individuals

from social or traditional enterprise, government or communities. The emphasis is purposively on the 'social purpose of knowledge' (Eric Jantsch in Apostel et al. 1972).

The second key difference is that transdisciplinarity seeks to engage and utilise knowledge spaces above disciplines. Transdisciplinarity is proposed as a superior epistemological stage that manages, connects and generates knowledge through theoretical frameworks such as Marxism, structuralism, general systems theory and policy sciences (Jean Piaget in Apostel et al. 1972).

2.8.3. Benefits

Transdisciplinarity teaches students the skills to collaborate and communicate with external stakeholders in dialogue to identify problems or challenges. It does not replace disciplinary knowledge but teaches students the skills to evaluate a problem or challenge and build a network of experts both within and outside the academy who will be able to fill knowledge gaps in understanding the complexity of a challenge.

In comparing different disciplinary perspectives and understanding epistemological stances, transdisciplinarity gives students an awareness of the politics and origins of thought. In doing so, it allows them to identify gaps, to analyse how knowledge is filtered by politics and ontologies. It also delivers the tools to connect ideas, identify gaps and negotiate spaces of shared understanding between different groups.

As a result of its learning aims, transdisciplinary education teaches students 21st century skills: communication, collaboration, negotiation, empathy, complexity, integration and solution-building.

It does not purport to replace disciplinary knowledge but is dependent on disciplinary knowledge as the foundation of problem-solving.

2.8.4. Challenges

Transdisciplinarity is an emergent skillset. Due to the proliferation of definitions in the literature it is frequently confused with the learning outcomes of Liberal Arts educational programmes which focus on breadth of learning, 21st century skills development or multi-disciplinarity. It can be perceived as threatening disciplinary integrity. However, transdisciplinarity is dependent on disciplines and prizes disciplinary insight in its pursuit of problem-identification and solution-making.

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2.9. Transnational and Intercultural Learning

2.9.1. Definition and description

Transnational and intercultural learning (TIL) refers to those teaching and learning processes and activities that occur in the context of internationalisation, especially through internationalisation abroad and internationalisation at home activities. Internationalisation at home (IaH) refers to the "purposeful integration of international and intercultural dimensions into the formal and informal curriculum for all students within domestic learning environments" (Beelen & Jones, 2015, p.69). It also refers to teaching, learning as well as student services in a culturally diverse setting; is strongly linked to the development of international, intercultural and global perspectives in all students; and concerns all beneficiaries and all processes (administrative processes as well as teaching, learning and research processes). It has implications for the curriculum, for general staff development, professional development for academic staff, services, systems administration and campus culture (Leask, 2004). This approach therefore raises the importance of internationalising all activities and learning outcomes not only for those who carry out a cross-border learning activities, but for those students who remain at the 'home institution'. Virtual exchange programmes fall into the category of IaH activities (Erdei & Káplár-Kodácsy, 2020).

Apart from the above, internationalisation abroad refers to "the movement of people, knowledge, programs, providers and curriculum across national or regional jurisdictional borders" (OECD, 2004, p. 19). International student and staff mobilities are the most prominent tools of internationalisation abroad. International student mobility refers to a certain study period of an educational programme that is integrated into the curriculum, taking place outside the geographical boundaries of the country of residence in order to provide students with a unique learning experience abroad, enhancing their intercultural, language, social and personal as well as professional competences (Clarke et al., 2009; Erdei & Káplár-Kodácsy, 2020; Kumpikaite & Duoba, 2011; Nilsson & Ripmeester, 2016; Smith & Mitry, 2008). International staff mobility refers to a certain period of time spent outside the geographical boundaries of the country of residence by academic staff – including teachers,

researchers – as well as non-academic staff with the purpose of enhancing the quality of the students' experience, while these international staff mobility programmes also provide the participants with extensive professional development opportunities (Horváth et al., 2020).

The 'transnational' component of TIL refers to educational environments in which the "cross-border movements of people, institutions, systems and programs" take place (Kesper-Biermann et al., 2018, p.116). Based on the definition provided by the Palgrave Dictionary of Transnational History, it also refers to "people, ideas, products, processes and patterns that operate over, across, through, beyond, above, under, or in-between policies and societies (…) or addresses the flows of people, goods, ideas or processes that stretched over borders" ("Palgrave Dict. Transnatl. Hist.," 2009, p.17.). Therefore 'transnational' refers to all teaching and learning processes that involve or heavily build on the physical relocation of the students and/or teachers, as well as benefits from the remote, virtually mediated, yet active collaboration of the main stakeholders across nations, creating unique learning opportunities for all beneficiaries.

On the other hand, intercultural learning refers to those teaching and learning processes and activities that support "the acquisition of knowledge and skills that support the ability of learners to both understand culture and interact with people from cultures different from their own. It is developmental in the sense that learners advance through stages of progressively more sophisticated levels of understanding. This understanding includes that of different cultures as well as their own. Specifically, to develop cultural awareness, it is important for a learner to have this sense of cultural self-awareness, which will form the basis for comparisons that are inevitably made by the learner" (Lane, 2012, p. 1618). Intercultural learning nevertheless it not an 'easy thing to achieve' (Leask, 2004), therefore the purposeful planning and structured integration of specific intercultural learning outcomes into the curriculum design is essential and necessary.

Transnational and Intercultural Learning (TIL) therefore refers to those teaching and learning processes that purposefully build on, exploit, and benefit from the international and intercultural diversity of all parties who are involved in the educational process. TIL incorporates a transnational and intercultural dimension into the complete design of the educational processes, including learning goals, content, teaching & learning activities, learning environment, instructional materials, tools & resources, assessment and extra-curricular activities as part of the design and delivery of the curriculum, following the constructive alignment approach (Biggs, 2003).

2.9.2. Benefits

Transnational and intercultural learning environment provides students with the possibility to enhance or develop a number of competences through transnational and intercultural T&L processes and activities. An indicative list of competences can be found below (Erdei & Káplár-Kodácsy, 2020):

1. Intercultural competences
    a. Cultural, intercultural, and cross-cultural skills
    b. Intercultural communication competences and skills
    c. Intercultural and cross-cultural awareness
    d. Intercultural and cross-cultural sensitivity
    e. Global or world-mindedness, global competence
2. Language competences
    a. Foreign language competences
    b. Communication competences, including oral and written communication skills
3. Professional competences
    a. Academic knowledge and skills
    b. ICT skills
    c. Learning skills
    d. Problem solving
    e. Creativity
    f. Organisational skills
    g. Management skills
    h. Critical thinking
    i. Decision making skills

   j. Others, such as ethics, adaptability, initiative, assertiveness, decisiveness, persistence, analytical skills, planning, co-ordinating

4. Personal and social competences
   a. Teamwork
   b. Collaboration skills
   c. Others, such as mindset, awareness, maturity, lifestyle choices, personal skills, sense of adventure and self-confidence, feelings of independence and self-efficacy, confidence, open-mindedness, consciousness of European identity

Development of intercultural competences is at the forefront of all transnational and intercultural learning processes; therefore it is necessary to elaborate on this topic in detail. Intercultural competence can be defined as the "ability to interact effectively and appropriately in intercultural situations based on one's intercultural knowledge, skills and attitudes" (Deardorff, 2009, p. 246), as well as the "knowledge of others; knowledge of self; skills to interpret and relate; skills to discover and/or to interact; valuing others' values, beliefs, and behaviours; and relativizing one's self. Linguistic competence plays a key role" (Byram, 1997, p. 34, cited by Deardorff, 2006, p. 247). "As found, the notion of intercultural competence is a multifaceted and widely interpreted concept that is often characterized by and associated with related ideas, such as intercultural proficiency, global awareness, adeptness at intercultural communication, openness to diverse people, intercultural sensitivity, ability to work effectively in a multicultural environment, tolerance and respect for others (Clarke et al., 2009) as well as cultural awareness, cultural intelligence, global mindedness, cultural sensitivity and empathy, cultural adaptability, language skills or cross-cultural communication skills (Roy et al., 2019). These terms refer to a wide range of possible intercultural outcomes that can be generated by the participation in student mobility programmes (Stebleton et al., 2012)" (Erdei & Káplár-Kodácsy, 2020, p.26-27). Intercultural competences therefore can and need to be purposefully reflected on when designing the programme and module learning outcomes, as well as incorporated into all T&L activities and assessment schemes.

2.9.3. Challenges

Transnational and intercultural learning outcomes that can be developed or enhanced through international student mobility and IaH activities, e.g. virtual exchange programmes seem to be planned, integrated purposefully, and reflected on into the curriculum and all teaching and learning processes to varying degrees and with different intensities. Even though informal and non-formal learning have an important role in the acquisition and development of the aforementioned knowledge, skills and competences throughout interacting and collaborating in diverse groups, in order to navigate this learning through the curriculum and maximise the transnational and intercultural learning potential for students, formalisation and structured support of such learning processes are essential.

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2.10. Inclusive Education

2.10.1. Description and definition

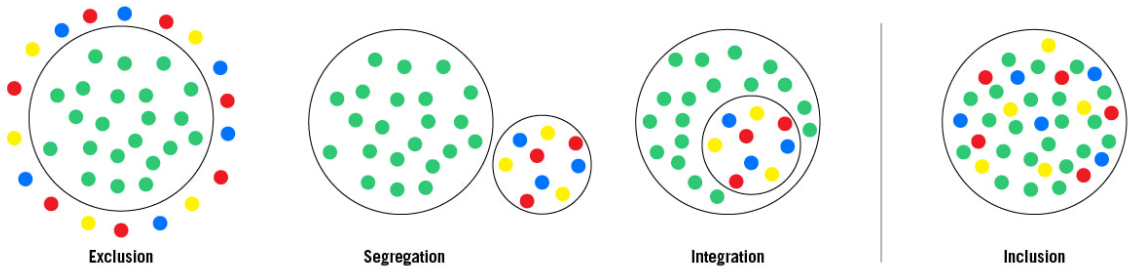
One of the challenges for 21st century higher education is to rethink and design environments to cater for increased numbers and changing composition of students, with different backgrounds, life situations, and access needs (Schofer & Meyer, 2005). Teaching and learning in higher education should consider the diversity of population and embed principles of inclusion in the design, delivery and evaluation of programmes, courses, modules (Thomas & May 2010; Hockings 2010b, Fazekas, 2018).

Before looking at what is inclusive education means, it is essential to understand the core terminologies in this space; exclusion, segregation, integration, inclusion and diversity.

- **Exclusion** is an effort and practice in which different groups or individuals with various circumstances, own lived experiences are directly or indirectly prevented from or denied access to any form of environment.
- **Segregation** occurs when different groups or individuals with various circumstances, own lived experiences are forced to be in separate environments designed for these groups or individuals, and it is an isolation from other groups or individuals (Fazekas, 2018).
- **Integration** is a process placing various groups or individuals in existing "mainstream" environments as long as the groups or individuals can adjust to the already existing environments. *"Integration and inclusion are often used interchangeably; however, they are not the same. Integration is allowing individuals to access into mainstream environments, but not making adaptations somebody needs. Integration expects everyone to fit into the already existing environment. This approach does not help in the long term (Todd, 2014; Fazekas, 2017)."* (Fazekas, 2019, p.8)
- **Inclusion** means a shift in an organisational culture where that different groups or individuals having different backgrounds, various circumstances, own lived

experiences are feeling the sense of belonging, feel respected and valued, socially accepted, welcomed and treated without discrimination. These circumstances can be visible or hidden.

- "Inclusion is creating an environment where people feel welcomed, feeling the true sense of belonging. Inclusion means having an approach that understands and encourages people to be different. An inclusive approach values respects and celebrates people equally. It enables people to fully participate in any mainstream activity. Being inclusive means listening to each other and being open to change. (Todd, 2014; Fazekas, 2017)
- *"People's identities are shaped by the multiplicity of contexts which intersect within an individual's life. Intersectional identities of people should be valued, respected and celebrated for the richness and diversity they bring to society."* (Fazekas, 2018, 18)."(Fazekas, 2019, p.8) Inclusion requires a systematic change in structures, approaches, strategies to dismantle barriers existing in the environment.



Source: www.thinkinclusive.us/mix-applesauce-with-medicine-to-create-inclusive-classroom-communities/

- **Diversity** used to be understood as any dimension that is used to differentiate groups or individuals from each other. There is also a paradigm shift here as well, rather than looking at diversity as a burden, it is crucial to see it as potential;

embrace it and also celebrate the rich dimensions. It is about the empowerment of people by respecting and valuing what makes them different.

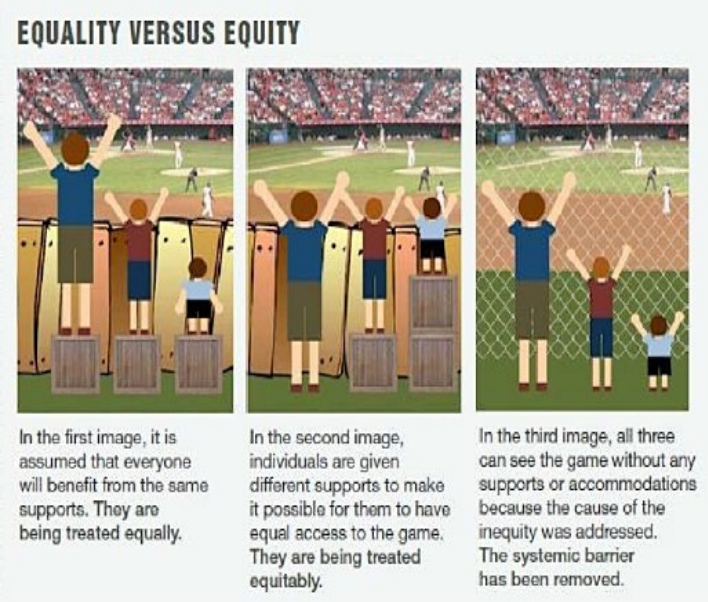


Figure 10 Source: Silcock, 2016, p.1

2.10.2. Types of access and participation in Higher Education

Equal treatment of individuals: The picture on the left showcases people with different heights and shapes, and the stool symbolizes the support provided. In this case, everyone is treated equally. The diversity of individuals are not taken into account. That approach rejects the support for different characteristics, different needs and requirements of individuals.

Equitable treatment of individuals: In the current Higher Education landscape, access & participation is designed for individuals, providing support on an individual basis. The second (middle) picture shows people of different heights and shapes symbolizes the variety composition of the student population; the stools correspond to the support provided, and the fence can be interpreted as an obstacle that affects viewing the event. This approach, while effective, does not question the systematic barriers in higher education which are eventually creating barriers in access and participation for individuals with own lived experiences.

Removal of systematic barriers: The third image showcases people with different shapes and heights, regardless of their circumstances, they can access and participate (watch) the event. In this position, the fence is the barrier (obstacle itself). That is the origin of inequality, forming an obstacle. In higher education, this can be interpreted, that this

approach looks at the diverse composition of individuals as positive, as a default. The focus is on the diverse population, and the educational and learning environment should be designed to minimise systematic barriers and cater to the needs of the population.

To achieve inclusive education, a universal design approach is commonly proposed. Broadly, a Universal Design approach is:

" the design and composition of an environment so that it can be accessed understood and used to the greatest extent possible by all people regardless of their age, size, ability or disability."[4]

2.10.3. Benefits

The Universal Design Approach refers to (Silcock, 2016, p.1) (picture on right hand) – where systematic barriers are removed. In the current higher education landscape, the most common solution is the picture in the middle (picture 2) (Silcock, 2016, p.1)

It is essential to acknowledge that the various universal design models (UDL, UID, UDI) result in several advantages and efficiencies also in the general student population as everybody accepts and processes new knowledge (David H. Rose (Rose et al., 2014) referred to this as kind of behaviour of the brain is just as typical for every individual as individual fingerprints) (Fazekas, 2019)

2.10.4. Challenges

Inclusive design has not been an integral part of the current design mindset. Designers do not consider the wide range of users with various backgrounds, own lived experiences, access needs and do not adopt this concept unless there is a specific request or a demand.

[4] http://universaldesign.ie/What-is-Universal-Design/

Implementation of universal educational models presents its challenges. It requires more professional development on the topic, awareness-raising on inclusion and diversity. Creation of an inclusive curriculum, requires time, funding, resources, input from multiple stakeholders, educators, and including the target audience (nothing about us without us). The challenge is that there are still many contradictions regarding the implementations which have been raised by many scholars (Nieminen & Pesonen, 2019).

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Further reference: David H. Rose presents UDL at AHEAD Ireland Conference in 2015.

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Revised UDL Guidelines Version 2.2 (2018) are available

http://udlguidelines.cast.org/more/downloads (CAST, 2018)

3. Guidelines for Educational Principles Integration

Integrating all these approaches into a CHARM-EU module may seem challenging. However, we have developed some simple guidelines for integrating them into your teaching based on theory from previous chapters.

3.1. Challenge Based Learning

- Define a global, real-world, authentic challenge as a starting point for your module. This can be very small (mini-challenge) or large (hackathon);
- Include a variety of actors into your module, such as academic, enterprise and diverse community participants;
- Support students to create a tangible output , such as a new process, idea or solution to a challenge;
- Consider teachers and students (and other stakeholders) as partners in solving societal challenges.

3.2. Research led, Research Based Learning

- Incorporate open access, peer reviewed research into module content. Discuss findings from this research with students;
- Engage students in practical research activities as formulating research questions, analysing data, writing an abstract; conducting a short literature review, drafting research grants or project outlines, presenting at a student ‘conference’;
- Consider teachers and students as co-students and partners in research (e.g. let students contribute or review your own research as an assistant);
- Communicate with students about your experiences as a researcher to stimulate their appreciation for research;
- Use experienced researchers as guest speakers for your module.

3.3. Sustainability in Education

- Use a related Sustainable Development Goal (SDG) to frame discussions of your module content;
- Connect module content to contemporaneous discussions within society (e.g. Climate Change);
- Consider a lifelong learning perspective; design exercises to encourage student reflection on the consequences of their current actions for the future;
- Design and deliver the module with eco-responsibility (reduce carbon footprint).

3.4. Technology-Enhanced Learning (TEL)

- Consider which modality fits best with your module learning outcomes e.g. fully online, blended, flipped or hybrid;
- Design your module considering content, accessibility, technology and pedagogy in the Virtual Learning Environment;
- Share learning materials in the Virtual Learning Environment;
- Use educational technologies with the intention to improve students' learning processes, rather than implementing technology as an isolated component;
- Consider the accessibility of online resources for all students.

3.5. Student Centred Teaching & Learning (SCTL)

- Encourage student responsibility for their own learning processes and activities e.g. by encouraging them to map out an assessment plan, or setting out and reflecting on their learning goals;
- Give options, choice, negotiation or provide flexibility in your module, e.g. for completing certain topics, the order of completing assignments, the methods or steps to achieve an end result or assessment. Focus on the learning process, rather than the teaching and assessments and communicate this approach to students;
- Use a variety of learning activities to reduce traditional "sage on the stage" lectures;

- Incorporate student suggestions for your module both during and after module delivery.

3.6. Situated Learning

- Provide learning activities in realistic, authentic contexts and real- life situations where possible;
- Encourage students to learn from more experienced professionals and provide clear steps on how to grow from novice to expert level;
- Stimulate students to engage in communities and networks and discuss what these identities mean for them as a professional (e.g. sports, family, friends, disciplines, professions).

3.7. Transversal Skills

- Incorporate collaborative group work into your module;
- Value and communicate transversal skills such as collaboration, presention, creativity and innovation, as much as content knowledge;
- Build in moments of reflection onto the student learning process.

3.8. Transdisciplinarity

- Ask students to think about what it means to be within a discipline (e.g. a chemist) and what it looks like to them;
- Consider how different disciplinary perspectives are represented into your module;
- Make sure that disciplines are not represented in isolation (one class on psychology and one lecture on biology) but that they are integrated (different disciplines covered in one class);
- Assign disciplinary perspectives to students (e.g. sociology, engineering, biomedical science) to use in solving a global challenge.

3.9. Transnational and Intercultural learning

- Build an open, respectful and interculturally sensitive learning environment that supports students to get to know each other and appreciate diversity;
- Use potential student cultural and language diversity in preparing, implementing and assessing teaching and learning activities;
- Develop transnational and intercultural competences by encouraging reflection on biases and behaviours;
- Enhance the module with content that has a clear transnational or intercultural relevance.

3.10. Inclusive Education

- Create a welcoming, safe, and respectful learning environment by avoiding stereotyping, motivating students, addressing individual needs, avoiding segregating or stigmatizing students[5]. Ask if students need anything in particular;
- Diversify Course Materials by incorporating different perspectives, authors, and experiences, in examples and case studies;
- Reflect on implicit biases by considering assumptions that may influence your interactions with students, course materials, and your discipline[6].
- Provide multiple ways to demonstrate knowledge by allowing students different ways to show what they have learned.

[5] https:// www.celt.iastate.edu/wp-content/uploads/2019/04/explore- ways-to-create-a-welcoming-learning-environment.pdf

[6] https://poorvucenter.yale.edu/ ImplicitBiasAwareness

5. Appendix A: List of authors and reviewers

Pedagogical approach	Name	Institute	Function title
Challenge based learning (CBL)	Silvia Gallagher (author)	Trinity College Dublin, Department of Computer Science and Statistics	Research fellow
	Veronique Bessière	University of Montpellier, Institute of Administration of Company (IAE) Labex ENTREPRENDRE	Prof in Management, Head of Master Management of Innovation
	Bert Slof	Utrecht University (UU), Educational sciences department	Assistant professor
Research led, Research Based Learning (RBL)	Nora Tartsay (author)	Eötvös Loránd University (Hungary)	Director of studies, School of English and American studies
	Sanne van Vugt (author)	Utrecht University, Educate-it	Educational coordinator, researcher, advisor
	Gilles Subra	University of Montpellier, Faculty of Pharmacy and IBMM lab	Prof in Pharmacy, Foundation of SynBio3 platform Responsible of module to preparation to research
	Niels Bovenschen	Utrecht University (UU), University	Associate Professor, Senior Fellow of UU Center for Academic Teaching

		Medical Center Utrecht (UMCU)	
	Irma Meijerman	Utrecht University, Centre for Academic Teaching	Senior Fellow, Associate professor
	Marta Sabariego	University of Barcelona, Faculty of Education	Full professor at the Department of Research Methods and Diagnosis in Education
Student Centred Teaching and Learning (SCTL)	Nora Tartsay (author)	Eötvös Loránd University (Hungary)	Director of studies, School of English and American studies
	Sanne van Vugt (author)	Utrecht University, Educate-it	Educational coordinator, researcher, advisor
	Brigitte Lundin	University of Montpellier, MUSE CSIP	Head of Learning Center of Montpellier
	Renée Jansen	University Medical Center Utrecht (UMCU), Center for Research and Innovation in Education	Head Quality management, former PhD candidate on "Dealing with Autonomy: Self-regulated Learning in Open Online Education"
	Beatriz Jarauta	University of Barcelona, Faculty of Education	Associate Professor of the Department of Didactics and Educational Organization
Transversal skills	Gloria Rubert (author)	University of Barcelona, Department of Economics	Associate professor

	Daniel Griffin (author)	Trinity College Dublin, Department of Computer Science and Statistics	Academic researcher
	Patricia Cucchi	University of Montpellier, Biology ecology teaching department in Sciences Faculty and MARBEC lab	Head of module in professional skill and integration in Master and Bachelor degree
	Heleen van Ravenswaaij	University Medical Centre Utrecht (UMCU), Centre for Research and Innovation in Education	PhD candidate "Students' development of soft skills in Utrecht University"
Sustainability in Education	Patricia Cucchi (author)	University of Montpellier, Biology ecology teaching department in Sciences Faculty and MARBEC lab	Senior Lecturer/ Assistant Professor
	Silvia Gallagher (author)	Trinity College Dublin, Department of Computer Science and Statistics	Research fellow

	Geertje Agricola	Utrecht University (UU), Educate-it (EdTech department)	Educational advisor at Educate-it, project Sustainability
	Daan Fraanje	Utrecht University (UU), Educate-it (EdTech department)	Project manager at Educate-it, project Sustainability
Transdisciplinarity in Education	Gemma O'Sullivan (author)	Trinity College Dublin, Department of Computer Science and Statistics	
	Daniel Griffin (author)	Trinity College Dublin, Department of Computer Science and Statistics	Academic researcher
	Iris van der Tuin	Utrecht University, Liberal Arts & Sciences (LAS)	Professor of Theory of Cultural Inquiry, Director of the School of Liberal Arts
	Fernando Hernandez	University of Barcelona, Department of Visual Arts and Design at the Faculty of Fine Arts	Full professor at the Unit of Cultural Pedagogies in the Fine Arts Faculty
Situated learning	Sanne van Vugt (author)	Utrecht University, Educate-it	Educational coordinator, researcher, advisor
	Arnaud Martin	University of Montpellier, Biology ecology teaching	Vice-Director of Master IEGB in sustainability, Responsible of modules with case study in land

		department in Sciences Faculty and OSU-OREME lab	use planning and lot of experience in situated learning
	Rouven Hagemeijer	Utrecht University (UU), Educational Sciences	Former University lecturer at Faculty of Social and Behavioural Sciences
	Jose Luis Medina	University of Barcelona, Faculty of Education	Full professor at the Department of Didactics and Educational Organization
	Isaac Calduch	University of Barcelona, at Faculty of Education	Predoctoral researcher in FPU training of the Department of Didactics and Educational Organization
	Márta Turcsányi-Szabó	Eötvös Loránd University (Hungary)	Vice-dean Educational innovation
Technology Enhanced Learning (TEL)	Aleid de Jong (author)	Utrecht University, Educate-it	Project manager at Educate-it
	David Cassagne	University of Montpellier, Informatic teaching department in Sciences Faculty and Charles Coulomb lab	Vice-rector of TLE in UM
	Bert Slof	Utrecht University (UU), Educational sciences department	Assistant professor

Transnational and intercultural learning	Luca Alexa Erdei (author) László Horváth (author) Kinga Káplár-Kodácsy (author)	Eötvös Loránd University (Hungary)	International coordinator, lecturer Research of Adult Education and Knowledge Management Assistant professor Assistant lecturer
Inclusivity	Ágnes Fazekas-Sarolta (author)	Eötvös Loránd University (Hungary)	Assistant professor