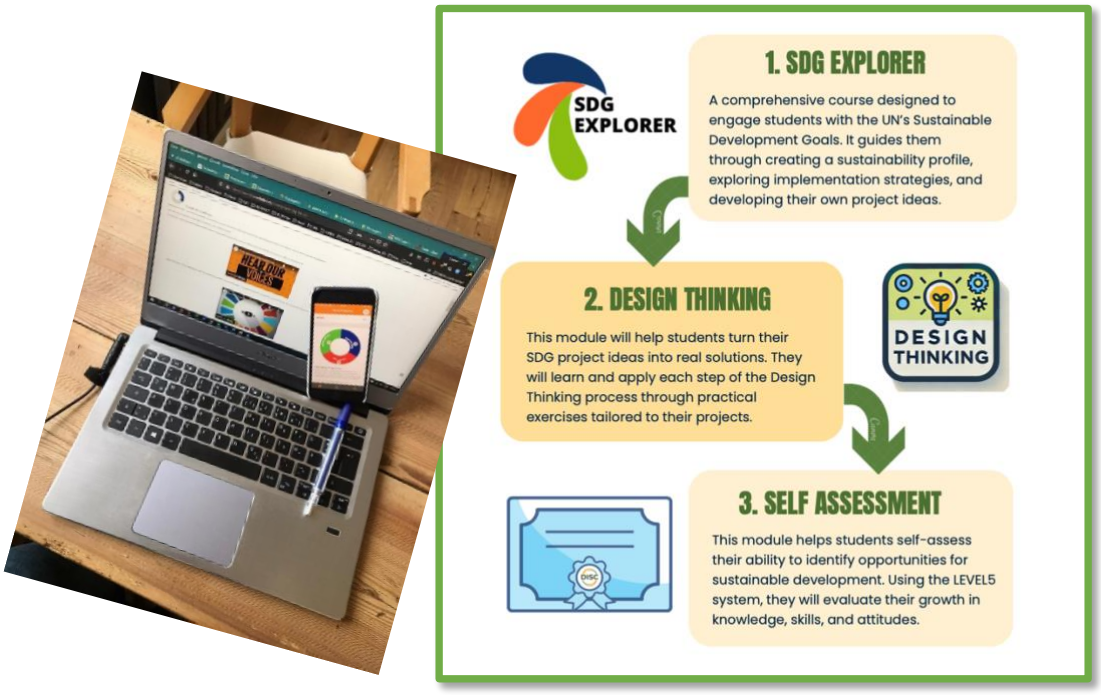

DISC Work Package 3:

DISC Student Course Learning Design

Co-funded by the European Union

The creation of these resources has been (partially) funded by the ERASMUS+ grant program of the European Union under grant no. 2022-1-DE01-KA220-HED-000087131. Neither the European Commission nor the project's national funding agency DAAD are responsible for the content or liable for any losses or damage resulting of the use of these resources.

Table of Contents

1. Introduction

1.1. Overview

Integrating Education for Sustainable Development in Higher Education through the DISC Modular Course and ECTS Framework

The DISC project was initiated to foster Education for Sustainable Development (ESD) in Higher Education (HE) by equipping students with the knowledge, skills, and attitudes required to address complex global challenges. Anchored in the UN Sustainable Development Goals (SDGs), DISC is a modular, transferable course that can be adapted across academic disciplines and institutional contexts. It supports the development of sustainability competences while promoting mobility and academic recognition through the European Credit Transfer and Accumulation System (ECTS).

The DISC learning approach is based on a competence-oriented learning approach, grounded on the DISC competence framework which roots in the European Competence Frameworks GreenComp and EntreComp. DISC aims to operationalise these rather theoretical concepts along the spirit of the GreenComp approach which aims to promote “values”, “complex (system) thinking”, “future orientation” and “taking (individual and collective) actions” for sustainability.

The resulting DISC course encourages interdisciplinary teamwork, systems thinking, and practice-based innovation. To make it transferrable, it is uniquely structured into four certified modules which can be freely recombined. This modularity enables institutions, enterprises, and learners to tailor the course to their specific contexts and objectives, making it a highly flexible and scalable tool for advancing sustainability education and action.

1.2. Explanation of the Approach

DISC’s modular course is composed of four core modules:

1. **SDG Explorer (1 ECTS)** – A self-learning and self-reflection module introducing the 17 SDGs. It supports learners in identifying their personal “SDG type,” forming interdisciplinary student teams around sustainability themes.
2. **Design Thinking for Sustainability (3 ECTS)** – A collaborative, problem-solving module that applies **Design-Based Collaborative Research (DBCR)**. This innovative approach integrates design thinking methodology with empirical, practice-oriented research to co-develop real-world sustainability solutions. DBCR introduces students to applied research and motivates them to ground their innovation in substantiated evidence and participatory engagement.
3. **LEVEL5 Validation (1 ECTS)** – A meta-cognitive module using the LEVEL5 taxonomy for competence-oriented learning validation. Students reflect on and document their learning processes, with emphasis on transversal competences and personal development.
4. **Domain specific Course Modules (1-n ECTS)** – These content-based modules provide sectoral grounding (e.g. in agriculture, tourism, education, or biology), allowing students to apply their sustainability projects within a relevant professional or academic field.

Due to the modular design, any of the modules can be recombined. While the first three form a logical learning progression, they can be integrated with newly developed or discipline-specific context modules. This flexibility enables customisation within HE institutions, joint programmes, or even enterprise learning environments.

2. Basic course concept

2.1. Introduction

The DISC Learning Design (DISC Course) follows a step-by-step learning and development approach – rather like a trainee programme which is focusing on an innovative introduction of sustainable development (SD) in HE courses in combination with theory input on the main subject-oriented approaches, which we call Design Based Collaborative Learning.

The "concept" or the theory of the DISC learning courses has been outlined in "DISC CPD Blended Teaching and Learning Approach" (WP3b) with details on the methodology of Competence Oriented Learning and Validation in connection with SD.

The paper on hand describes the approach to facilitate the introduction of SD in HE in a blended learning design consisting of self-learning part ("SDG explorer") in combination with a constructive collaborative learning project and a competence validation phase which can be performed as formative, summative and combined assessment.

The three parts together are the ideal combination to plan and deliver theory and practice on (design-based collaborative) learning for Sustainable Development, thus converting the DISC approach in HE practice.

In a nutshell, the aim of the modular course is to equip the students with practical skills and competences to document, design and develop open educational projects and to apply Design Based Collaborative Learning for Sustainable Development.

For this purpose, the students have been going through different phases:

- Pre-Phase: to get familiar with own (and partners') projects and with theory on:
    - Sustainable Development and the SDGs
    - DBCL (Design Based Collaborative Learning in Theory)
- In the F2F phase they
    - receive further theory inputs and
    - create their joint DBCL project on SD
- In the following pilot phase they apply their knowledge in their own domains and organisations.
- The courses end with a self-reflection on the own projects, a self- and expert-assessment of the competence development and a LEVEL5 certification.

1.1. Didactic Framework

2.1.1. Action Field

The action field is a tool which relates especially to a contextualised learning scheme, for instance in learning projects (e.g. in teams). It is especially relevant in **contextualised learning environments**, such as project-based teamwork, internships, volunteering, or workplace learning. In DISC, action field supports the core pedagogical principle of **Design-Based Collaborative Learning (DBCL)** by connecting learning directly with social, environmental, and organisational challenges.

The action field of the DISC Student Course is centered on enabling students to develop and implement practice-based solutions that contribute to a more sustainable culture in their local academic or community environment. It serves as a contextual anchor point for applying knowledge, skills, and attitudes acquired throughout the course, particularly the competence to spot ideas and opportunities for sustainable development.

In DISC, *"sustainable culture"* refers not only to environmental awareness, but also to the behaviours, values, and systems within institutions, communities, and professional domains that support long-term ecological, social, and economic well-being. Students are encouraged to explore how these elements interact within their own context and to identify realistic, meaningful opportunities for change.

This action field allows for a high degree of flexibility. Each partner university, faculty, or student group is encouraged to contextualise the challenge in a way that resonates with their disciplinary focus, local needs, or professional networks. DISC partnership created in total of EIGHT action fields through its pilots, details of these actions fields can be found in "DISC Pilot Implementation Report".

Learning Context and Environment	The DISC action field takes place in a blended learning environment that combines online learning (via Moodle) with facilitated group sessions and project-based collaboration. Learning occurs within students' own academic, civic, or professional contexts, allowing for real-life application of sustainability competences.
Target Group	Students in Higher Education Institutions (HEIs) across a wide range of academic disciplines. These include educational sciences (DE, EL), digital and mechanical engineering (SR), tourism and natural sciences (PT), as well as interns from diverse domains in DE and IT. The course is designed to foster interdisciplinary collaboration, encouraging students with different professional perspectives to jointly explore sustainability-oriented solutions.
Aim and overall objectives	To develop students' **competence to spot ideas and opportunities for sustainable development** by engaging them in real-life challenges. The action field fosters creative problem-solving, systemic thinking, and a commitment to shaping a more sustainable culture within their immediate environments.
Challenge Orientation	Students are encouraged to identify, investigate, and respond to sustainability-related challenges that exist within their local or institutional context. These challenges may relate to social innovation, resource use, energy, well-being, digital behaviour, cultural change, or organisational practices. The goal is to co-create meaningful and feasible solutions that contribute to a sustainable culture.

2.1.2. Aspired Competences

The DISC Course aimed at developing the following competences:

Competences relating to the creation of Sustainable Development learning projects

1. Sustainable Development
2. Spotting ideas and opportunities

All competences are comprised in the "Competence to create ideas and opportunities on sustainable development" which forms basis for the central taxonomy within DISC. The description of the DISC "Competence to create ideas and opportunities on sustainable development" as in 2.1.2

2.1.3. Learning objectives and competence levels

The aspired competence level of the learners relating to "The Competence to Spot Ideas and Opportunities for Sustainable Development" is levels 4 with in the LEVEL5 taxonomy (see 2.1.4). Level 5 could be reached if a learner has a lot of experience in different contexts and has completely internalised the Sustainability or the Entrepreneurial aspect:

- Knowledge (applied knowledge = Level4):
  - SD: Knowing when to apply right instruments from the portfolio of different SD approaches and tools to develop a concept and prototype for SDGs.
  - Spotting ideas and opportunities: Knowing when to apply the right instruments from the portfolio of different ideation and prototyping approaches and tools. Knowing when to use certain ideating and prototyping strategies
- Skills (Acting independently = Level4):
  - SD: Creating and executing a prototyping strategy to invent SD in the own context and professional domain.
  - Spotting ideas and opportunities: Deliberately searching for and selecting appropriate ideation and prototyping techniques and instruments for the own business. Creating and executing an ideation and prototyping strategy for the own context and the professional domain.
- Attitudes (Commitment = Level4):
  - SD: Being determined and pro-active to create ideas and prototypes in the own environment to implement SDGs.
  - Spotting ideas and opportunities: L4 Being determined and pro-active and finding it important to be creative in this respect.

2.1.4. Phases/Methods/Activities

1. Self-Learning on the moodle based in research materials
   - Sustainability and the SDGs
   - Innovation and Creativity
   - DT Theory
   - Competence Validation: LEVEL5

2. B) F2F Session (and partly online): Introduction to Design Thinking
    - Facilitated group sessions following the steps in the design thinking process.
    - Theory inputs on:
        i. Sustainability and the SDGs
        ii. Innovation & creativity
        iii. Design Thinking
        iv. COL&V
        v. DBCR
3. Pilot Phase:
    - DBCL and DBCR in the own DISC Learning Project
    - Planning and developing the own DISC Learning Project (structuring the project)
4. Self-assessment on own competences before and after the learning experiences:
   "Competence to create ideas and opportunities on sustainable development"

2.1.5. Learning Field – Competence to spot Ideas & Opportunities for Sustainable Development

	KNOWLEDGE		SKILLS//CAPABILITIES		ATTITUDES/VALUES	
L	**Level Titles**	**Level description**	**Level Titles**	**Level description**	**Level Titles**	**Level description**
5	Knowing where else (strategic transfer)	Knowing how to transfer SDG strategies and concepts into other contexts. Knowing how to help other people act successfully in implementing SDGs.	Developing, constructing, transferring	Being able to transfer ideation and prototyping strategies for SD. Actively planning and creating new SD activities based on ideating and prototyping.	Incorpora-tion	Having internalised SD as a fundamental personal entrepreneurship mindset. Being an inspiration for others in their ideation and prototyping activities for SD
4	Knowing when (implicit understanding)	Knowing when to apply right instruments from the portfolio of different ideation and prototyping approaches and tools. Knowing when to use certain ideation and prototyping strategies.	Discovering acting independentl y	Deliberately searching for and selecting appropriate ideation and prototyping techniques and instruments for the advancement of SD. Creating and executing an ideation and prototyping strategy.	Self-regulation, Commit-ment	Being determined and pro-active in using and improving ideation and prototyping in the own environment for Sd Finding it important to be creative in this respect.
3	Knowing how	Knowing different ideation and prototyping approaches, techniques related to: • Checking for Sustainability • Spotting opportunities • Creating ideas • Working towards a vision • Valuing ideas Theoretically knowing how to act along an ideation and prototyping concept.	Deciding/ selecting	Taking part in ideation and prototyping activities as they are offered by others in safe (undisturbed) contexts. Choosing singular ideation and prototyping tools from a given (known) SDGs portfolio	Motivation/ appreciation	Valuing SD and SGDs in general. Being motivated to develop own ideation and prototyping competences and visions.
2	Knowing why (distant understanding)	Having basic knowledge on SD and SDGs. Knowing that idea creation, a multi-perspective view on SDGs and the check of ideas is an essential part of the product/service and business development. Understanding basic aspects of the ideation and prototyping.	Using, imitating	Occasionally taking part in non-structured activities related to the creating ideas for SD. Carrying out ideating actions when being instructed to.	Perspective taking	Being curious and interested in ideating and prototyping and spotting of opportunities for SD
1	Knowing what	Knowing that entrepreneurship is based on innovation and the creation of ideas, and the principles of sustainable development (SD)	Perceiving	Perceiving and recognising the concept of creating ideas and opportunities for sustainable development (SD) without taking further steps.	Self-orientation	Perceiving the concept of sustainable development (SD) without relating it to oneself.

3. Learning Pathway within the course

Step No.	Title	Content	Learning objective	Method/ Activity	Media	time	Competence column
1	Introduction to SDGs and the DISC project	Concept Intro to the project	Creating curiosity on the concept Understanding the approach Reflecting on own experience	trainer Input, work groups, individual research INTERFACE to DISC: Design based collaborative learning in groups on concrete projects parallel from session 2 onwards	Online, synchronous (zoom), literature via moodle, collaboration via via Canva Whiteboard	3 hrs	Knowledge 2-3 Skills 2-3 Attitude 2
2	SDGs from the individual perspective	Self-assessment on competences of SD	Theory on SD and SDGs Theory on the SDGs Selecting the most interesting ones Transfer to own educational organisation and concrete project	trainer Input, work groups, individual research INTERFACE to DISC: Design based collaborative learning in groups on concrete projects parallel from session 2 onwards	Online, synchronous (zoom), literature via moodle, collaboration via Canva Whiteboard	15 hrs	Knowledge 2-4 Skills 2-4 Attitude 2-4
3	SDGs from the Organisational perspective	Theory on the SDGs in organisations	Theory input on Design Thinking and Creativity and Innovation Management Background, history of the approaches, future impact, innovation and 21st century skills) Understanding the background of the case (here the organisation blinc)	trainer Input, work groups, Design based collaborative Learning	Online, synchronous (zoom), collaboration via Canva Whiteboard	15 hrs in each module in F2F units plus workgroup input	Knowledge 2-4 Skills 2-4 Attitude 2-4

			become interested and motivated in using the Design Thinking Approach				
4	Team building	Liaising with team members Discussing of a challenge (what to tackle in the team)	Understanding the background of the case (here the organisation blinc) become interested and motivated in using the Design Thinking Approach	Design based collaborative Learning Brainwriting on Canva Whiteboard	Online, synchronous (zoom), literature via moodle, via Canva Whiteboard	4 hrs	Knowledge 2-4 Skills 2-4 Attitude 2-4
5	SDGs in business	How to integrate SD in corporate management How to involve the management Organisational development (PDCA) Tools and instruments	Define a challenge that may guide the further creative work Jointly discuss and agree on a common goal	Design based collaborative Learning Brainwriting on Canva Whiteboard boards	Online, synchronous (zoom), literature via moodle, collaboration via Canva Whiteboard	4 hrs	Knowledge 2-4 Skills 2-4 Attitude 2-4
6	Ideation phase	Ideating session, collecting ideas for improvement in the own environment(s)	Thinking out of the box, exercising and reflecting lateral thinking	Design based collaborative Learning Brainwriting on Canva Whiteboard	Online, synchronous (zoom), literature via moodle, collaboration via Canva Whiteboard	4 hrs	Knowledge 2-4 Skills 2-4 Attitude 2-4
7	Selection	Selecting most feasible ideas by using appropriate creative /Design Thinking Tools	Relating the case and the ideas to the clients becoming aware of real needs and becoming motivated in taking these as a guideline	Design based collaborative Learning Persona Canvas Brainwriting on Canva Whiteboard	Online, synchronous (zoom), literature via moodle, collaboration via Canva Whiteboard	4 hrs	Knowledge 3-4 Skills 3-4 Attitude 3-4
8	Prototyping	Self-organised Prototyping phase with feed-back and Q&A slots	Understanding selection criteria, finding solutions in group processes, applying	Design based collaborative Learning Brainwriting on MIRO boards	Face to Face	8 hrs	Knowledge 3-4 Skills 3-4 Attitude 3-4

			certain instruments like value canvas and COCD box				
9	Presentation	Presentation of the prototype (Pitch) in front of a selected audience	Developing consistent and convincing concepts and pitches Reflecting on attractive formats, evaluating the own work	Design based collaborative Learning Brainwriting on MIRO boards	Face to Face	8 hrs	Knowledge 4 Skills 4 Attitude 4
10	Assessment, Essay	Interns reflect and self-assess own competence development (in conjunction with peers and external)	reflecting on potential of design thinking for own context reflecting on own competences	feedback talk Self-Peer Assessment (LEVEL5 assessment pack) External assessment self-assessment questionnaire	Individual work, Feed-back,	8 hrs	Knowledge 4 Skills 4
11	Follow-up in own project 1	Taking over documentation tasks	Getting to know concrete EU applications Understanding documentation content and finances Developing defined innovative ideas in the project realisation	Theory via research on programme and project level Practice with concrete documentation tasks on monitoring and controlling	Online, synchronous (zoom) Collaboration via Canva Whiteboard	Connected to concrete tasks over 3 months	Knowledge 2-3 Skills 2-3 Attitude 2-3
12	Follow-up in new project 2	Taking over development tasks	Getting to know concrete EU projects Understanding programmes, content and finances Support in consortium building Developing defined innovative ideas in the project application	Theory via research on programme and project level Practice with concrete development tasks on partnering, project design and budgeting	Online, synchronous (zoom)	Connected to concrete tasks over 3 months	Knowledge 3-4 Skills 3-4 Attitude 3-4

13	Follow-up in the organisation 3	Reflecting and exchange on the own ambitions and competence developments	Applying the LEVEL5 self-assessment to the action fields in the job. Reflecting and exchanging on the own competence development	Theory via research on programme and project level Practice with concrete development tasks on partnering, project design and budgeting	F2F, Online, synchronous (zoom)		Knowledge 3-4 Skills 3-4 Attitude 3-4

- This is an exemplary pattern for an Introduction and the start phase of an internal project (filled out for illustration purposes)
- Various self-learning resources are being provided on the DSIC platform on SD, Design Thinking and Competence Validation, e

4. Design Based Collaborative Learning Activities (DBCL)

Within the DISC project, design thinking is applied as **a** DBCL strategy, where students work in diverse teams to co-develop solutions addressing the UN Sustainable Development Goals (SDGs). This approach goes beyond traditional problem-solving by integrating interdisciplinary perspectives, real-world stakeholder engagement, and reflective practice.

This chapter provides activites and tool for the six-phase design thinking process. Each phase includes methods and tools tailored to foster sustainability literacy, innovation, and collaborative competence. Learners will work on authentic SDG-related challenges, strengthening their ability to design impactful, context-sensitive solutions that contribute to sustainable development in their communities and beyond.

Overview of the six-phases of design thinking:

1. **Understand** (Research and Explore): In this phase, designers delve into the problem by conducting research, interviews, and observations to gain a broad understanding of the context and the user's world.
2. **Empathize** (Understand User Needs): Building on the understanding phase, designers seek to empathize with users, developing a deep appreciation of their needs, emotions, and motivations.
3. **Synthesis and Define** (Frame the Problem): With insights from the empathize phase, designers define the problem statement, synthesizing data and user needs to form a clear, actionable problem statement.
4. **Ideate** (Generate Ideas): Next, designers brainstorm and ideate, generating a multitude of creative solutions without judgment to address the defined problem.
5. **Prototype** (Build Tangible Solutions): Designers create low-fidelity prototypes or representations of their ideas, allowing them to quickly test and refine concepts based on user feedback.
6. **Test and Evaluate** (Gather Feedback): Prototypes are presented to users for feedback and evaluation, leading to further refinements and insights to inform the final solution.

4.1. Understand the Problem

The Design Thinking Process starts by focussing on the problem or challenge we want to solve. Understanding and identifying the problem is the first step in the design thinking process. It is only possible to sustainably solve a challenge/problem if it is understood holistically. For this reason, uncovering and combining the information is the starting point of the Design Thinking process.

The aim of this phase is to unearth the root causes of an issue, thus, ensuring that solutions address core challenges rather than surface-level symptoms. It aids in problem framing, where a well-defined problem statement sets clear, actionable goals, prevents ambiguity, and fosters shared understanding among team members. Skipping or breezing through the understanding phase may lead to misdirection and costly errors and wasted efforts in subsequent stages as you. Without a solid grasp of the problem, designers risk “answering the wrong question” and leading to irrelevant, ineffective, or misaligned solutions.

In the first phase we focus on the problem or challenges we want to solve. What problem does our client/target group have? We understand the problem. WE understand who our target group is, when the result is needed and why our client thinks they need a solution to the problem. We also take into account the framework conditions that exist in our team/company or that our client has given us.

4.1.1. Tools and Methods

- **Mind Map**

Mind maps are a special form of presenting ideas and information to visualize relationships between them. In short, it's about tying the loose ends together and getting the bigger picture. A mind map is created by the team, either on paper or digitally.

At the beginning, the topic of the map is placed in the centre and marked as a central concept or train of thought. Then everyone writes down everything they can think of related to the issue, firstly individually, then all issues are collected and grouped around the topic of the map. In addition to words, visuals such as icons or pictures can be used. As a tip: If you are working with paper, use individual post-its so that you can group them later. Finally, arrange and connect the terms with lines and show similarities with colours or symbols.

Figure 1. Mind Map (Image by rawpixel on Freepik)

If you want to use a (free) online tool to create mind maps. This is especially useful if your team works from different places, for further editing and sharing. Here are some mind mapping tools:

- **Coggle** for mind map beginners
- **Mindly** for mobile mind mapping
- **MindMeister** for collaborating on a mind map with a team.
- **Scapple** for fluid, non-traditional mind mapping.
- **Stormboard** for in-person mind mapping sessions
- **Ayoa** for a modern approach to mind mapping
- **MindNode** for Apple users
- **SimpleMind** for not having to subscribe to anything.

- **Six Questions Method**

The six questions method helps to get a basic understanding of any situation.

The clarification of the questions Who? Why? What? When? Where? and How? support the team in generating a common basis of understanding of the context of the challenge. This procedure is simple, does not require a lot of time and prevents misunderstandings later.

- Who? Identify the people involved.
- Why? Identify reasons that require action and list them.
- What? Identify relevant actions. Create a list of them.
- When? Are there decisive time factors? Gather information about it.
- Where? Write down any places that might be relevant.
- How? Identify how scenarios have worked out in the past and list them.

4.1.2. Example Task

Choose a local sustainability challenge that aligns with one or more SDGs (e.g. reducing plastic use on campus, promoting local food systems). Conduct initial desktop research, map the broader context, and summarise your challenge in a shared team presentation or collaborative brief.

4.2. EMPATHISE

In the second step of the design thinking process, "Empathise," the focus shifts to one of the core principles of this human-centered approach: understanding the target groups' experiences, needs, and emotions of the still immature idea.

In this phase, we immerse ourselves in the target groups' world, seeking to view, feel, and think as they do. By empathizing with the end-users, we gain insights will guide the entire creative process. This phase fosters a deeper connection with those who will ultimately benefit from the design solutions, unveiling hidden insights and setting the stage for innovative and human-centered solutions that genuinely address their needs and aspirations. In essence, "Empathize" empowers us to embark on a design journey rooted in a comprehensive understanding of the problem and a genuine connection with the people we aim to serve. Other people can also be included, such as bystanders to contribute with views and opinions. The more opinions, emotions, and needs come together, the better and more varied the results are for the further process.

4.2.1. Tool and Methods

- **5-Whys**

5-Whys is a simple and quick questioning technique for a root-cause analysis that tries to get to the "pain point" of a challenge or problem. It helps to deeply analyse a situation, because often the obvious construction sites are not the cause but only a symptom of a chain of problems.

1. Formulate a sentence that describes the current challenge. Make it visible to the whole team.
2. Try to find the answer 'why' this is together as a team.
3. The answer to the question should also be put down in writing.
4. Now, together, transform the previous answer into the next why-question to be clarified.
5. Repeat this step five times until you get to the real pain point.

- **Emotional Journey Map**

The "Emotional Journey Map" technique illustrates the user's journey. The map shows the emotional journey of the user when using a product or service. The focus is on the interaction with the product and on what gets stuck with the users: Does the product satisfy them or not? With this technique, important knowledge can be gathered before prototyping (it can be used in different phases).

Figure 2. Emotional Journey Map on user's experience of a movie ticket booking app (Source: Calderon & Dimitri, Open Practice Library 2022)

1. Define the activity for which you want to map out the emotional journey. For example, it could be a person's ride on the subway while heading home.
2. Define the course of actions of your type of user within the present scenario.
3. Together determine the high and low points of user-friendliness during the course of action. Research results can also help you at this point.
4. List the evaluation points found individually (you can also use numbers that you assign for the points) and connect them to a line.
5. Look at the low points of the user journey together and think about how you can avoid them.

- **Qualitative interviews**

Qualitative interviews are very suitable for getting to know potential users and questioning their needs. In the interviews, information about the user and the context should be gathered. It is important that the session is well prepared, including the questions - appropriate to the phase of the design thinking process you are currently in (this technique can be used in different phases).

1. Formulate questions in advance and put yourself in the role of the user: "What concerns the user?"
2. Try to formulate the questions as openly as possible and avoid closed questions with yes / no answers (most of the information is between the lines)
3. Pay attention to what your interviewees say and also question the statements made.
4. Record the information you provide. Use a voice recorder or camera if possible - taking notes yourself takes longer and can distract you.
5. Filter the information after the interview and record the findings and statements that are most interesting for your challenge.

4.2.2. Example Task

Identify key stakeholders connected to your sustainability challenge (e.g. students, local residents, service providers). Conduct interviews or observe relevant settings. Record and share findings via journey maps or personas based on real insights.

4.3. Synthesize and Define

In the third phase, we summarise and combine our most important findings and knowledge from the first two phases (Understanding and Empathise). Synthesize and Define is a critical juncture where the diverse insights and ideas gathered in the previous stages are distilled, refined, and structured into a coherent and actionable framework.

What insights can we gain? We share our knowledge within the team. We interpret our previous analysis and draw new insights and weigh the findings. The picture of our users clearly increases in detail. The main goals are to identify patterns, common themes, and the root causes of the problem. This analytical approach helps distil a wealth of data into key insights, revealing the core issues that need to be addressed.

The aim of this phase is to share the knowledge with our team and to generate tangible findings. We summarise our findings in a persona, for example. The persona represents our user group with its

needs and allows us to feel empathy in the generation of ideas in the next phases of the Design Thinking process. We finally conclude this phase with a How Might We question.

4.3.1. Tools and Methods

- **How Might We Statements**

"How Might We" (HMW) is a technique that turns insights and observations into actionable problem statements. It helps reframe challenges in a positive, open-ended way that sparks creative thinking. After synthesising your research and empathy work, identify a key user need or pain point. Then ask:

How might we… [solve this problem or meet this need]?

For example, if your insight is: *"Students avoid public transport at night because they feel unsafe,"* a possible HMW could be: *"How might we make public transport feel safer for students after dark?"*

A good HMW question is:

- **Human-centred** – focused on real users
- **Optimistic** – framed as a possibility
- **Focused, yet open** – invites multiple solution

- **Personas**

Personas are useful when the context or users are not sufficiently known. They are representations of fictional people who represent potential types of users of your idea, product, or service. They are designed on the basis on information gathered in the previous phase, through research or interviews with the target groups. The creation of personas helps the DT team to gain a greater understanding and empathy for the users and to be able to further develop the project according to the needs and preferences of users.

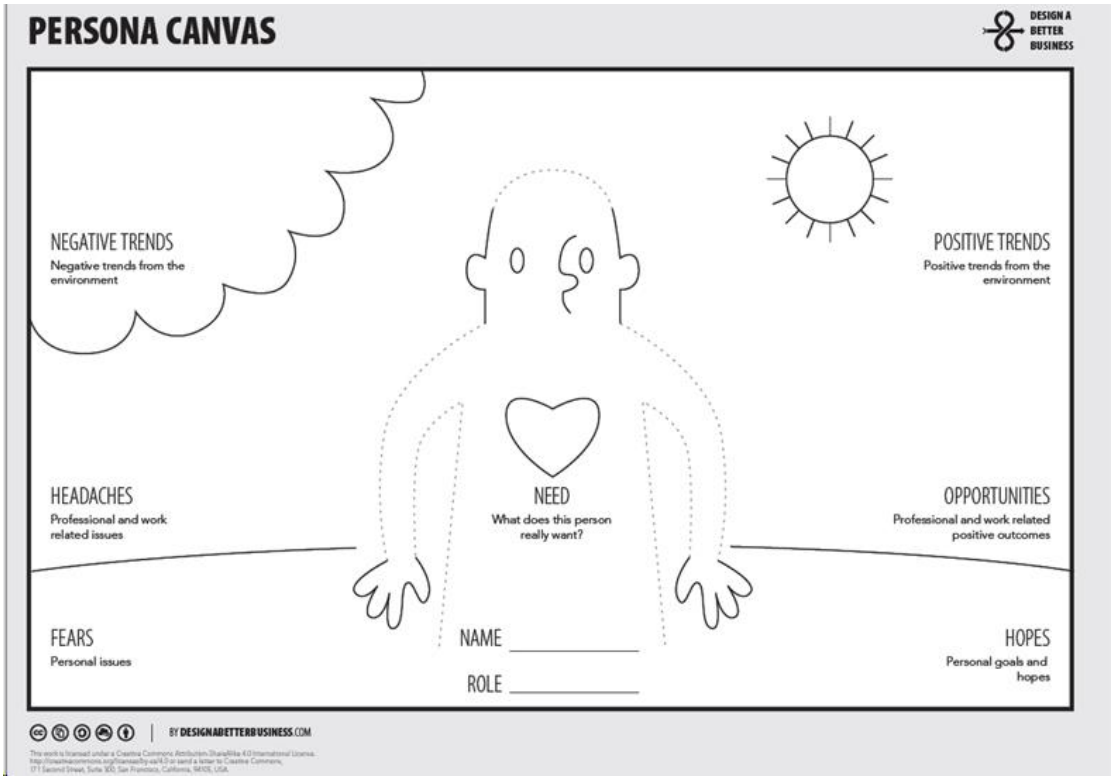

Figure 3 Example of a Persona Canvas, a tool to help to better understand and represent the target group. (Source: Design a Better Business)

1. Understand your key audience. This can include data collected and gathered by yourself (e.g., through interviews) or draw on information from market research
2. Divide then the fictitious users into individual groups and filter their specific needs from the preliminary information
3. Create one or more personas based on the groups and try to avoid stereotypes. A bit of imagination is required at this point

4.3.2. Example Task

From your empathy findings, define 1–2 primary user personas and identify their core needs. Draft a clear problem statement and formulate a "How Might We...?" question that captures the challenge you'll work on solving.

4.4. Ideate Solutions

In the fourth phase of the design thinking process, known as "Ideate," our primary goal is to generate a wide array of ideas and potential solutions. We draw upon our collective knowledge and creativity to brainstorm as many ideas as possible, emphasizing quantity over quality at this stage. Our approach is to explore various creative techniques to create a fertile ground for innovation.

As the team starts to generate more and more ideas, we recognise that not all will be equally valuable and some ideas will be very similar. It is then important to cluster and prioritize among them. We might use methods like the Wow-How-Now technique. The aim is to reach a consensus on one or two ideas that hold the most promise and align with the problem we've defined. These selected ideas will move on to the next phase for testing and validation.

Ideation serves as a transition into the "solution space," where we channel our creativity to craft solutions tailored to the personas we've identified earlier in the process. It's a dynamic phase where we focus on generating and exploring ideas that have the potential to address specific user needs and challenges effectively.

4.4.1. Tools and Methods

- **Brain Writing**

Brainwriting method can be used as an alternative or as preparation for classic brainstorming. In contrast to brainstorming, in which an open discussion arises from the start, the participants initially collect their ideas in silence just for themselves. Then each person can present the points they have collected to the group. The goal that every person has their say (not just the extroverts), can be easily achieved with this method.

1. At the beginning it is necessary to formulate a concrete question, if it is not already there (e.g. "How can we ...?")
2. Then each person in the group formulates some ideas on post-its. This process should be done in silence and with a timeline. It also makes sense to set the maximum number of post- its or ideas per person (e.g., 5 per person) in order to also limit the time for the subsequent presentation and discussion.
3. After the actual brainwriting process, the ideas become visible to everyone presented in the group and clustered if possible. At this point, the method can flow smoothly into an open brainstorming session

- **Bodystorming**

Bodystorming is very reminiscent of the brainstorming method. The difference lies in not only discussing a (fictitious) challenge or question, but also physically empathizing with the situation. In this way, the actual perspective of the potential user is taken and understood. In this way, the ideas can be developed in a more targeted manner.

1. Think in advance where the situation should be examined more closely.
2. Go there with your DT team and observe the behaviour and interaction of the users
3. Record everything that influences the actions (e.g., the framework conditions). You can take notes or film the situation (videos are ideal for analysing the situation later)
4. Determine team members who, taking into account the knowledge gained, put themselves in the situation as "users" and act out the situations
5. Analysis of the findings: Ask the team members about their subjective experiences and feelings during the re-enactment

- **Bisociation**

The method of bisociation or also stimulus image or stimulus word technique describes the creative process of generating ideas in which images or terms from unfamiliar areas are combined with one another. The technique is ideal for breaking through established thought patterns and finding completely new approaches.

1. The DT team looks at pictures, words, or videos that at first glance have nothing in common. It doesn't have to be stimuli from one category only. It is also possible to use a combination such as photos and words. Ideally, the group analyses two stimuli, especially if the technology is new to them (maximum five)
2. Then the team members individually note which associations the stimuli trigger in them - of course in relation to the original challenge
3. In the following brainwriting phase the new ideas were collected and discussed in terms of potential and feasibility.

- **Wow-How-Now**

The Wow-How-Now method is suitable when the process of collecting ideas is largely completed and you need to set priorities. The ideas collected are evaluated according to their originality or innovative strength as well as on the basis of their feasibility and entered into a matrix. In this way, the team can decide which ideas to select to continue the process.

Figure 4. Wow-How-Now-Ciao Matrix

1. The DT team draws a two-axis matrix (2x2).
    a. The Y-axis is referred to with the term originality,
    b. the X-axis with feasibility.
2. The field at the top right is labelled "How" (the originality is high, but it is difficult to implement); "Wow" follows at the bottom right (the originality is high, so is the feasibility - the best ideas will be found here later); "Now " is written at the bottom left (the originality is low, but the feasibility is feasible - short-term measures can be collected here). In the field at the top left, ideas are written down that are neither original nor feasible - they will not be used for the rest of the process, so you can say “Ciao”.
3. Be sure to discuss these decisions in the team.

4.4.2. Example Task

Hold a creative team session to brainstorm at least 15–20 ideas in response to your "How Might We...?" question. Use clustering and the Wow-How-Now Matrix to select 1–2 promising ideas to take forward into prototyping.

4.5. Build a Prototype

In the fifth phase of the process, we bring our idea(s) identified in the previous phase to life. Now our solution is made tangible. How do we visualise the idea?

The goal is to test the solution with our users and gain new feedback and further insights. We focus on creating prototypes as quickly as possible and with little effort. The prototypes are continuously adapted based on feedback from our customers. At the beginning, a sketch or a handcrafted element is often sufficient. A wide variety of materials can be used for this. Examples of analogue models include paper, modelling clay, and building blocks. Digital tools can be used just as well, for example to display an app or to realize an object with the aid of a 3D printer - there are no limits to creativity!

The fifth phase of the process is a very important one, but also one of the funnier. In prototyping, the thoughts and ideas previously developed are translated into a tangible product. A wide variety of materials can be used for this. Examples of analogue models include paper, modelling clay, and building blocks. Digital tools can be used just as well, for example to display an app or to create an

object with the aid of a 3D printer - there are no limits to creativity! The aim is to create a prototype that can be used to obtain feedback.

4.5.1. Forms of Prototypes

- **Paper prototypes**

Simple prototypes made of paper, for example, are used to represent the essential characteristics of a product or service in a simplified manner. It's not about showing the full range of functions, but about illustrating the solution for potential user groups through a paper model of the product. Since it is only about a basic understanding and the interaction with the object, we consciously work with simple means.

For creating a paper prototype, you can use these materials:

- Paper and processing tools (e.g., scissors, glue, colours)
- alternative materials such as clay or blocks, plaster, etc.

Proceed like this:

1. Identify and define the essential criteria and features of the product or service idea
2. Then consider which material is best suited to depict your idea in an abstract and reduced form
3. Model the prototype with the help of suitable materials (e.g., paper, clay, building blocks, wood, etc.)
4. Go out with your prototype and show it to different people you meet (by chance). Show the people the essential characteristics and collect feedback (note the feedback)
5. Document the results of the feedback and possible discussions and use these findings for the further development of the idea.

- **Role Play**

For the role play method, one or more (ideally) uninvolved persons simulate a situation with the developed idea. Through the role play, on the one hand, the uninvolved people should have a realistic user experience with the prototype, and, on the other hand, they should provide the DT team with a gain in knowledge. The degree of specifications and improvisation for the scenery can be determined individually.

1. Identify and define the situation to be analysed and then determine the people involved as well as the framework for the action
2. Then the roles are allocated to the uninvolved or performing persons
3. While performing the role-play, pay attention to your script but be open to it other, spontaneous courses of action
4. After the role play, document and discuss the results and the resulting feedback loops.

- **Storyboard**

Storyboards are another form of prototype that visualizes an idea through a sequence of photos, sketches or collages or shows the user experience with the prototype. The form of representation helps users to understand the context and can also stimulate discussions.

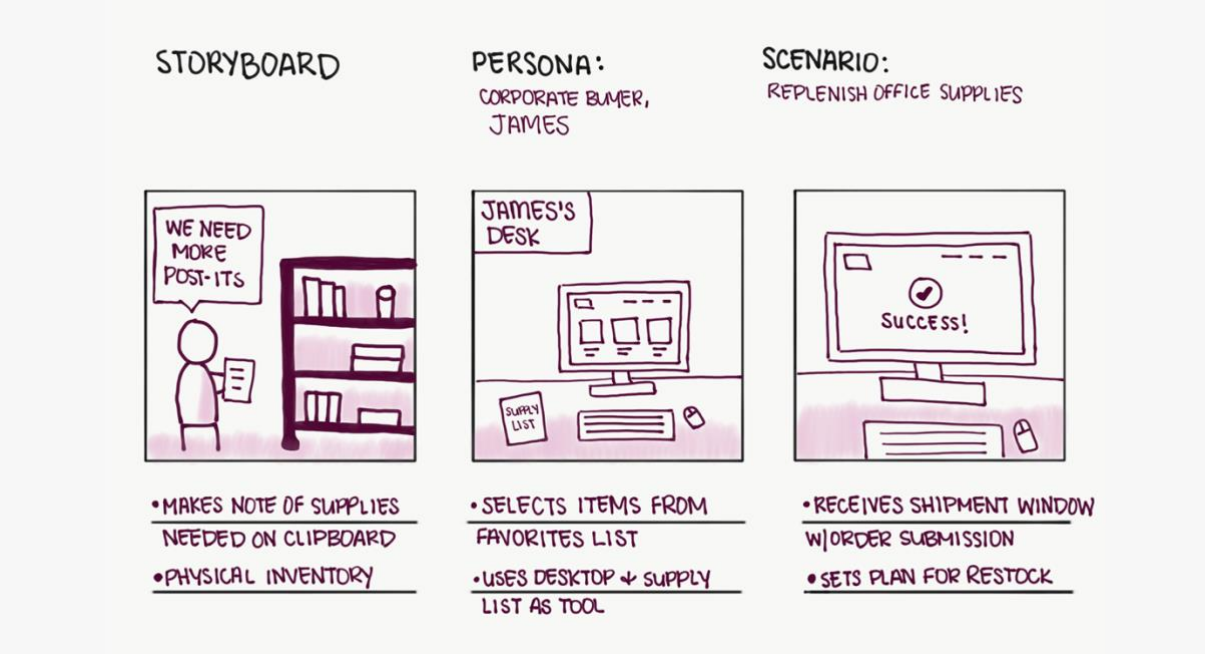

Figure 5 . Example of Story Board..(Source: Rachel Krause 2018)

To design a storyboard, you can either use plain paper or pre-formatted templates (link provided below).

1. Specify together the topic and the message that you want to represent through the story and then create roles for your story.
2. Then write the story down briefly in bullet points like a script and divide it into suitable sections or scenes. Limit yourself to c. 4-12 scenes her converts images.
3. Decide together how you want to represent the story (e.g.. Drawing, digital graphics, etc.).
4. At best, use a storyboard template (digital or printed)
5. The storyboard can then be used to explain the purpose of your project or serve as a basis for discussion with users.

Templates:

https://boords.com/storyboard-template

https://www.canva.com/create/storyboards/

4.5.2. Example Task

Create a rough prototype of your selected solution (e.g. storyboard, role-play scenario, mock-up). Keep it simple and focused. Present the prototype to another team or potential users for feedback.

4.6. Test and Evaluate

In the final phase of the design thinking process, we take the prototype we've developed and put it to the test with our clients or users. This step is all about gathering qualitative feedback from those who will ultimately use our solution. We aim to understand their perspectives, uncover their needs, and determine whether our prototype effectively addresses the problem at hand.

Our goal is to continue refining and developing our idea until our clients or users recognize it as a viable solution to their challenges. Testing is essential in evaluating whether our solution aligns with the needs and expectations of our users. For instance, we may employ methods like card sorting to

evaluate the usability and arrangement of features within our product or service. Ideally, external individuals who are not directly involved in the project evaluate our offering. Their unbiased feedback is invaluable.

This final step in the design thinking process is significant but also challenging, as it requires seeking feedback from external, uninvolved individuals. We venture out with the prototype, engaging with unknown people to gather insights on how our idea and its implementation are received. What can be improved? What do potential users desire? These questions guide our feedback-seeking efforts.

It's essential to understand that the design thinking process doesn't conclude here. Instead, it enters into an iterative loop where feedback continually contributes to the refinement and enhancement of the prototype. This ongoing cycle ensures that our solution evolves in response to real-world feedback, ultimately resulting in a more effective and user-centric product or service.

4.6.1. Tools and Methods

- **User Test**

User tests are used to have prototypes tested by selected users. All or only part of the functionality can be made available. When operating the prototype, undiscovered potentials but also possible weak points become apparent. The simple user testing can be carried out in different stages of development in order to incorporate feedback.

1. Show the users your prototype, as best as possible without further explanations, in order to get a first unfiltered opinion. If the idea is not self-explanatory, just explain the context, which is needed for further understanding.
2. Let your users report during the testing what they are doing and how they experience the application.
3. Observe the processes carefully and do not intervene in any way.
4. During the testing and / or afterwards, asks you valuable questions such as “Would you use the product / service? And if so, why, or why not?”

- **Capture Grid**

The Capture Grid offers the DT team the opportunity to note and cluster all findings from the user tests. The 2x2 matrix lists all aspects that have been understood well or badly, as well as ambiguities and new ideas. The classification into the four areas help enormously with the structuring.

1. Sketch the 2x2 grid (matrix) on a whiteboard (manual or virtual)
2. At the top left there are positive aspects, at the top right negative aspects. At the bottom left, ambiguities/questions are listed. And at the bottom right new ideas that arose during the testing.
3. Start the testing and transfer the findings as directly as possible to the feedback grid.

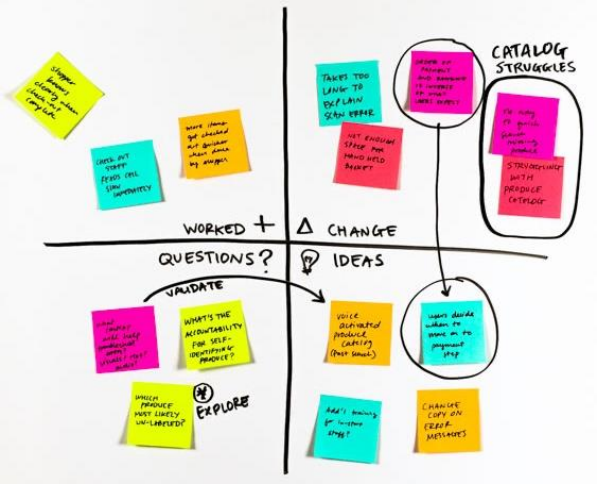

Figure 6. Capture Grid Example (Source Enterprise Design Thinking Toolkit, IBM 2018)

4. Discuss and checks the grid after each test run the users and, if necessary, add further aspects
5. The grid can be added to or modified by further testing

- **Testing Card**

The preparation of a testing card helps you to prepare an optimal test scenario for your prototype. Specific questions are collected on the card that relate to the prototyping object and its application in the test. In this way, the goal is kept in view when interacting with the potential users. In addition, the tests are so well prepared that the knowledge gained can flow directly into the further development or finalization of the project.

1. Together, think about questions that reflect the essential factors of your project (and what you want to check). For example, ask yourself what kind of feedback do you need for the next steps ?, Who is your ideal user? Which scenario should the users put themselves into during testing ?
2. Write down the final questions and comments for the users on your testing card. It is also helpful if you can describe your prototype in one sentence. So, you can "pick up" the users at the beginning.
3. Go through the questions yourself after completion to adapt or expand them if necessary.
4. Then carry out the tests using your prototype and your testing card and document the results for further development.

4.6.2. Example Task

Organise a testing session with real users or peer groups. Use a structured feedback method (e.g. feedback cards or capture grid). Identify what works, what needs improvement, and how to evolve your idea for greater impact.

5. Design Based Collaborative Research Methods

Research serves as the cornerstone of innovation, policy development, and educational advancement. In the context of the DISC project, it is a strategic tool for generating new knowledge, addressing societal challenges, and informing the design of educational programmes that foster sustainability and collaborative entrepreneurship. Through research, DISC partners aim to co-develop academic approaches that solve real-world problems and cultivate interdisciplinary competencies for the future of work and education.

Design-Based Collaborative Research (DBCR) uses research methods to study, validate, and improve those learning processes and outcomes. DBCR, as defined in the DISC framework, is an interdisciplinary, practice-oriented research approach that integrates the principles of Design Thinking with empirical scientific methods to solve real-world sustainability challenges in educational and social contexts.

This chapter explores the various research methods and activities applicable within a DBCR framework. Educators can integrate these methods into their course or learning offer design. Effective innovation and problem-solving require a comprehensive approach, and this chapter details how insights and methodologies from diverse scientific disciplines can enhance DBCR projects. We systematically categorise and explain representative methods across Social Sciences, Natural Sciences, Engineering, Digital Sciences, and Educational Sciences. For each method, we outline its background, objectives, advantages, disadvantages, examples, and practical tools, providing a clear understanding of its application in developing impactful and evidence-based design solutions.

5.1. Social Science

Here's a structured overview of representative **mixed methods approaches in social sciences**, organised into three key research clusters relevant to your DBCR and DISC context: **Desk Research**, **Quantitative Methods**, and **Qualitative Methods**.

5.1.1. Desk Research

Desk research (also known as secondary research) involves collecting and analysing existing data, literature, and sources without direct fieldwork. It is often the starting point for identifying knowledge gaps, informing theoretical frameworks, and contextualising empirical findings in social science and design-based research.

b) Objectives:

- To map existing knowledge and conceptual frameworks.
- To identify trends, policies, or historical data relevant to the research topic.
- To refine research questions and support hypothesis development.

c) Advantages / Disadvantages Compared to Other Clusters:
Advantages:

- Cost-effective and time-efficient.
- Allows for comprehensive background understanding.
- Supports triangulation when combined with primary data.

Disadvantages:

- May lack relevance or specificity to current/local context.
- Limited control over data quality or methodology.
- Cannot generate new primary insights.

d) Example:
A DISC module development team conducts desk research on European ESD policy documents to identify best practices and policy alignment needs before designing an educational intervention.

e) Tools/Instruments:
- Academic databases (e.g., Scopus, JSTOR, ERIC)
- Open data portals (e.g., Eurostat, OECD)
- Institutional reports and grey literature
- Systematic literature reviews
- Meta-analyses
- Content analysis software (e.g., NVivo for documents)

5.1.2. Quantitative Methods

Quantitative research is rooted in the positivist tradition, aiming to measure variables objectively and test hypotheses using numerical data. It's widely used in educational settings to assess learning outcomes, validate instruments, or analyse correlations.

b) Objectives:
- To test theories or hypotheses through empirical measurement.
- To determine statistical relationships and causality.
- To generalise findings across populations (when applicable).

c) Advantages / Disadvantages Compared to Other Clusters:
Advantages:
- Enables statistical analysis and trend identification.
- Perceived as more "objective" and replicable.
- Useful for large-scale comparisons and evaluations.

Disadvantages:
- Often limited in capturing depth, nuance, or context.
- Rigid structure can overlook emergent insights.
- Assumes standardisation, which may not fit complex educational environments.

d) Example:
In DISC, a student survey measures the perceived effectiveness of a sustainability module across five partner universities, enabling comparison of learning gains.

e) Tools/Instruments:
- Online surveys (e.g., LimeSurvey, Qualtrics, Google Forms)
- Statistical analysis software (e.g., SPSS, R, Excel, Stata)
- Experimental designs (pre-test/post-test)
- Structured questionnaires and Likert scales
- Learning analytics platforms (e.g., Moodle data exports)
- Dashboards for visualising trends and indicators

For additional reading please see:
Forza, C. (2002), "Survey research in operations management: a process-based perspective", International Journal of Operations & Production Management, Vol. 22 No. 2, pp. 152-194. https://doi.org/10.1108/01443570210414310

5.1.3. Qualitative Methods

Qualitative research focuses on understanding human experience, meaning-making, and social processes. It is deeply interpretative and is essential for exploring the "how" and "why" behind patterns observed in education, culture, and behaviour.

b) Objectives:

- To explore perceptions, behaviours, and contexts in depth.
- To generate grounded theory or themes directly from data.
- To support co-creation and participatory insights.

c) Advantages / Disadvantages Compared to Other Clusters:
Advantages:

- Captures complexity, subjectivity, and lived experiences.
- Highly adaptable and responsive to context.
- Essential for developing theory and understanding meaning.

Disadvantages:

- Time-intensive and harder to replicate.
- May lack generalisability.
- Subject to researcher interpretation bias (if not reflexively managed).

d) Example:
A DISC partner conducts semi-structured interviews with educators implementing a design thinking module to understand their pedagogical shifts and student engagement outcomes.
e) Tools/Instruments:

- Interview guides and protocols (structured, semi-structured)
- Focus groups and observation protocols
- Thematic coding frameworks
- Audio/video recording and transcription tools
- Qualitative analysis software (e.g., NVivo, MAXQDA, ATLAS.ti)
- Reflexive journals and field notes
- Case study

For additional reading please see:

Forza, C. (2002), "Survey research in operations management: a process-based perspective", International Journal of Operations & Production Management, Vol. 22 No. 2, pp. 152-194. https://doi.org/10.1108/01443570210414310

Voss, C., Tsikriktsis, N. and Frohlich, M. (2002), "Case research in operations management", International Journal of Operations & Production Management, Vol. 22 No. 2, pp. 195-219. https://doi.org/10.1108/01443570210414329

Scandura, T. A., and Williams, E. A. (2000), “Research Methodology in Management: Current Practices, Trends, and Implications for Future Research”, The Academy of Management Journal, Vol. 43, No. 6, pp. 1248-1264. https://doi.org/10.2307/1556348

Babbie, E. (2020), “The Practice of Social Research” 15th Edition, CengageLearning publishing.

5.2. Nature sciences

Design-Based Collaborative Research (DBCR), as promoted within the DISC context, seeks to integrate scientific rigour with iterative, user-centred innovation. Although often associated with social science and design methodologies, DBCR can gain substantial depth and robustness from the inclusion of natural science-based research approaches. Natural sciences provide frameworks for evidence validation, systematic experimentation, and modelling—making them especially valuable when dealing with technological prototyping, system behaviour, and environmental sustainability.

Objectives:

- To identify clusters of natural science research methods suitable for DBCR.
- To map these methods to the phases of design thinking.
- To enhance the methodological repertoire of design-based research teams by incorporating empirical, measurable, and repeatable approaches from the natural sciences.

5.2.1. Cluster 1: Experimental and Laboratory Research

Typical Methods:

- Controlled experiments (e.g. A/B testing, material testing)
- Randomised trials (where ethical and feasible)
- Sensory evaluation (e.g. human-computer interaction, usability)
- Analytical chemistry/biochemistry for testing environmental or health effects

Applications in DBCR:

- Evaluating technical functionality of prototypes
- Testing interventions under controlled variables
- Assessing health, safety, or environmental impacts

Advantages / Disadvantages Compared to Other Clusters:
Advantages: High internal validity; reproducible; precise control of variables.
Disadvantages: Limited ecological validity; may lack user context or complexity.

Examples:

- Lab-based testing of energy-efficient materials
- Randomised control trials on learning tools

Tools/Instruments:

- Lab instrumentation (e.g. spectrometers, calorimeters)
- Environmental chambers
- Software for data logging and analysis (e.g. MATLAB, SPSS)

5.2.2. Cluster 2: Systems Modelling and Simulation

Typical Methods:

- System Dynamics Modelling
- Agent-Based Modelling (ABM)
- Finite Element Analysis (FEA)
- Computational Fluid Dynamics (CFD)

Applications in DBCR:
- Simulating the effects of proposed innovations in real-world scenarios
- Modelling resource flows, energy use, or system feedbacks
- Supporting decision-making through predictive modelling

Advantages / Disadvantages Compared to Other Clusters:
Advantages: Enables testing of complex systems; scalable; low cost of iteration.
Disadvantages: Assumes simplification; model accuracy depends on input quality.

Examples:
- Modelling urban mobility solutions
- Simulating the energy impact of smart homes

Tools/Instruments:
- Vensim, AnyLogic
- NetLogo (ABM)
- COMSOL Multiphysics, ANSYS

5.2.3. Cluster 3: Environmental and Field Research

Typical Methods:
- Environmental impact assessments (EIA)
- Life Cycle Analysis (LCA)
- Field experiments and ecological surveys
- GIS-based spatial analysis

Applications in DBCR:
- Embedding sustainability research in eco-design or circular economy projects
- Validating environmental claims for market adoption
- Informing the problem space with systemic environmental insights

Advantages / Disadvantages Compared to Other Clusters:
Advantages: High ecological validity; addresses real-world complexity; relevant for sustainability.
Disadvantages: Lower control over variables; time- and resource-intensive.

Examples:
- Measuring carbon footprints of product lifecycles
- Mapping green infrastructure in urban environments

Tools/Instruments:
- GIS software (ArcGIS, QGIS)
- LCA tools (SimaPro, OpenLCA)
- Portable environmental sensors

5.2.4. Cluster 4: Quantitative Measurement and Instrumentation

Typical Methods:
- Sensor data collection and logging
- Instrumental monitoring (e.g., temperature, energy, biometrics)
- Digital logging of user behaviour and interaction patterns
- Data acquisition via IoT devices

Applications in DBCR:

- Generating empirical data from real-world settings
- Supporting usability studies with quantitative feedback
- Benchmarking product/system performance

Advantages / Disadvantages Compared to Other Clusters:
Advantages: High-resolution data; objective and real-time; adaptable to various domains.
Disadvantages: Requires calibration; data interpretation can be complex.
Examples:

- IoT-based environmental monitoring in smart buildings
- Tracking user interaction patterns with digital prototypes

Tools/Instruments:

- Arduino, Raspberry Pi
- Wearable biosensors
- Data platforms (ThingSpeak, AWS IoT, Tableau)

5.2.5. Cluster 5: Statistical and Computational Analysis

Typical Methods:

- Descriptive and inferential statistics
- Multivariate analysis (e.g. PCA, regression modelling)
- Machine learning for pattern recognition or predictive analytics
- Meta-analysis for synthesising findings

Applications in DBCR:

- Deriving insights from user testing and validation surveys
- Supporting abduction through data-driven discoveries
- Enhancing interdisciplinary studies with robust datasets

Advantages / Disadvantages Compared to Other Clusters:
Advantages: Scalable; supports generalisation; powerful with large datasets.
Disadvantages: Requires high data quality; not always intuitive for design teams.

Examples:

- Analysing survey responses to refine personas
- Predicting usage trends for digital services

Tools/Instruments:

- R, Python (Pandas, scikit-learn)
- SPSS, SAS
- Data visualisation software (Power BI, Tableau)

5.3. Engineering Research Clusters for DBCR and DISC

Engineering research contributes to DBCR by providing structured, problem-solving approaches rooted in iterative development, optimisation, and implementation of technologies. Its focus on functionality, efficiency, and practical application aligns well with the prototyping and upscaling phases of design thinking. In DISC, where innovative product and system development is key, engineering methods serve to test feasibility and scalability.

Objectives:

- To provide methodological support for prototyping, validation, and implementation.
- To promote iterative design and technological development.
- To ensure solution robustness and technical viability.

5.3.1. Cluster 1: Design and Technical Development

Typical Methods:

- Engineering design processes (CAD, simulation)
- Concurrent engineering
- Failure mode and effects analysis (FMEA)
- Morphological analysis

Applications in DBCR:

- Creating and refining product designs
- Assessing design risks and performance trade-offs
- Integrating stakeholder feedback into iterative design cycles

Advantages / Disadvantages Compared to Other Clusters:
Advantages: Technically rigorous; structured workflow; focused on implementation.
Disadvantages: Can overlook user context if not integrated with participatory methods.

Examples:

- Redesigning low-cost medical devices
- Developing modular urban mobility systems

Tools/Instruments:

- SolidWorks, AutoCAD, Fusion 360
- FMEA software (IQ-FMEA, APIS)
- TRIZ innovation tools

5.3.2. Cluster 2: Systems Engineering and Integration

Typical Methods:

- Model-Based Systems Engineering (MBSE)
- Requirements engineering
- Verification and validation (V&V)
- Interface definition and systems integration testing

Applications in DBCR:

- Structuring interdisciplinary system designs
- Ensuring compatibility and alignment of subsystems
- Supporting scalability and interoperability of prototypes

Advantages / Disadvantages Compared to Other Clusters:
Advantages: Supports complexity management; integrates hardware/software perspectives.
Disadvantages: Can be overly technical or documentation-heavy for agile projects.

Examples:

- Integrating IoT devices into smart housing solutions
- Ensuring system operability across transport modes

Tools/Instruments:

- SysML, Enterprise Architect
- DOORS (requirements management)
- Test automation frameworks

5.4. Digital Sciences Research Clusters for DBCR and DISC

Digital science research brings computational, algorithmic, and data-centric approaches that enrich DBCR with capabilities such as modelling, simulation, real-time data integration, and AI-enhanced design support. In the DISC context, where digital transformation intersects with education, culture, and sustainability, these methods help scale and personalise innovation.

Objectives:

- To enable data-driven decision-making and real-time adaptation.
- To leverage digital technologies in prototyping, evaluation, and iteration.
- To support AI-enhanced ideation, modelling, and simulation.

5.4.1. Cluster 1: Human-Computer Interaction and UX Research

Typical Methods:

- Usability testing (lab and remote)
- Cognitive walkthroughs
- Eye tracking and clickstream analysis
- Think-aloud protocols

Applications in DBCR:

- Evaluating digital interfaces and tools
- Enhancing user experience in educational and civic tech
- Informing user-centred iteration of digital prototypes

Advantages / Disadvantages Compared to Other Clusters:
Advantages: Direct user feedback; behaviourally anchored; iterative.
Disadvantages: Limited to interface-level feedback; resource-intensive.

Examples:

- Testing navigation and usability of e-learning platforms
- Refining user flows in public service apps

Tools/Instruments:

- Morae, Lookback.io, Hotjar
- Figma/Adobe XD (prototyping)
- UX metrics dashboards (Google Analytics, Mixpanel)

5.4.2. Cluster 2: Data Science and AI-Supported Research

Typical Methods:

- Data mining and clustering
- Predictive modelling and recommendation systems
- Natural Language Processing (NLP)
- Generative AI for design ideation

Applications in DBCR:

- Analysing large datasets to identify design opportunities
- Supporting abductive reasoning with pattern discovery
- Enhancing ideation and scenario modelling

Advantages / Disadvantages Compared to Other Clusters:
Advantages: Handles complex, unstructured data; enhances creative phases.
Disadvantages: Requires computational infrastructure and technical expertise.

Examples:

- Using AI to generate curriculum redesign ideas
- Predicting learning outcomes in adaptive learning systems

Tools/Instruments:

- Python (scikit-learn, GPT models)
- RapidMiner, Orange
- Jupyter notebooks, cloud-based ML platforms

5.5. Educational Sciences Research Clusters for DBCR and DISC

Educational sciences research within Design-Based Collaborative Research (DBCR) focuses on understanding and improving teaching, learning, and educational systems. This field prioritises human-centred approaches, collaboration, and iterative development to address real-world educational challenges. It integrates theoretical understanding with practical application, often involving stakeholders directly in the research and design process to ensure relevance and impact.

Objectives:

- To develop, evaluate, and refine educational interventions and programmes.
- To understand learning processes, experiences, and outcomes within specific contexts.
- To promote collaborative and participatory methods in educational design and development.
- To generate context-specific and actionable knowledge for educational improvement and innovation.

5.5.1. Cluster 1: Participatory and Co-Creative Methods

1. Participatory Action Research (PAR)

Participatory Action Research (PAR) is a collaborative research methodology that positions participants as co-researchers in every stage of the inquiry process. Rooted in critical pedagogy and emancipatory traditions, it aims to generate knowledge that leads directly to action and transformation. Within DBCR, it is especially powerful when working with marginalised or underrepresented groups in educational and community contexts.

Objectives:
To co-develop solutions to educational or social challenges through collective reflection, iterative experimentation, and shared ownership of outcomes.

Advantages / Disadvantages Compared to Other Clusters:
Advantages include its democratic ethos, grounding in lived experience, and direct relevance to participants' realities. However, PAR can be time-intensive and requires sustained engagement, which may not align with institutional timeframes or funding cycles.

Example:
A university team collaborates with adult learners to identify structural barriers in vocational training and co-designs new flexible delivery formats.

Tools/Instruments:
Community forums, reflective journals, participatory video, group facilitation techniques, collaborative digital platforms.

2. Co-Design Workshop

Co-design workshops are structured participatory sessions where multiple stakeholders—learners, educators, community members, policymakers—jointly ideate and shape educational tools, interventions, or policies. This method reflects DBCR's core principle of user-centred innovation and has roots in Scandinavian participatory design traditions.

Objectives:
To generate and refine educational designs collaboratively, ensuring they reflect diverse needs, experiences, and aspirations.

Advantages / Disadvantages Compared to Other Clusters:
The main advantage lies in the diversity of insights and the high level of engagement these workshops foster. On the downside, effective facilitation is critical, and the logistics of convening diverse groups can be demanding.

Example:
In the context of DISC, a partner university hosts a co-design workshop with local educators, students, and NGO representatives to create a new sustainability education module.

Tools/Instruments:
Persona templates, empathy maps, digital whiteboards (e.g., Miro), post-it-based ideation walls, LEGO Serious Play, role-play scripts.

3. Design Charettes

Design charettes are intensive, time-bound collaborative design sessions that bring together interdisciplinary stakeholders to tackle complex challenges. Originating in architecture and urban planning, they are increasingly used in educational and social innovation through DBCR frameworks.

Objectives:
To rapidly produce actionable concepts and early-stage prototypes through high-energy, facilitated collaboration.

Advantages / Disadvantages Compared to Other Clusters:
They allow for accelerated design cycles and strong collective momentum, but they may privilege extroverted participants or established power structures unless actively managed.

Example:
A cross-European group of educators and researchers conduct a two-day charette to develop prototypes for hybrid teaching formats post-COVID.

Tools/Instruments:
Canvas templates, ideation kits, mood boards, printed frameworks, collaborative drawing sets, digital capture tools.

4. Community-Based Research (CBR)

CBR is a relational, locally-anchored methodology that integrates community knowledge and needs into the research agenda. It is especially relevant in DBCR for engaging geographically or culturally distinct learning environments, where standardised approaches fail to capture local realities.

Objectives:
To co-investigate pressing issues with community members and collaboratively generate context-appropriate knowledge and solutions.

Advantages / Disadvantages Compared to Other Clusters:
CBR strengthens community ownership and promotes applied impact. However, it requires long-term trust-building and negotiation of differing priorities between academic and community actors.

Example:
A team of Greek university students works with a local cooperative to co-develop educational materials on sustainable agriculture tailored to regional practices.

Tools/Instruments:
Community meetings, focus groups, participatory mapping, oral history interviews, digital storytelling platforms.

5. Deliberative Dialogue Methodology

Deliberative dialogue is a structured conversation method designed to engage diverse stakeholders in deep, respectful discourse around shared challenges. In DBCR, it is used to explore controversial or value-laden topics in education and to reach collective insight or policy direction.

Objectives:
To foster mutual understanding, critical reflection, and consensus-building for complex decision-making processes in education and social development.

Advantages / Disadvantages Compared to Other Clusters:
Its strength lies in surfacing tacit assumptions and values through structured dialogue. However, it demands skilled facilitation and may be slow in yielding tangible design outputs.

Example:
During a curriculum redesign process, an institution organises a series of deliberative dialogues with faculty, students, and employers on decolonising educational content.

Tools/Instruments:
Facilitator guides, issue briefs, values clarification exercises, live polling tools, collaborative summarisation platforms (e.g., Kialo, Padlet).

5.5.2. Cluster 2: Mixed-Methods and Iterative Inquiry, comprising five methods that support the cyclical, abductive, and evidence-informed nature of DBCR in educational and social science contexts.

1. Sequential Exploratory Design

Sequential exploratory design is a type of mixed-methods research where qualitative exploration precedes quantitative measurement. It enables deep insight into human experience, which is then tested or expanded through large-scale data collection. This fits particularly well with DBCR's prototyping and validation phases.

Objectives:
To explore complex phenomena qualitatively, then quantify findings to test scope, prevalence, or effectiveness.

Advantages / Disadvantages Compared to Other Clusters:
It allows contextual depth followed by scalability and generalisation. However, it can be time- and resource-intensive, requiring expertise in both methodologies.

Example:
In a DISC module, learner interviews reveal new indicators of sustainability competence. These are then turned into survey items administered across partner universities.

Tools/Instruments:
Interview guides, coding software (e.g., NVivo), survey platforms (Qualtrics, Google Forms), statistical tools (SPSS, R).

2. Grounded Theory with Iterative Prototyping

Grounded Theory develops theory inductively from data. When integrated into DBCR, it can be combined with design iterations to generate both conceptual and material innovations concurrently. Objectives:

To generate explanatory models directly from field experience, while iteratively testing these through prototyping.

Advantages / Disadvantages Compared to Other Clusters:
Highly responsive to real-world contexts and ideal for novel domains. However, managing the dual focus on theory and design can be methodologically complex.

Example:
A team codes interviews from educators piloting a civic education tool; emergent themes are immediately integrated into revised versions of the tool.

Tools/Instruments:
Memoing, open/axial coding, concept mapping, prototyping canvases, user feedback loops.

3. Developmental Evaluation (DE)

DE supports innovation in dynamic systems by embedding the evaluator within the design process. It fits DBCR by offering real-time feedback and helping teams pivot rapidly in response to stakeholder insights.

Objectives:
To support adaptive development through embedded, formative evaluation aligned with system complexity.

Advantages / Disadvantages Compared to Other Clusters:
DE enables agile response and learning within uncertainty. However, it may lack the formal structure expected by traditional research funders or reviewers.

Example:
An evaluator is embedded in a team designing a new transdisciplinary module and continuously feeds back user reactions and team reflections.

Tools/Instruments:
Reflective logs, theory of change visualisations, after-action reviews, developmental rubrics.

4. Design-Based Implementation Research (DBIR)

DBIR is a specific design-based approach that focuses not only on innovation but also on sustainable, system-wide implementation. It aligns tightly with DBCR in its commitment to long-term, scalable change in educational contexts.

Objectives:
To design, enact, analyse, and redesign interventions collaboratively with educational stakeholders across time and settings.

Advantages / Disadvantages Compared to Other Clusters:
DBIR combines rigour with relevance and is ideal for institutional change. However, its longitudinal nature requires commitment and may not yield quick wins.

Example:
Over three years, schools and researchers co-develop and implement a digital feedback tool, with each phase informed by classroom trials and teacher feedback.

Tools/Instruments:
Implementation logs, cross-case analyses, stakeholder feedback loops, logic models.

5. Embedded Case Study Design

An embedded case study captures multiple sub-units within a single bounded case. It is especially effective in DBCR when innovations touch multiple levels—such as learner, teacher, and institutional.

Objectives:
To provide a rich, multi-perspective analysis of an intervention's development and effects across a system.

Advantages / Disadvantages Compared to Other Clusters:
Enables triangulation and systemic insight, but managing multiple data streams and maintaining focus can be challenging.

Example:
A DBCR study explores how a new assessment strategy is experienced by students, educators, and administrators in a vocational college.

Tools/Instruments:
Interview and observation protocols, within- and cross-case matrices, triangulation charts, institutional data dashboards.

5.5.3. Cluster 3: Ethnographic and Interpretive Methods

1. Rapid Ethnography

Rapid ethnography is a condensed version of traditional ethnographic fieldwork, designed for fast-paced projects without compromising contextual depth. It aligns with DBCR's need for rich, situated insights within agile development timelines.

Objectives:
To quickly uncover cultural patterns, behavioural norms, and tacit knowledge within educational settings.
Advantages / Disadvantages Compared to Other Clusters:
It offers rich insight in limited time, but risks superficial interpretation if not carefully triangulated.

Example:
Before prototyping a new mentorship programme, a DISC team spends one week observing and informally interviewing students and staff in two universities.

Tools/Instruments:
Field notes, informal interviews, site sketches, digital ethnography apps, audio/photo diaries.

2. Critical Incident Technique (CIT)

CIT focuses on significant, memorable moments—"critical incidents"—that reveal challenges, needs, or values. Within DBCR, it's useful for surfacing design-relevant insights grounded in real events.

Objectives:
To collect and analyse concrete experiences that illustrate what works or fails in educational practice.

Advantages / Disadvantages Compared to Other Clusters:
It is pragmatic, time-efficient, and yields focused data. However, it may miss broader systemic issues and relies on participants' memory and articulation.

Example:
Students are asked to describe one moment when they felt especially included or excluded in an online learning environment.

Tools/Instruments:
Incident report forms, storytelling sessions, thematic coding templates, follow-up reflection protocols.

3. Narrative Inquiry

Narrative inquiry is centred on the stories people tell about their experiences, offering access to emotional, cultural, and developmental layers of meaning. In DBCR, it supports empathetic and human-centred design grounded in real lived worlds.

Objectives:
To explore and interpret educational experiences through the personal narratives of learners, educators, or stakeholders.

Advantages / Disadvantages Compared to Other Clusters:
Narratives are powerful tools for capturing complexity and emotional truth. However, the data is interpretive and not always suited for generalisation.

Example:
A design team gathers educator stories about how they adapted during the COVID crisis to inform the co-design of crisis-resilient pedagogy.

Tools/Instruments:
Life-story interviews, narrative timelines, reflective journaling, dialogical mapping, narrative coding schemes.

4. PhotoVoice

PhotoVoice empowers participants to capture and discuss visual representations of their lived realities. It bridges research, activism, and design, and is especially useful in DBCR for engaging marginalised voices.

Objectives:
To surface perspectives and experiences through participant-generated imagery and accompanying narratives.

Advantages / Disadvantages Compared to Other Clusters:
Highly engaging and accessible, but requires sensitive facilitation and ethical consideration around image use.

Example:
Young refugees in Athens photograph places of belonging and exclusion, co-creating design principles for inclusive learning centres.

Tools/Instruments:
Digital cameras or smartphones, storytelling prompts, photo-elicitation tools, consent forms, visual analysis protocols.

5. Reflexive Journaling and Learning Logs

Reflexive journaling captures internal cognitive, emotional, and developmental processes as they unfold. It complements DBCR by enabling participants and researchers to document and reflect on their roles and learning.

Objectives:
To foster reflective insight and track change over time within DBCR cycles.

Advantages / Disadvantages Compared to Other Clusters:
Encourages deep learning and adaptive thinking. However, its open-ended nature can lead to variability in data quality and structure.

Example:
During a semester-long DBCR pilot, student participants maintain journals documenting their reactions to each design iteration and group discussion.

Tools/Instruments:
Guided journaling templates, digital diary apps, sentiment tracking tools, reflective prompts, periodic peer-review mechanisms.

5.5.4. Cluster 4: Systems and Visual Inquiry Methods

1. Systemic Constellations (Educational Systems Mapping)

Originally from psychotherapy and organisational development, systemic constellations offer a spatial, embodied method for revealing hidden dynamics in systems. In DBCR, they are used to explore interrelations within educational ecosystems and uncover leverage points for change.

Objectives:
To visualise systemic patterns and relational tensions among actors, institutions, and structures in complex educational environments.

Advantages / Disadvantages Compared to Other Clusters:
They are intuitive and accessible, revealing tacit knowledge. However, they require skilled facilitation and may be perceived as "soft" or unconventional by some audiences.

Example:
A university uses constellations to explore institutional barriers to interdisciplinary curriculum integration, involving staff and students as spatial representatives.

Tools/Instruments:
Physical space, object markers (e.g., chairs, cards), facilitator scripts, systemic mapping software (e.g., Kumu).

2. Journey Mapping (Learner/Stakeholder)

Journey mapping tracks the experiences, decisions, emotions, and touchpoints of a user or stakeholder over time. In DBCR, it clarifies pain points, moments of engagement, and opportunities for redesign in educational pathways.

Objectives:
To trace and analyse the trajectory of experiences within an educational process, from the perspective of those involved.

Advantages / Disadvantages Compared to Other Clusters:
Visually rich and participatory; however, oversimplification is a risk if nuance is not maintained.

Example:
Students map their experience from course enrolment to final assessment, highlighting where support was felt or absent.

Tools/Instruments:
Templates (paper or digital), experience diaries, empathy maps, journey mapping software (e.g., Smaply, UXPressia).

3. Scenario Planning and Backcasting

Scenario planning explores multiple possible futures, while backcasting works backward from a preferred vision to identify actions needed in the present. Together, they are strategic foresight tools that support transformative design in DBCR.

Objectives:
To anticipate future challenges and design robust, context-sensitive educational responses.

Advantages / Disadvantages Compared to Other Clusters:
Encourages long-term thinking and systems change; however, outcomes are speculative and require strong facilitation to remain actionable.

Example:
A DISC working group imagines the future of university learning in 2040 and backcasts to design immediate pedagogical interventions.

Tools/Instruments:
Visioning exercises, trend analysis templates, futures wheels, horizon scanning, scenario matrixes.

4. Q Methodology

Q methodology is a unique blend of qualitative and quantitative analysis that explores subjective viewpoints. It is especially useful in DBCR for surfacing diverse stakeholder perspectives on complex educational issues.

Objectives:
To identify and compare shared patterns of belief or preference among participants regarding a design challenge.

Advantages / Disadvantages Compared to Other Clusters:
Rich in nuance and participant-led interpretation. However, requires training and specific analysis software.

Example:
Teachers from different European countries sort statements about learner autonomy in DBCR projects to identify cross-cultural patterns of belief.

Tools/Instruments:
Q sorting grids, statement banks, PQMethod software, follow-up interview protocols.

5. Digital Co-Creation with AI Tools

This method integrates human creativity with AI-generated outputs in the co-design of educational interventions. Within DBCR, it augments ideation, modelling, and validation phases, especially under time pressure.

Objectives:
To enhance design iterations with generative AI, machine learning models, or NLP tools that extend abductive and divergent thinking.

Advantages / Disadvantages Compared to Other Clusters:
Expands design possibilities and offers scalable insight generation. However, ethical concerns and digital literacy gaps must be addressed.

Example:
A team uses a large language model to generate multiple prototype lesson plans based on input from real student challenges, which are then reviewed and adapted collaboratively.

Tools/Instruments:
ChatGPT, DALL·E, Google Gemini, RunwayML, Notion AI, concept validation dashboards, prompt engineering templates.

6. Inventory of Suitable Assessment Methods

6.1. Introduction

This catalogue gives an overview of possible methods applicable to assess the development of core competences for students and other learners.

The catalogue doesn't claim to be a complete list, but is designed to be a growing compilation of approaches to support professionals in applying the DISC competence framework and to validate competence developments. The catalogues presents a sample of methods that can be used in individual or group work, the examples shown should reflect a good balance of productive and responsive assessment methods. The annex provides materials that can be applied in certain assessment situations.

The assessment of competences on different competence levels acquires a good overview of suitable assessment methods. Not every method of data collection fits to each learning situation. We would like to provide a catalogue of methods which can be used for individual projects and settings.

Every method is presented with a short description, recommendations and instructions, and advantages as well as disadvantages of the method.

6.2. Methods and Data Collection

In many cases it is feasible to apply a set of methods to receive more and complementing data as basis for a rating on a competence level. In the design of the assessment setting you should consider the following aspects:

- Which target group do you work with and how many learners and assessors are involved?
- Which competences are to be assessed?
- How much time and interaction with the learners is available?
- For which purpose do you assess and evidence the competence developments? This determines the depth of the assessment, e.g. is it to show learners that they made any progress or is it to document achievements that shall benefit the learner in job-applications?

On the following pages you find the descriptions of different methods and approaches for data collection in different contexts.

Method of Data Collection	Short Description of the Method	Recommendation, Instructions	Advantages and Disadvantages
Reflective Learning Diary	A reflective diary is an instrument for learner´s self-evaluation. It enables learners to document and reflect upon their learning experiences with regard to a certain topic. As a learning activity reflective diaries facilitate learner's self-reflection. As an assessment method reflective diaries provide insight in learner's understanding, content knowledge, knowledge application but also critical self-reflection and awareness. For this method it is also possible to use a blog or other digital tools, offline or online.	Give regularly time (about 15 min. each day) for the learners to write down their learning experiences in a booklet. Explain that a reflective diary should focus on some basic elements: • A description of what happened • Personal feelings about what happened • A personal interpretation / evaluation of what happened • A conclusion from the experience • Take care that learners do not only report what happened! Let them focus on an issue related to the topic. .	**Advantages:** Gives a deep insight in the learning process Facilitates reflective learning. Digital documentation can be shared with others more quickly and more easily. **Disadvantages/Difficulties:** Takes time and discipline to keep the diary regularly Requires ability for self-reflection Sharing personal feelings with others might be a sensitive issue. Digital documentation may require certain IT skills.
Concept Map	A concept map is a diagram intended to illustrate the understanding of the relationships between concepts involved with a particular area of study. A list of words describing important aspects of a topic is assembled. The words are sorted into a hierarchy from most general to specific. They are arranged so that similar terms are near each other. Links are then drawn between the concept words, and statements written to describe or explain the links. The concept map can be created in the form of a mind map.	Use a concept map at the beginning and at the end of a learning activity to identify the progress the learners made. Identify basic concepts and ask the learners to come up with related concepts and skills.	**Advantages:** It helps individuals to establish logical connection among ideas seemingly related. **Disadvantages/Difficulties:** For individuals who are not used to thinking along a clear structure, it might be difficult to reflect themselves.

Method of data collection	Short description of the method	Recommendation, instructions	Advantages and disadvantages
Group Discussion	In group discussions for the purpose of assessing competence developments a learning group is interviewed by a moderator. A specific format of such a discussion are focus groups, which are in particular useful for exploring norms, beliefs, attitudes, practices and languages.	The optimal size group consists of six to twelve individuals. Choose a topic for the discussion and prepare a list of open ended questions that are arranged in a natural and logical sequence. The discussion should be audio recorded for transcription, or even filmed. An alternative is to take careful notes during the discussion. Write a summary for each group discussion. Focus groups require trained moderators.	**Advantages:** Is very close to daily communication forms. Can be used to "explore the field", to get an insight on a particular subject. The information gained can be used to generate ideas and to prepare more structured methods (e.g. questionnaire) **Disadvantages/Difficulties:** Group discussions give information about a group not about individuals; and they do also not provide any information about the frequency or the distribution of beliefs in the target population. Much effort and time is needed.
Personal (informal) Interview	A purposeful exchange between two individuals to uncover perspectives, experiences, feelings and insights on a phenomenon. A powerful method of collecting in-depth and detailed qualitative data. Data can be analyzed through content analysis with narrations and quotations.	Prepare an interview form with questions in line with the evaluation focus. Use open ended, clear questions with follow up prompts. Do not test knowledge but explore it through experience and description questions. Do not mislead respondents with biased, assumption loaded questions. Record conversation with permission (if audio recording is not possible, take shorthand notes)	**Advantages:** Uses the basic methods of communication and eliminates limitations & artificiality of writing/ filling in a questionnaire. Helps gather in-depth and detailed data. Flexible, open to follow up. **Disadvantages/Difficulties:** Much effort and time is needed. Small samples, generalization from sample to population cannot be done.

Method of data collection	Short description of the method	Recommendation, instructions	Advantages and disadvantages
Questionnaire/ Test/Exam	Questionnaires or tests can be used as a measurement tool for knowledge, skills and attitudes as well as experience gained through a training/programme. It could be used to assess initial knowledge, attitude and behaviour, improvement in these respects in the training process and outcomes reached at the end of training. Questions to test or measure learning can be in verbal or written formats: verbal questioning, e.g. a question and answer session at the start and end of a session; written format e.g. tests or exams. Questionnaires can be formal as in an examination, or informal as in a quiz.	Questionnaires or tests can be used in the 3 stages of assessment: Stage 1. Initial assessment to identify prior learning, experience or achievement. This allows the assessor to develop a baseline for learning and achievement. Stage 2. Formative assessment—to identify where the learner is, what progress is being made and how to "Fill Gaps" in knowledge, skills and understanding. Learners consider where they want to be and plan how to get there. Stage 3. Summative assessment-This is carried out to make judgements about the learner performance at the end of a training/ programme or activity. Examples of questions: • "Closed" questions which restrict the learner to answering YES or NO, TRUE or FALSE • "Open" questions which allow the learner to express an opinion or knowledge in sentences • Multiple choice questions which provide a range of answers for the learner to select the right one	**Advantages:** Provides written evidence of learning. Provides assessor with a quick way to test that learning has taken place. Can be used for both formative and summative assessment. Helps to identify the strengths and weaknesses of learners and provides feedback to both learners and trainers. Fits well into formal learning situations. **Disadvantages/Difficulties:** Questions can be misunderstood, results are determined by the interpretation of the reader. Formal style does not meet needs of learners with other learning styles. Can formalise the curriculum and suppress creativity. Does not fit easily with informal learning situations. Could cover only a limited extend of the set CPD goals and processes.

Method of data collection	Short description of the method	Recommendation, instructions	Advantages and disadvantages
Self assessment/ Checklist	Self Assessment involves learners in the process of assessment and allows them to reflect upon their learning and to review and record their achievements. Self Assessment can be both formative and summative: In formative assessments the learner reflects on where they are and where they need to go next. In summative assessment the learner reflects on the knowledge that has been gained and the skills they have acquired, at the end of an activity. Self assessment enables learners to manage their own learning and plan their progression while they gather evidence for portfolios and qualifications.	It is important that learners have the opportunity to reflect on their own contribution to activities as well as the skills and knowledge they have gained. Self assessment can be used as a stimulus to provoke discussion and to encourage learners to develop their own techniques for reviewing their learning. The self assessment process is a cycle of planning, reviewing and evaluating. It is useful for learners to undertake some form of initial self assessment at the beginning of a learning activity, to identify existing knowledge or skills. The learner can then use this information as a base-line to monitor their progress and to recognise achievement. It is useful for the learner to develop a *logbook* as part of the planning process, which will help to identify what aim to achieve and how objectives will be achieved. Later, a comparison can be made to review progress. This is part of formative self assessment. An *evidence chart* helps the learner to keep a record of the activities done and the skills used. This is used when reflecting on what has been learned. This is part of formative self assessment An *assessment matrix* enables the learner to review their learning against pre-determined criteria by giving scores for each criterion. This	**Advantages:** Gives ownership of learning. Builds confidence. Motivates learners to progress. Develops planning and reflective skills. Provides evidence of knowledge and competence. Improves decision making and communication skills. LEVEL5 offers an interface to e-learning platforms that enable learners to autonomously carry out their self-assessment and receive a respective certificate. **Disadvantages/Difficulties** Requires a disciplined and honest self-reflection

		gives a visual record of progress and enables to identify strengths and weaknesses. This can be used for formative and summative assessment. *Evaluation sheets* act as a reflective diary and conclude the self assessment process. The learner brings together the log, the evidence of achievements and assessment matrix to reflect on what was achieved and the progress made. This is summative self assessment. Especially for target groups with little experience in self-reflection, it is recommended that a mentor is at hand to support the reflection. When applying LEVEL5 the learner should be familiar with the structure and underlying idea of the reference system.	

Method of data collection	Short description of the method	Recommendation, instructions	Advantages and disadvantages
Observation	The purpose of direct and indirect observation is to collect evidence of achievement by watching learners' performances while they take part in an activity, but without interfering in their work. The activity can be a real situation or a simulated situation e.g. role-plays. Observation allows you to see the knowledge being put into practice and is better used when assessing and evidencing competence based learning. Direct observation is undertaken in person, either by an assessor, peer or workplace supervisor. Indirect observation takes place when using appropriate technology such as video recording. Analysis of documents is also a kind of observation. Here documents rather than behaviour are scrutinised.	Direct Observation by an assessor: Assessor fills in a prepared observation report form during the learner is undertaking the activity – he makes a judgement against pre-determined criteria.. The assessor records what the learner does, how the learner behaves and interacts with others. Peer Assessment: This can be in the form of a discussion, a question and answer session or by recording information on a pro-forma. The peer can be another learner who has taken part in the activity alongside the learner who is being assessed. The peer assessor will either record or provide verbal feedback what the learner has done during the activity. Witness Testimony: This is a statement from a "third party" who has witnessed the learner take part in the activity in verbal or written form. The witness could be a work supervisor or colleague. Indirect Observation: This can be a video or film of the learner taking part in an activity. The assessor can recognise competence or achievement by observing the activity on the video. This can be supplemented by asking the learner questions about what is taking place on the film. 360% Feedback: this is a deliberate confrontation of observations and views on the learner's performance from different perspectives – e.g. of trainer, supervisor and colleagues.	**Advantages:** Provides the learner with the opportunity to demonstrate competence and skills Allows learner to put knowledge into practice Provides creative and innovative method of assessment Contributes to the development of an activity based curriculum Provides a range of evidence for Portfolios **Disadvantages/Difficulties:** Can be time consuming for assessor Can be difficult to observe and assess individuals within a group

Method of data collection	Short description of the method	Recommendation, instructions	Advantages and disadvantages
(E-)Portfolio	Portfolios are personal collections of information describing and documenting a person's achievements and learning. An electronic portfolio, is a collection of electronic evidence (artifacts, including inputted text, electronic files such as Word and PDF files, images, multimedia, blog entries and Web links etc.) assembled and managed by a user, usually online. (E-) Portfolios are both demonstrations of the user's abilities and platforms for self-expression, and, if they are online, they can be maintained dynamically over time.	Ask your learners/ learners to create their own portfolio/e-portfolio, e.g. on the REBUS Platform. Encourage them to include all kinds of activities. Review during your project how competence levels are changing.	**Advantages:** Enables the individual to be evaluated on various levels. Highlights all of an individual's skill sets. Extra curricular activities can also be highlighted. Allows the reader to understand the different dimensions of the individual. Empowers individuals to connect their formal education, work experience and extra curricular activities. **Disadvantages/Difficulties:** Learners might need individual help. E-portfolios require some technical skills as well as available soft- and hardware.

Method of data collection	Short description of the method	Recommendation, instructions	Advantages and disadvantages
Games	A tool to assess knowledge, skills or attitudes in a non formal way. Learners of a group get questions or task in a playful surrounding.	Not all people like games or are open to participate. Consider this when you select games. Make a good balance between knowledge questions and creative tasks. The atmosphere must be friendly enough to protect “losers”. The group must not be too big. Invent tasks, which are also nice or useful to the other participants that are not directly involved in the task. Play the game yourself first before using it in the group to see the traps and to make a time-table. Every game needs a games-master. The games-master makes notes about the answers and assesses the orders.	**Advantage:** Creates a nice atmosphere. The learner can demonstrate skills or knowledge in a creative way. Improves communication skills. **Disadvantages/Difficulties:** Not every group appreciate “just games”. Because of the gamble part it is a roughly assessment. It takes time, to prepare it and to play it.
Case study	A strategy to describe events and processes within a framework through various data collection methods such as observation, interview, document analysis in order to understand and evaluate the case.	Use the case study strategy to evaluate the implementation and the effects of an event or process on individuals/groups, e.g. the REBUS learning project. Case studies focusing on implementation help the evaluator to make decision whether the implementation responds to the initial intent.	**Advantages:** It helps to assess a complex activity or process through longitudinal, in depth and detailed description and contextual analysis. Both qualitative and quantitative data could be collected and analysed for triangulation. **Disadvantages/Difficulties:** Time consuming. Only small samples can be included in the study.

Method of data collection	Short description of the method	Recommendation, instructions	Advantages and disadvantages
		Case studies focusing on program outcomes assess the impact of the program and help identify reasons for success and failure. Plans should be made to obtain longitudinal data in depth and in detail.	
Essay	An essay is, generally, a piece of writing that gives the author's own argument — but the definition is vague, overlapping with those of a paper, an article, a pamphlet, and a short story. Essays have traditionally been sub-classified as formal and informal. An Essay is an assessment question that requires an answer in a sentence, paragraph, or short composition. Essay assessments are usually classified as subjective assessments as there are normally a variety of responses.	An essay (depending on the types of essays) is usually expected to consist of an 1. Introduction/Aims/Objectives 2. Major points and ideas explained and summarized 3. Results/Related points/Issues/or others depending on the topic 4. Conclusion – future work In regard to the taxonomy essays can be used as project reports thus tackling higher competence levels or key competences of higher complexity like related to Entrepreneurship projects. An essay (depending on the types of essays) is usually expected to consist of an 1. Introduction/Aims/Objectives 2. Major points and ideas explained and summarized 3. Results/Related points/Issues/or others depending on the topic 4. Conclusion – future work Recommendations:	**Advantages:** • Essays have the ability to assess all levels of learning objectives. • It encourages original and creative thinking. **Disadvantages/Difficulties:** • Due to the subjective nature of essay assessments, grading is very unreliable even for the same assessor at different periods. • Grading may be influenced by other factors such as handwriting and length of response. • As essays are very time-consuming to answer and to correct, they are not recommended if only low-level of learning outcomes are assessed which can be assessed by multiple choices or short answer questions. • Although guessing is not possible in essay assessments, but “bluffing” is.

Method of data collection	Short description of the method	Recommendation, instructions	Advantages and disadvantages
		- Let students know the assessment criteria and marking scheme, including grammar, spellings and other issues. - Try to reduce ambiguity in the essay questions, clearly define the expected response such as compare, evaluate, summarize, critique etc. - Do not use essays to measure knowledge or understanding that can be assessed using less time consuming assessment methods.	• It is also not advisable to give the topic of the essay to the students at an early date. This may give rise to superficial learning where students concentrate all their efforts in completing the essay only.

7. Code of Practice for Assessment and Validation

7.1. Validation

Validation of informal and non-formal learning is one of the major educational initiatives in Europe. It has been developed since 2002 and comes with a number of very powerful instruments like the EQF, ECVET and EUROPASS which have been promoted in the European Educational field. The main purpose is to make skills and competences of the individuals visible, transparent and transferable and with it to contribute to European mobility and cohesion.

The year 2018 marked the official European introduction of validation of informal and non-formal learning in political and administrative structures in all European member states.

Validation of competences is an integral part of the applications for KA1 projects. Hence education Professionals should be competent in validation.

Up to now, however, validation of competences is still unknown territory to the vast majority of educators in Europe.

Our surveys over the last 10 years[1] show that a competence validation is not being managed, its' potential usefulness is not even explored and the need for it remains undiscovered by the large majority of educational stakeholders in Europe.

Validation is often reduced to certification, connected only to the delivery of proofs of attendance or considered as a rather formal exercise to deliver some kind of proof that learners crossed a certain threshold for whatever reason and for whichever purpose. In the utilitarian world of purely work-related learning, the only driver for this is often regulatory compliance by the employer.

It must be emphasised though, that the validation of competences can be far more than just another (isolated) assessment and certification exercise. It is also a great opportunity to invent new forms of learning and to improve teaching, training and learning design.

It inherits the identification, documentation, assessment and certification and related counselling, training and learning activities.

Most educational stakeholders in Europe are still a long way from a feasible and attractive integration of competence validation in their training offers.

However, innovative learning formats (especially also online, blended technology supported) can contribute a lot to holistic learning approaches which also include validation processes, be it identification, assessment and documentation and eventually also certification.

7.1.1. Levels of Formality in Learning

Since the full title of the concept is called "Validation of non-formal and informal learning" it is crucial to understand the concept of formalisation in learning and education.

As with many formal structures in society we take our education systems for granted – we consider them as quasi-natural systems. We are simply used to them, and many of us (educationalists) never really question them or reflect about major principles.

Some official documents define 'informal learning' as a 'precursor to learning" or 'unintentional' learning; in other words: learning which cannot be influenced. However, the term 'informal learning' was coined in the 1970s in connection with adequate (informal) learning strategies to educate citizens in the former European colonies. In this case it was the opposite of 'unintended'. In connection with validation the term was hijacked and used for a rather unconscious state of competence acquisition which can be exploited for qualification purposes.

[1] Regularly carried out online surveys in ERASMUS projects like PROVIDE (2013), IMPACT (2014), Badges (2016) REVEAL (2017), CIM (2018), PITCH (2019), GSD (2021) and DISC (2022).

Some other approaches developed concepts of the 'Recognition of Prior Learning' which at least have a learning aspect in it.

However, at the beginning of the invention of validation of non-formal and informal learning, the 'learning' part was not more than a pre-stage that was not considered at all.

As well as this, more than 20 years after the first official concept and 15 years after the specifications of VINFL[2] there is still the danger that either validation is treated as an add-on to adult education or conversely that adult education is not a part of validation (which is far worse). In this case (and from a solely utilitarian point of view) validation would become just a smart tool for qualification, an instrument to speed up certification processes and to produce certified individuals without development of their competences. This is exactly the structural threat of validation for informal and non-formal adult and youth education: the risk is that they might become obsolete since learners (or more likely their employers or the state) only need assessments and certifications and not the learning part – especially where training providers are being 'paid by results'

With the 2016 guidelines for VINFL it seems that also the CEDEFOP[3] realised this danger and the fears expressed by some of the AE and youth stakeholders[4] and emphasised the necessity for guidance, counselling and accompanied training.

However, what is missing is a holistic approach to integrate Validation in the Learning process, not only for the sake of the individual learner but also as an improvement of the quality of the learning offer and as a starting point to Competence Oriented Learning. To fully understand all implications of the concept of "Validation of Informal and Non-Formal learning" (and its integration into COL) it is worth taking the time to reflect a bit on the nature of formality and informality in education.

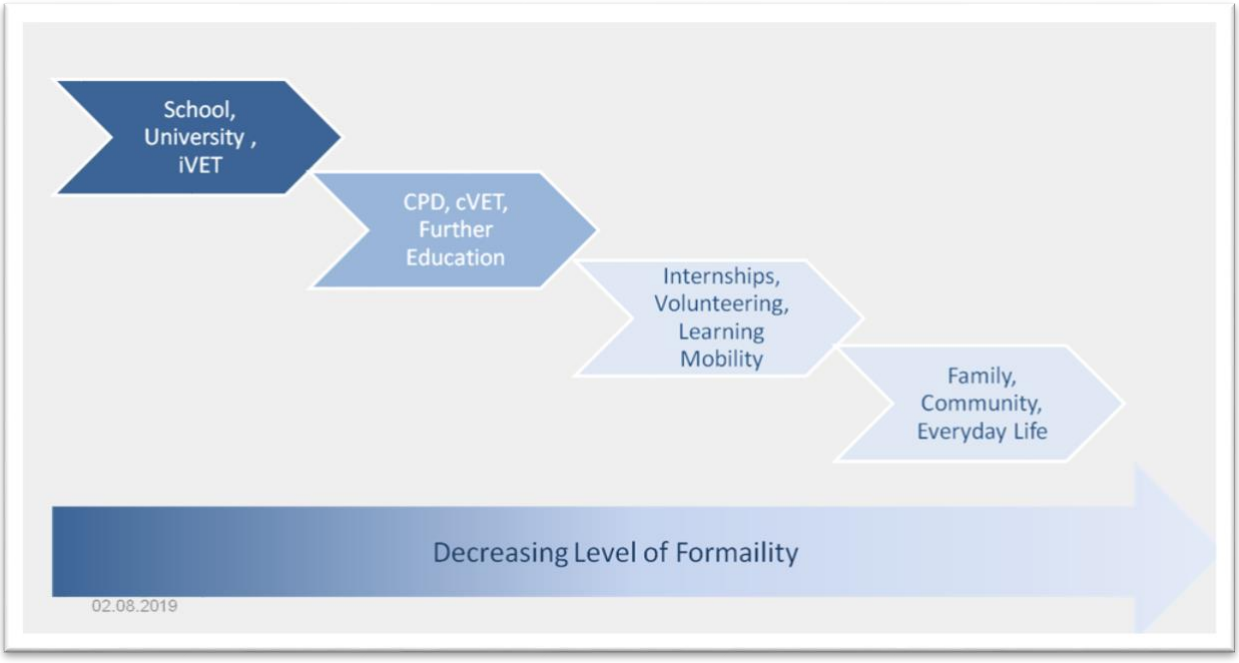

Fig. 1: Learning offers in relation to the level of formalisation

Fig. 1 shows the main educational domains and training/learning offers along a decreasing level of formality.

[2] VINFL validation of non-formal and informal learning specs 2009, European Commission
[3] Cedefop (European Center for the Development of Vocational Training) is one of the EU's decentralised agencies. Founded in 1975 and based in Greece

From the purpose point of view the focus of formal education (in school, university, iVET) is clearly on qualification – as a doorway into the labour market.

The focus of CD is still very much on qualification, however it allows more choices and probably also tackles more generic competences.

In the fourth cluster there is still a more or less conscious personal development component like in internship, learning on mobility, volunteering and other societal engagement – however, the learning is more practical and overlapped by other motives like travelling, discovery, trying out, help and support etc.

The last area is unintentional learning such as that which occurs within the family and communities.

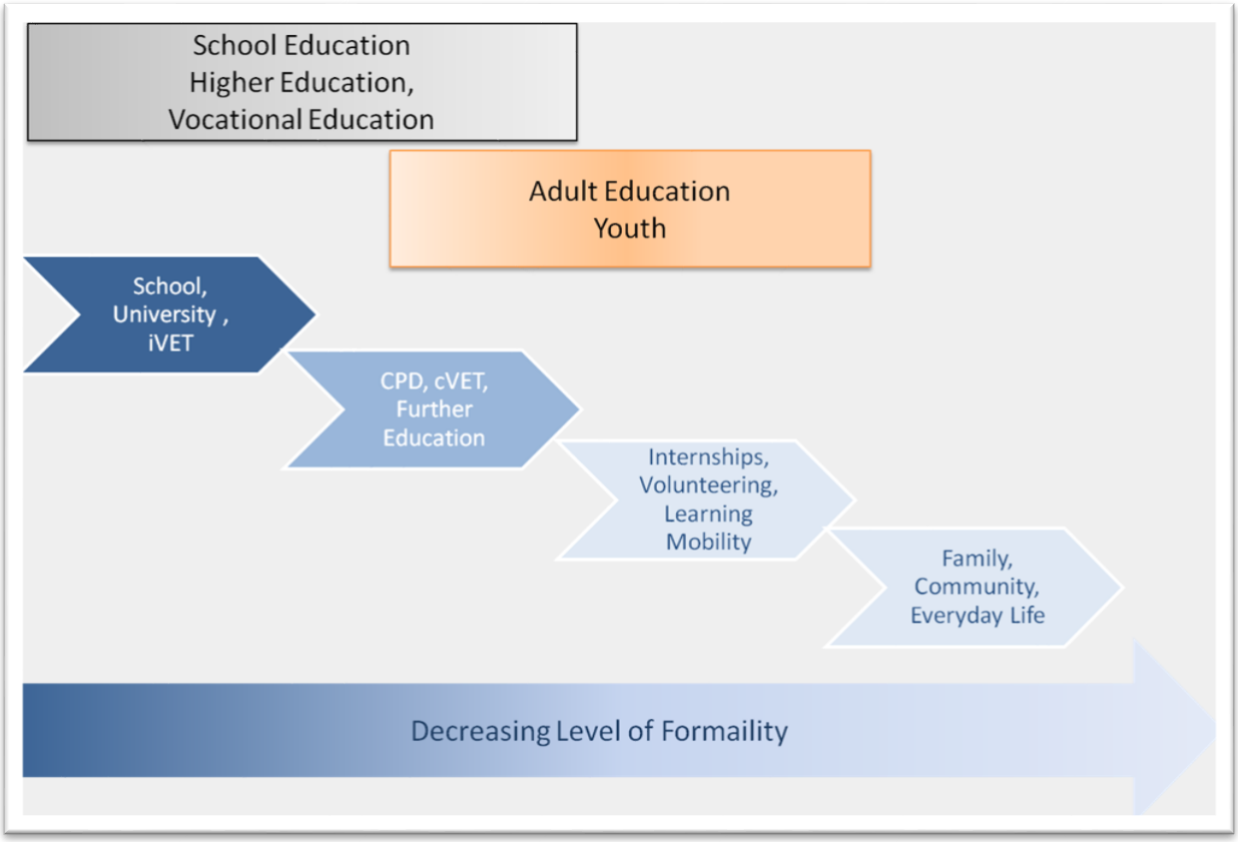

Fig. 2: Education sectors in relation to the level of formalisation

It goes without saying that adult and youth education are operating in less formalised sectors.

However, this also applies to practical education projects in formalised sectors, like for instance in internships or projects on sustainable development.

This is one of the reasons why education providers should pay more attention to VINFL and integrate it into their learning offers. This goes together with the competences which are acquired in these less formal learning areas. They are less formalised and more contextualised, not so much looking to be certified, not so much anchored to curricula and more are more generic in nature.

This does not mean that they are less important as a quick check through the job adverts will certainly reveal. Enterprises are looking more and more for team workers, networkers, communicators and interculturally skilled labour or candidates having competences in sustainable development.

Given the fact that these competences can be validated, this is a great opportunity for adult and youth educators to gain more importance and influence.

Characteristics of formal, non-formal and informal Learning

	Formal	Non-formal	informal
Absicht	• Long-term and proof of entitlement-based	• Short-term and specific	• situated learning, specific, activity/experience-based
Timeframe	• Long-term cycles / preparatory / full-time	• Individualized / output-oriented	• individualised
Content	• Standardized, • input-centered • AcademicEntry requirements determine clientele	• Individualized / output-centered • Practical Clientele determines entry requirements	• Individualized, contextualized • Practical knowledge • Individual interests and needs
Delivery	• institution-oriented • Isolated from environment • rigidly structured • teacher-centered, resource-intensive	• environmentally based, community based • flexible, learner-centred and resource-saving	• Community-based, practice/work context, community-based, collegial • Flexible, not price based
Controle	• External / hierarchical	• autonomous / democratic	• self-guided
Curriculum	• top-down • given curriculum	• mixed, top-down or bottom-up • negotiated	• bottom-up, conversation-based, non-curricular, interest and need

Weiß et al. (2005)

Fig. 3: Characteristics of formal, non-formal and informal learning

Fig. 11 shows indicators for each of the educational areas.

Certain characteristics can be assigned to each of the areas though it has to be emphasised that this table as well as the previous graph visualise a continuum and not discrete categories. Even in school and university there are hopefully also informal (or less formal) traits and activities and there may also be formal aspects in mobility activities (e.g. the mobility supplement to the EUROPASS).

However, what the table from Weiß clearly shows is that informal learning is also intended learning – intended at least from one learning partner – either facilitator and/or learner.

7.1.2. Validation Stakeholders

"*Validation is the process of identifying, assessing and recognising a wider range of skills and competences which people develop through their lives and in different contexts*" (Bjoernavold 2004).

In order to fully understand the concept of validation we have to think about the stakeholders and their (potential) motivations in being part of the system.

From the side of the European Commission the idea is clear:

"The purpose of validation is to make visible the entire scope of knowledge and experience held by an individual, irrespective of the context where the learning originally took place."

"Lifelong learning requires that learning outcomes from different settings and contexts can be linked together."

"In lifelong and life-wide learning, 'validation' is a crucial element to ensure the visibility and to indicate the appropriate value of the learning that took place anywhere and at any time in the life of the individual." (Colardyn/Bjornavold 2004)

Given that the CEDEFOP and the authors represent the will of the EU, the main idea is to make competences of individuals more transparent and comparable and to contribute to the European Cohesion and economic growth.

One has to see validation in the larger context of the growing Europe and its educational policy, starting already in the years after the Rome treaty (to support guest labourers and their children) through the Maastricht and Lisbon contracts (Lifelong Learning) up to the European Skills Agenda (2018) and its components.

Below the European and national political stakeholders there are four other groups which play decisive roles in validation:

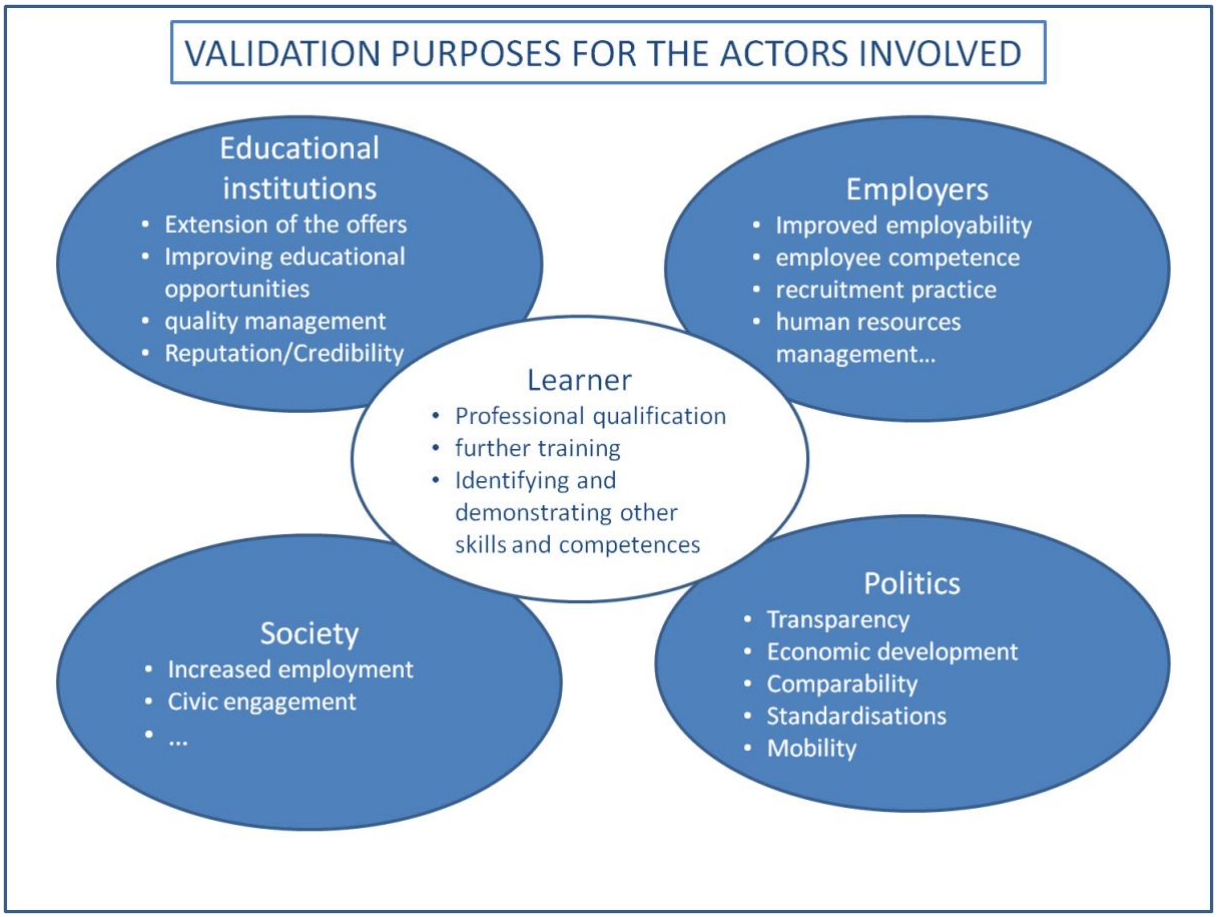

Fig. 4: Stakeholders involved in validation

Following the idea of the inventors of validation the individual learner should be in the centre of the system and improve his/her employability and through the management of the competences.

Employers expect a more competent labour force and better access to and visibility on competent human resources.

Educational institutions expand their offers, improve their quality and credibility.

Eventually the European societies benefit via higher employment greater productivity and higher social engagement.

This is of course still rather visionary and up to now we neither have the administrative nor the educational structures to effect a reasonable introduction. However, the system inherits chances for innovative and creative adult education institutes.

7.1.3. Validation Purposes

Validation purposes can firstly be clustered along organisation levels:

1. EUROPEAN level (European Commission)
    - Transparency of qualifications
    - Mobility
    - Comparability
    - European economic growth and stability
2. INSTITUTIONAL level (enterprises, public institutions, schools)
    - Finding personnel
    - Providing evidences of own capacities
    - Organisational development
3. INDIVIDUAL level
    - Showing potentials and competences
    - Finding jobs
    - Collecting evidences in CV
    - Sharing competences for private projects/purposes

As far as educational stakeholders are concerned the purpose changes with the level of formality. This is especially important for Adult Educators since a sole qualification purpose would not bring any added value in their working area.

Hence, one could differentiate 2 opposite sectors, derived from the levels of formality as outlined in 7.1.1.

Professional Formal Qualification:

Purpose: 'profiling', identifying levels of competences and measuring 'performances'

Means: -> summative assessments and high level of formality, certification

Personal development:

Purpose: incentive for civic engagement, showing potentials of learners

Means:-> identification, formative assessment and low level of formality

Between those two poles there are a large number of different scenarios ready and waiting for competence validation:

- Innovative and complex competences or competence frameworks such as EntreComp, GreenComp, DigiComp,
- Non-formal and informal learning arrangements like
    - Continuing professional education and training, on almost all CPD themes, especially for key competences
    - Learning on the job,
    - Training on social/personal competences like teamwork, communication, customer orientation etc.,
    - Orientation projects for young (unemployed) adults,

- Mobility projects for those Not in Employment Education or Training (NEETs) – what used to be known as the Intermediate Labour Market or ILM - to develop their potentials and to bridge to the working life or formal education again,
- Self-learning arrangements, to give evidence to competences acquired in rather informal learning contexts, e.g. in volunteering,
- Competence Oriented Learning Arrangements, e.g. Design Thinking workshops for young entrepreneurs -

just to name a few.

7.1.4. Validation procedure

Validation, as a European concept, is based on a 4-step procedure consisting of

- identifying,
- assessing,
- documenting and
- recognising

Knowledge, Skills and Competences[5] acquired in formal, non-formal and informal settings.

CEDEFOP glossary, EU Communication on LLL:

”Validation is the process of identifying, assessing and recognising a wider range of skills and competences which people develop through their lives and in different contexts…“

The EU-wide agreed process of validation of informal and non-formal learning (EU Directives 2009/2012) consists of the four steps of identification, documentation, assessment, certification of "learning outcomes achieved by a person in a non-formal or informal way".

Learning outcomes play an essential role in the validation concept - they are descriptions of what a learner should know and be able to do (after completing a learning activity).

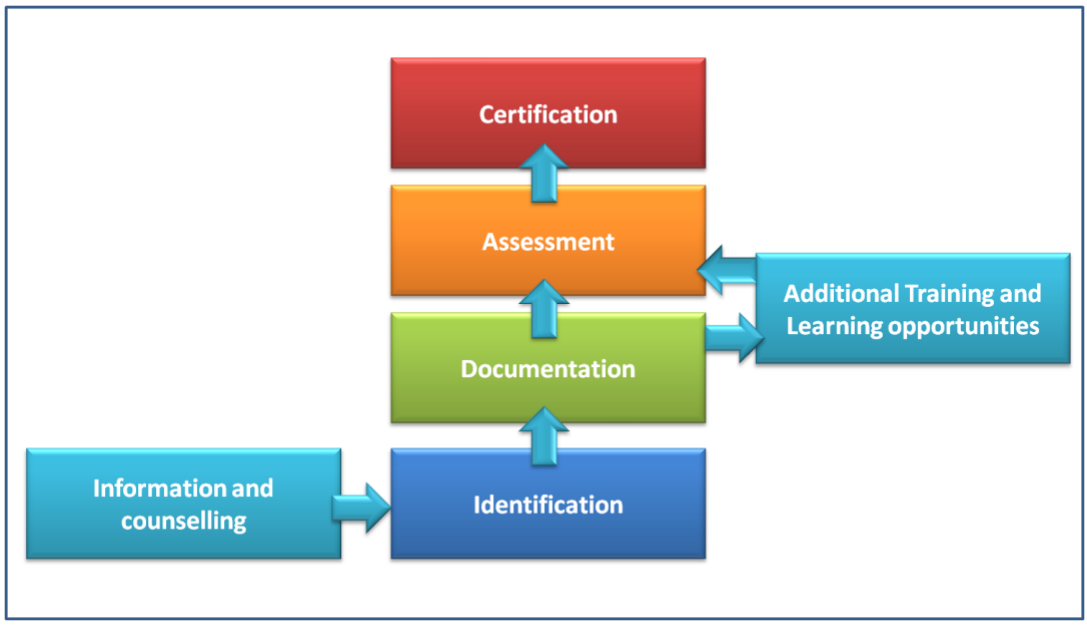

Fig. 5: Validation steps and necessary support measures (information, counselling, training)

[5] For educationalists of certain member states the ’competence’ component sounds rather odd or tautological (since knowledge and skills are parts of a ’competence’). In this definition ‘competent’ marks the level of autonomy and responsibility that a person shows in the working process.

'Identification' is the collection and identification of existing competences and learning outcomes of the individual.

'Documentation' means that the competence proofs and learning outcomes are collected in appropriate tools, for instance in e-portfolios. To identify potentials, strengths and competences, biographical tools such as ProfilPASS play an important role, as the purpose of the collection phase is also to increase the awareness of the results of previous learning experiences.

'Assessment' is the third validation step in which the existing evidence of competences and learning outcomes are classified according to specific reference points and / or standards. This step requires high quality measurements for the credibility and transparency of the procedures. According to the 2016 Guidelines, this step will use "similar methods and tools as used in the formal education and training system". However, at a time when social, personal and organisational competences are becoming increasingly important, the question arises as to how these competences are also taken into account in the validation process.

The fourth element of validation is '**Certification**', which seeks to 'authorize' a person to perform certain activities by awarding a formal qualification (or partial qualification, or 'license').

The multiple meaning of the term '**competence**' becomes clear at this point: In formal, qualification-oriented contexts, being competent may have the main meaning of 'being allowed to'. In a pedagogical context it describes the comprehensive ability of a human being, to apply a mixture of knowledge, skills attitudes/values in a defined context (which may also be professional) in a certain quality.

For qualification purposes, learning outcomes are assigned to defined professional skill levels, for example through the European Credit Point System for Vocational Education and Training (ECVET). Here, the European Qualifications Framework (EQF) serves as a background system and orientation framework for the descriptions and classification of different qualification levels. The EQF is the central European reference system that integrates and links the different national qualifications frameworks and thus serves to make comparisons and transparency of qualifications possible.

A broader understanding of the concept of validation, as increasingly articulated in the CEDEFOP 2016 Guidelines, creates new opportunities for adult learning and its actors. The purpose of validation is to make visible the full range of a person's knowledge and experience, regardless of the context in which the learning originally took place. This vision includes at least in principle essential elements of adult education conception (e.g. a competence orientation), even if the objective of the validation was originally entirely occupation related.

EU Member States should include by 2018 the necessary regulations for the introduction of the four validation steps, which "give individuals the opportunity to use each of these steps, either individually or in combination, according to their needs."

This makes it clear that, in contrast to input-oriented education models, the validation of informal learning focuses on the individual and the validation steps and instruments used should be flexible.

Secondly, it emphasizes that validation does not necessarily have to include all four steps. Thus, 'validation' is also to be understood as an umbrella term for all recording, documentation, evaluation and certification activities.

7.1.5. European Tools and Instruments

The EU has developed a number of instruments to facilitate the Validation of Non-formal and Informal learning (VINFL).

The most prominent ones are the EQF (European Qualification Framework) and the credit transfer systems:

ECTS for the Higher Education sector, based on time-related credit points and ECVET is the European Credit Transfer System for VET. In contrast to ECTS the ECVET system is based on learning outcomes,

which are descriptions of what a learner knows, is able to perform in which grade of responsibility and autonomy.

As outlined above, the EQF is a central taxonomy to compare 'qualifications' among member states with the help of 8 levels.

The ECVET system is entirely based on the EQF level descriptions that should be transferred into an occupation-specific taxonomy. In reality, the system was implemented without much success. Even in more than 100 funded model projects only a minority kept to the ECVET specification and only about 10% delivered reasonable models for 10 VET and CPD areas.

EUROPASS has been designed as European wide CV with several interfaces to practical learning and mobility learning documentation.

The instruments serve as assessment and documentation tools.

For identification purposes the German ProfilPASS may be mentioned as well as the YouthPass for youth and volunteering actions.

7.1.6. The LEVEL5 validation approach

REVEAL has developed and maintained the LEVEL5 system since there are a number of shortcomings that relate to a solely formal validation approach as it has been brought forward by the Commission and the CEDFEOP in recent decades.

Firstly, LEVEL5 aims to also validate those competences that are not related to qualification or curricula. Nevertheless, they are becoming increasingly important in our professional lives. We cluster them in social, personal or organisational competences, among them teamwork, communication, flexibility, creativity and innovation, conflict management, client orientation, critical thinking and spotting ideas and opportunities, just to name a few.

A second aspect which differentiates the LEVEL5 validation from the above-mentioned systems (EQF, ECVET, ECTS) is its purpose: while the EU systems aim at summative assessment and validation, LEVEL5 can also be used in a formative approach. Formative assessments aim primarily at empowering learners, while summative assessment is a sort of grading process which aims at measuring performances related to knowledge or expected behaviours. We can therefore say that formative assessment is diagnostic in nature while summative assessment is evaluative. For us the diagnostic functionality is very important since the learning process is very much in the focus of our members and not just the assessment and grading of the learners. Nevertheless LEVEL5 can also be used as a summative tool to judge the performances; hence it allows a balanced assessment based on both functions, thus delivering on the one hand necessary information about the next steps of the trainers and learning providers and motivating learners to go on, and at the same time measuring the student's learning regarding to the taxonomy.

Eventually – and this goes along with the second aspect, LEVEL5 does not relate only to one measurement at the end of a learning process but to several points in time which allows a documentation of the progression of a learner. This progression is displayed in the LEVEL5 cube and the LEVEL5 certificates.

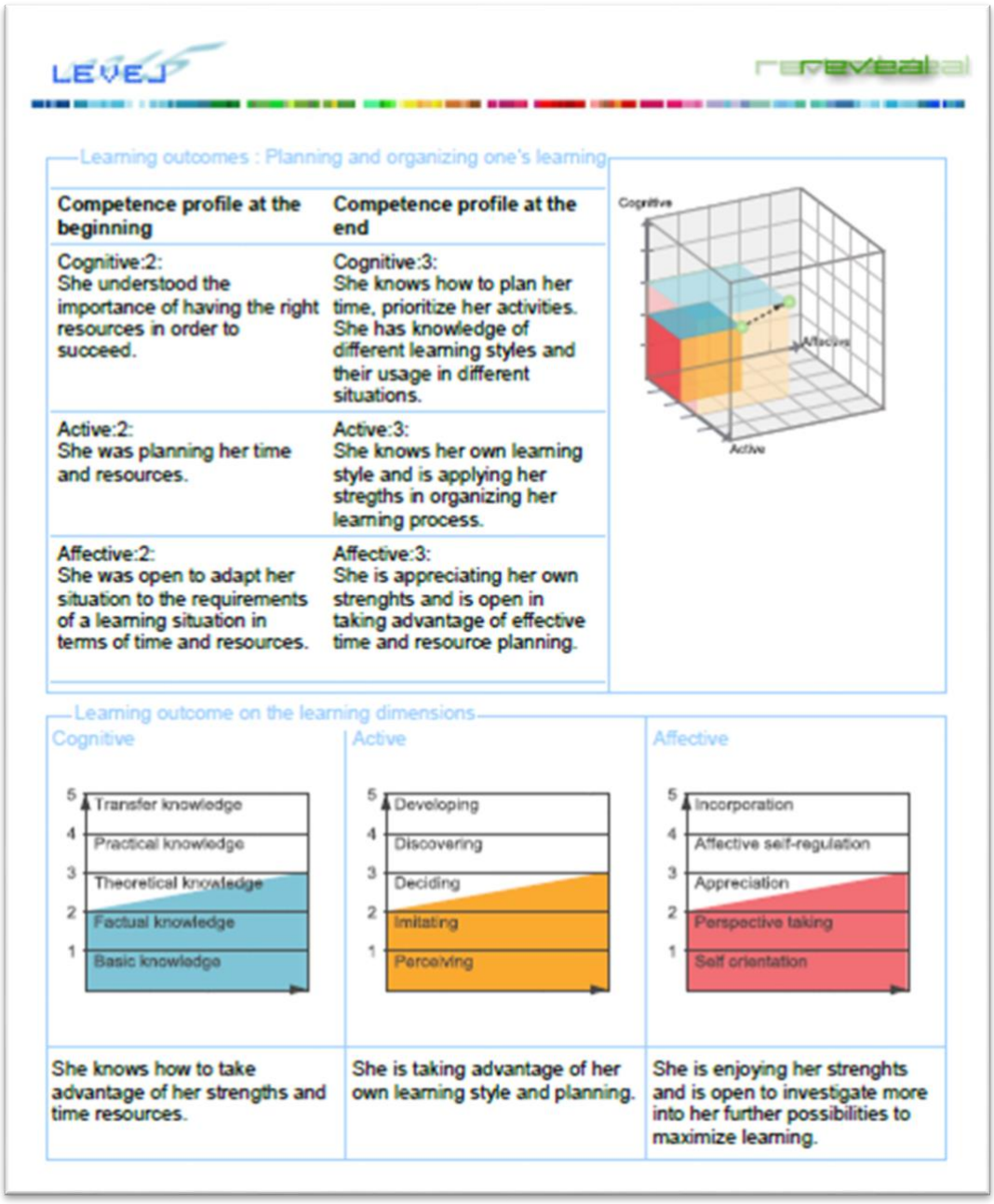

Fig. 6: Excerpt from a LEVEL5 certificate

To conclude: LEVEL5 is not just a validation system but an approach which combines Competence Validation with Competence Acquisition; a holistic training, learning and validation approach which we call “Competence Oriented Learning and Validation”.

7.2. How to apply Competence Oriented Learning and Validation

The LEVEL5 approach is based on the definition that a competence is the ability of a person to apply

- Knowledge,
- Skills and
- Attitudes

in a specific context and in a particular quality.

Unlike in this holistic model the third affective dimension is mostly neglected in formal and professional education, particularly in traditional learning settings and in connection with the assessment of 'learning outcomes'. The attitudes of the learner, if they are reported on at all, are usually relegated to general notes at the end of a tutor's assessment.
Neurobiological (brain) research in recent years, however, has clearly proven that the affective (emotional and non-cognitive) dimension of learning is of utmost importance for the learning process. Feelings, attitudes and values are crucial for learning, especially for the development of social and personal competences – which play an increasingly important role in our modern societies, be it in professional or civic life.

Communication, teamwork, service-mindedness, intercultural and diversity management, autonomy, flexibility and problem solving belong to these competences, but also the complex 'key competences' like entrepreneurship or active citizenship which cannot be efficiently 'taught' in school but are mostly acquired in practical and real life learning situations.

For efficient learning in formal or non- formalised learning contexts we need innovative learning approaches that promote tailor-made, needs driven and situational learning for the integrated development and validation of these skills and competences.

7.2.1. Core Elements of Competence Oriented Learning and Validation

All three competence dimensions have to be considered to design learning and validate competence development along a comprehensive, holistic and effective learning approach.

Therefore, LEVEL5 is based on a three-dimensional model which maps the development of:

- Knowledge (-> cognitions)
- Skills (-> actions) and
- Attitudes (-> emotions and values)

along five quality levels – from beginner to competent expert.

This model forms the basis for the two core LEVEL5 instruments:

The LEVEL5 *cube* visualises a person's competence development in a specific (preferably practical) learning field which is described in the so called LEVEL5 *reference system*.

The LEVEL5 *reference systems* facilitate the design and planning of informal/non-formal learning and the validation of competences in a specific practical action and learning field.

The LEVEL5 *cube model* reduces significantly the complexity when visualising and describing learning outcomes and therefore provides an attractive presentation and documentation system for learning.

With LEVEL5, learning and validation of competences is promoted in practical, rather informal learning situations (e.g. learning on the job, in internships, volunteering and in mobility programmes etc.) and in innovative competence fields (e.g. entrepreneurship, active citizenship and other key-competences).

7.2.2. Principles of Competence Oriented Learning

Competence oriented learning is based on human centred educational concepts that are backed up by educational research and practice.

We believe that it should contain the following features:

- Active learning
- Experiential learning
- Contextualized learning
- Explorative learning
- Collaborative learning
- Constructive learning
- Personalized learning
- Reflective learning

These principles and features should be considered when designing, planning and delivering a learning module or learning pathway.

There are several tools and instruments that support competence-oriented learning. Design Thinking approaches, for instance contain a large number of instruments and tools for different phases of visioning, spotting and creation of ideas, refinement and prototyping.

Open-source learning technologies offer multiple learning pathways be it as LMS or e-Portfolios. They are also rich development and collaboration pools.

Especially in mainly informal learning environments (for instance in mobility learning, volunteering etc.) well designed learning apps can be used as (hidden) navigation to lead learners through intended learning steps. Here explorative (e.g. app-guided) learning arrangements can be the methods of choice, especially when working with non-mainstreaming or hard to reach learning groups such as those excluded from conventional schools, Hence, there is no lack of state-of-the-art technologies or creative approaches to design and deliver Competence Oriented Learning. What was identified as a shortcoming is a lack of a systemic approach to create a holistic, quality driven method of developing competences and the means to assess and document them.

To design and deliver Competence Oriented Learning we have to plan learning in (contextualised) real life scenarios in which we make use of real demands and interests of the learners. This was the original idea of 'informal learning': It should relate to challenges in REAL life, should have an immediate effect and use more practical and fewer theoretical learning resources.

Of course, we need knowledge and theory to learn – but we have to **construct** knowledge rather than just transfer it from teacher to learner. We have to stimulate learners to be more active: show them how to them explore knowledge and research sources and do not just transmit theory at them but let it be constructed by action, reflection, and comparison to real life experience.

7.2.3. Planning and Delivering Competence Oriented Learning

There is a high demand for Professional Development for Educational personnel, be it trainers, teachers, coaches, learning providers or e-Learning designers (and increasingly also professionals without a professional educational background who deliver learning to others).

For both groups, professionals working in formalised education and other competent learning providers working in informal learning we wanted to set up an easy-to-use approach to plan and deliver Competence Oriented Learning and Validation.

Therefore, we developed the LEVEL5 system which builds on a simplified Plan-Do-Check step procedure:

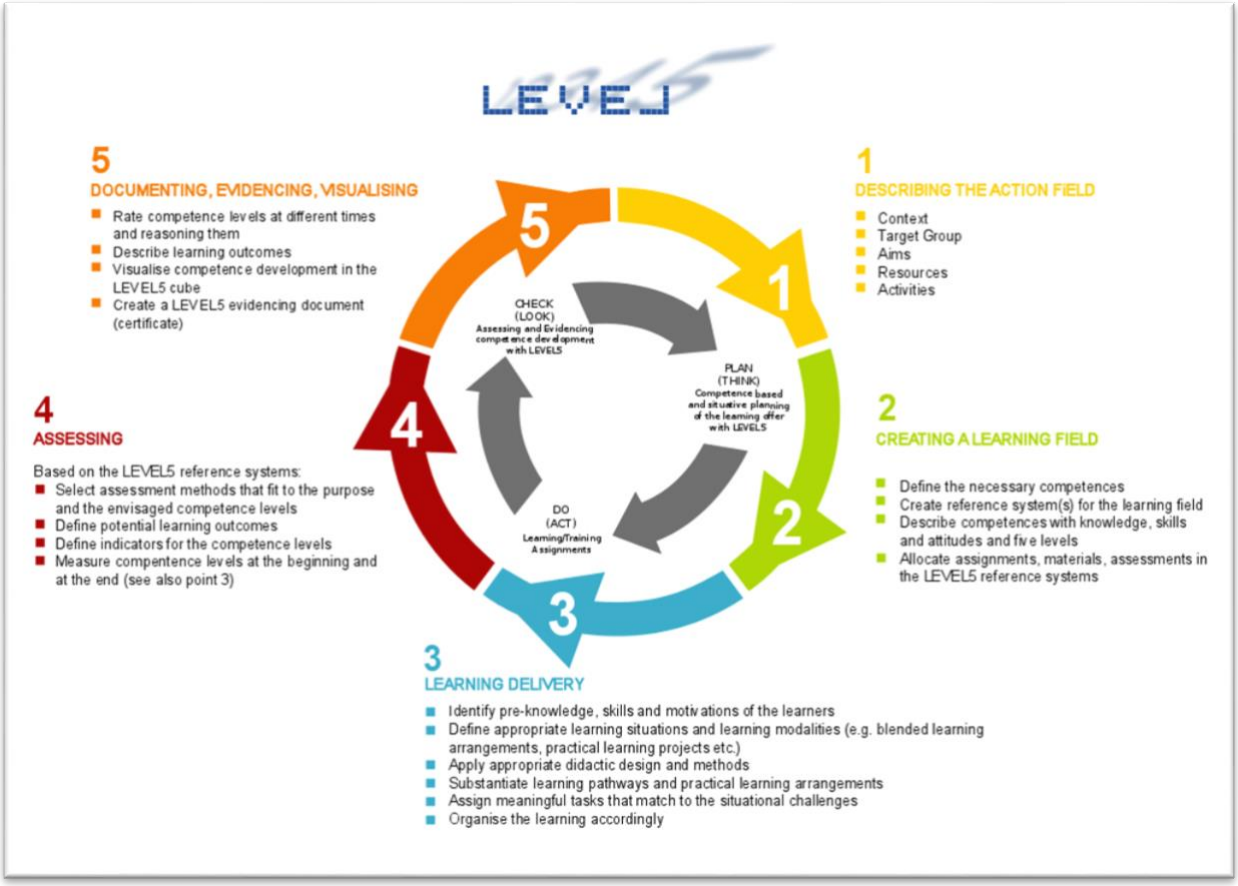

Fig. 7: Procedure to plan and deliver COL&V

Plan:

The starting point of the planning is the so called 'action field' in which the learner is located. It describes context, actions, resources and objectives of his/her activities, in other words it defines the actions and tasks that the person is supposed to perfom at a certain quality in real life, e.g. at his/her workplace.

The conversion of this action field into a learning field is facilitated by the LEVEL5 reference systems which include learning objactives (or aspired learning outcomes) that are necessary to tackle the actions and solve the tasks in the field.

Do:

The delivery of learning is highly dependent on the context. It can range from a rather informal, self-guided learning (e.g. in learning on the job or in mobility settings) to more formal arrangements (e.g. in school projects or more guided continuing professional development (CPD) actions).

Check:

The check-element refers to the validation within LEVEL5. Dependent on the identified action and learning field it covers the identification, documentation, assessment and certification of competences. It is largely based on the LEVEL5 reference systems that facilitate individual and contextualised validation. The learning outcomes are documented in LEVEL5 certificates including the dynamic LEVEL5 cube.

7.2.4. Instruments for Planning and Delivery

Based on the procedure we have developed four main instruments to plan and deliver Competence Oriented Learning and Validation.

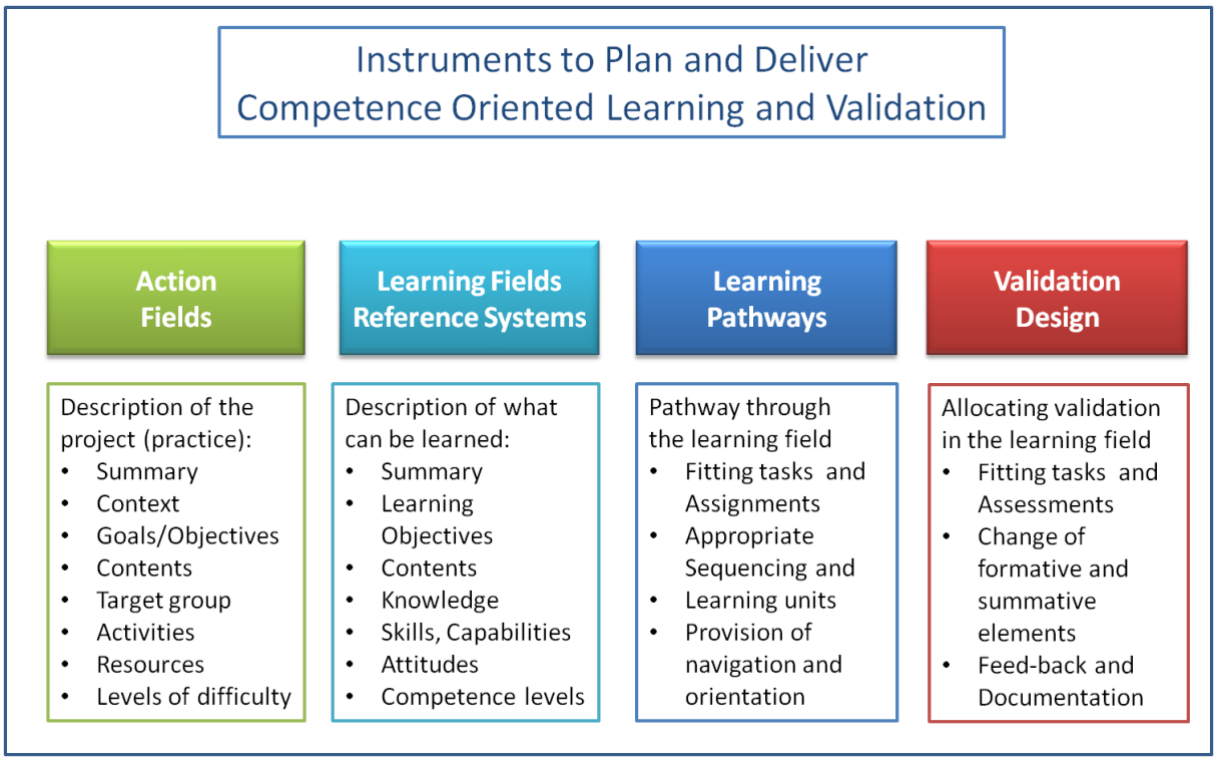

Fig. 8: Tools and Instruments for Planning and Delivering COL&V

The instruments are easy to use tools that facilitate the planning according to a logical step-by step procedure. The first step (action field) scans the practical field and the challenges therein.

The learning field connects to learning objectives and envisaged competences levels and sets up a contextualised reference system. In the third step a learning pathway is designed and reasonable tasks and assignments are located on it. In the last step a reasonable assortment of assessments is assigned to it (formative and summative if applicable) as well as meaningful documentation and certification.

Action fields

The first planning step is always related to the practical situation and describes:

What is the acting field and what does the individual has to perform in a specific context –(what are the tasks, the challenges, the visions, background and the perspectives)?

The action field is thoroughly described in a pre-defined project pattern. It can be applied in a large variety of learning sectors ranging from modern HR-management for highly efficient continuing professional development (CPD at the workplace) to practical learning projects in NGOs or in innovative (primary, secondary or VET) schools, e.g. in climate friendly management, system thinking or other interdisciplinary action fields.

The action field already comes with five different quality levels and describes the challenges and tasks that the individual is confronted with in his/her field of action (which can be professional and/or private).

Learning fields

In the next planning step, the action field is turned into a learning field, following the question: Which competences, more specifically, which learning outcomes do we need at which (quality) level in order to tackle the situation successfully? At this stage the LEVEL5 reference systems establish a framework which maps the necessary (contextualised) competences on three dimensions and quality levels.

KNOWLEDGE			SKILLS Capabilities		ATTITUDES Emotions/Values	
L	Level Titles	Level description	Level Titles	Level description	Level Titles	Level description
5	Knowing where else (strategic transfer)	Knowing how to enhance team processes in different teams. Knowing how to help other people act successfully in teams and to assign specific responsibilities to people keeping in mind their relevant skills.	Developing, constructing, transferring	Leading a team in a way that members are able to contribute to the best of their abilities, supporting them to do so. Being able to strategically develop a team.	Incorporation	Having internalised the "culture" of constructive team work and to accomplish goals through mutual support. Inspiring others to improve their teamwork skills.
4	Knowing when (implicit understanding)	Having substantial knowledge on how and when to join/form a team. Understanding strength and weaknesses of team members. Knowing the importance of communication and how to coordinate workflows.	Discovering acting independently	Being able to assign and coordinate specific tasks and roles to team members on the basis of their strengths and weaknesses. Monitoring team processes. Trying out new roles for one-self.	Self-regulation, determination	Feeling the importance to refrain from own preferences (e.g. in regard to procedures, own solution strategies, methods etc.) for the sake of the team and the teamwork. Being determined to be a good team worker.
3	Knowing how	Knowing the basic dynamics and demands of teamwork. Knowing how to engage in a coordinated work flow where the skills, qualities and limits of each member are taken into account in order to work efficiently.	Deciding/ selecting	Actively reaching out to join a team or help create a team. Contributing to the team process according to own strengths and needs for reaching the shared goal.	Motivation/ appreciation	Having a positive attitude towards working together in a team and to appreciate team diversity. Finding it important to have a 'team spirit'. Being motivated to develop own competence to successfully work in a team.
2	Knowing why (distant understanding)	Knowing that teamwork is a more effective way to achieve results. Knowing it demands from individuals to coordinate their work considering individual competences and abilities.	Using, imitating	Contributing to team work when being invited or instructed to. Fulfilling assigned tasks in a team by following the example of others.	Perspective taking	Being interested in the potentials of team work and to learn more about it.
1	Knowing what	Knowing that teamwork is collaborating with others to reach a shared goal.	Perceiving	Recognising situations in which teamwork is feasible to reach goals.	Self-orientation	Seeing teamwork as something positive, but without considering developing own team work competence.

Fig. 9: LEVEL5 Reference system (Learning field)

Knowledge, skills and attitudes in the learning field are described in a consistent way on the five quality levels including potential learning outcomes. Appropriate learning activities, materials, resources, and potential validation settings are assigned to and allocated in the reference systems.

Learning Pathways - Planning of Competence Oriented Learning

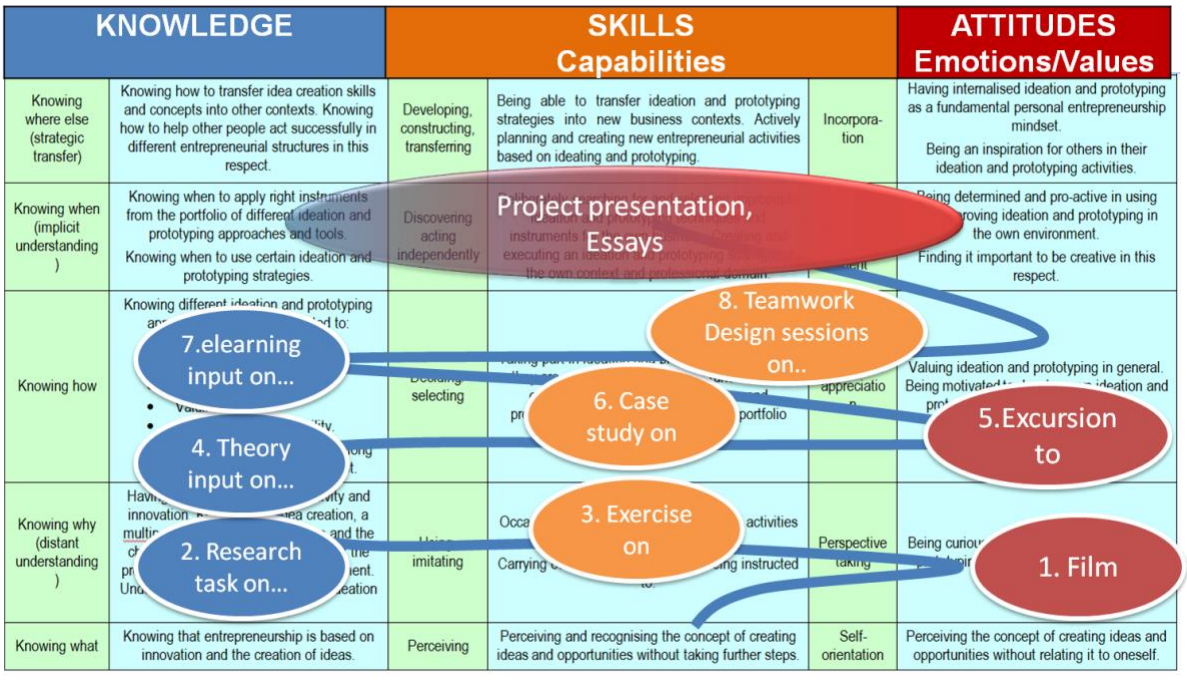

Fig. 10: Learning pathway with envisaged activities in the Learning field

In a nutshell: What do we have to consider while planning and delivering COL?

- Assigning the right tasks to the right boxes; Depending on
- content levels (level of complexity)
- levels of difficulty
- levels of knowledge, skills
- attitudes
- intention of the designer

The action and learning fields help the learning designer to identify different competence levels, to describe learning outcomes related to the levels and the three dimensions (columns) knowledge, skills and attitudes. They are then able to deliver a kind of landscape to develop a consistent and high-quality learning pathway – also in informal learning settings.

Based on these landscapes, designers can also plan entrepreneurial learning or learning trajectories when the learner is not in a classroom (e.g. in internships, volunteering or on mobility) and/or connected with mobile learning apps.

Validation Design for informal and non-formal learning

Validation is a complementary process to planning and delivery of competence-oriented learning. As outlined in the competences for AE professionals, validation refers to the identification of already available competences, their documentation, a competent assessment and (if needed) a certification as formal proof of the learning activity.

The identification can be easily integrated into the learning processes, for instance as entry questionnaires or competence spiders based on self-assessments.

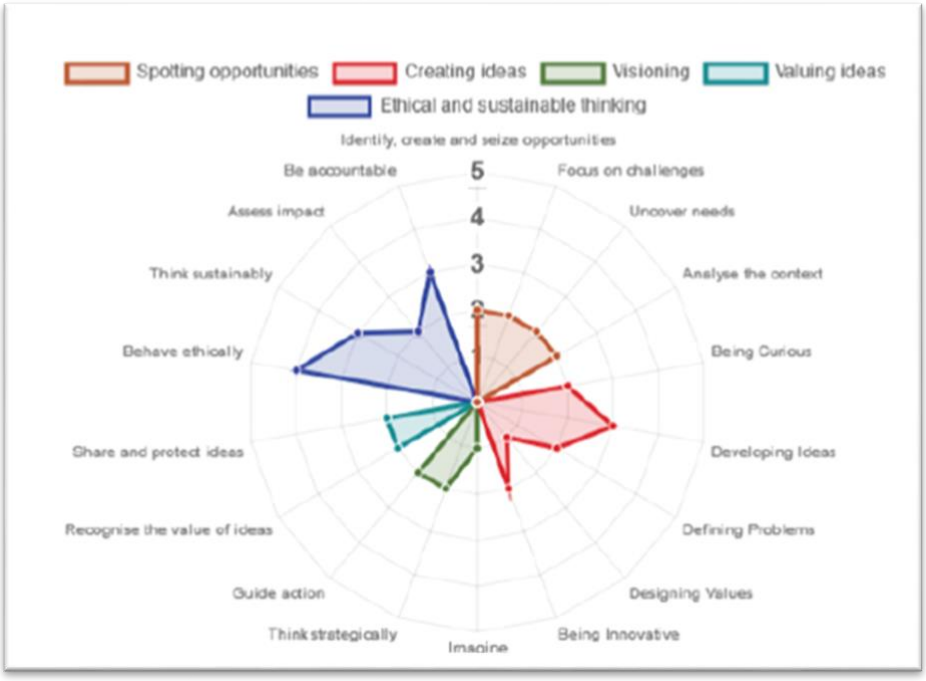

Fig. 11: Competence spider on the Competence to spot ideas and opportunities used in design thinking

Documentation, as outlined above, can be facilitated with e-Portfolios or with tools like Europass and Mahara badges backpacks. Here, the learning proofs or artefacts can easily be collected and connected to the learners' competence profiles.

Assessments have to be competence-oriented as well. This refers to

1. the competence column (knowledge, skills and attitudes): there is no need to identify and measure complex attitudes with simplified tick-box questions.
2. on the other hand, to the competence level (again, the higher the competences level is, the greater the need for a more complex assessment)
3. to the purpose (formative to empower, summative to measure performances)

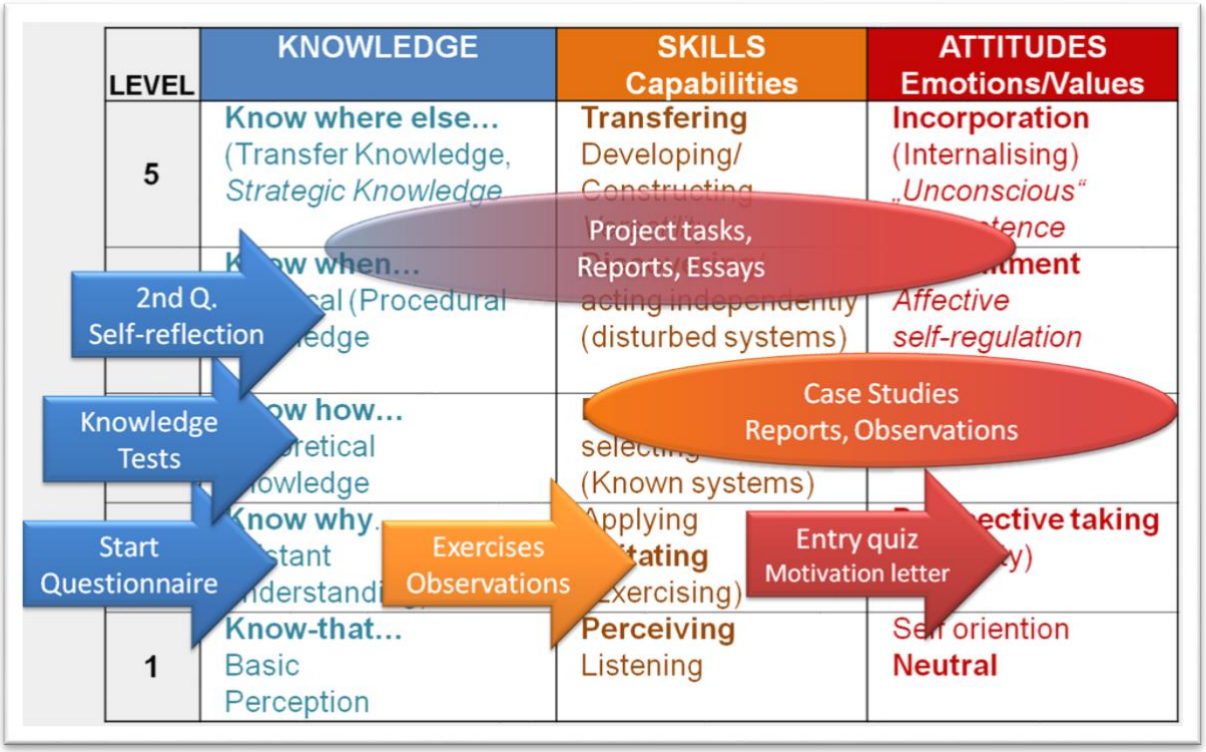

Fig. 12: Schematic ordering of assessments with a reference system for competence-oriented learning

When looking for proofs of learning we should also consider that a smart assignment is often a very powerful assessment tool. Especially in higher competence regions it is not helpful to only go for a knowledge related assessment, since the performance quality can only be observed by looking at all three dimensions.

At least from level 4 the complexity of a challenge is in most cases so high that it needs more than just a simple, descriptive report to understand capabilities, motivation and commitment but also procedural knowledge. We can expect a rather high level of reflection on a problem and self-reflection (metacognition) which will only be revealed either in more complex essays and/or in complex pieces of work.

Given that, it is only logical that the individual (who is in the centre of the validation, remember?) has the opportunity to organise his/her learning proofs accordingly, for instance in a web-based portfolio which also facilitates a 'management' of these proofs of competences.

Eventually the learning outcomes have to be documented and (if useful) certified.

A standard LEVEL5 certificate is displayed below, in this case related to a design-thinking learning project and the validation of the competences to spot ideas and opportunities[6] and intercultural teamwork.

As outlined above LEVEL5 is not only designed to proof singular performances but the development of a learner in a practical and complex learning project.

[6] Based on the EntreComp framework

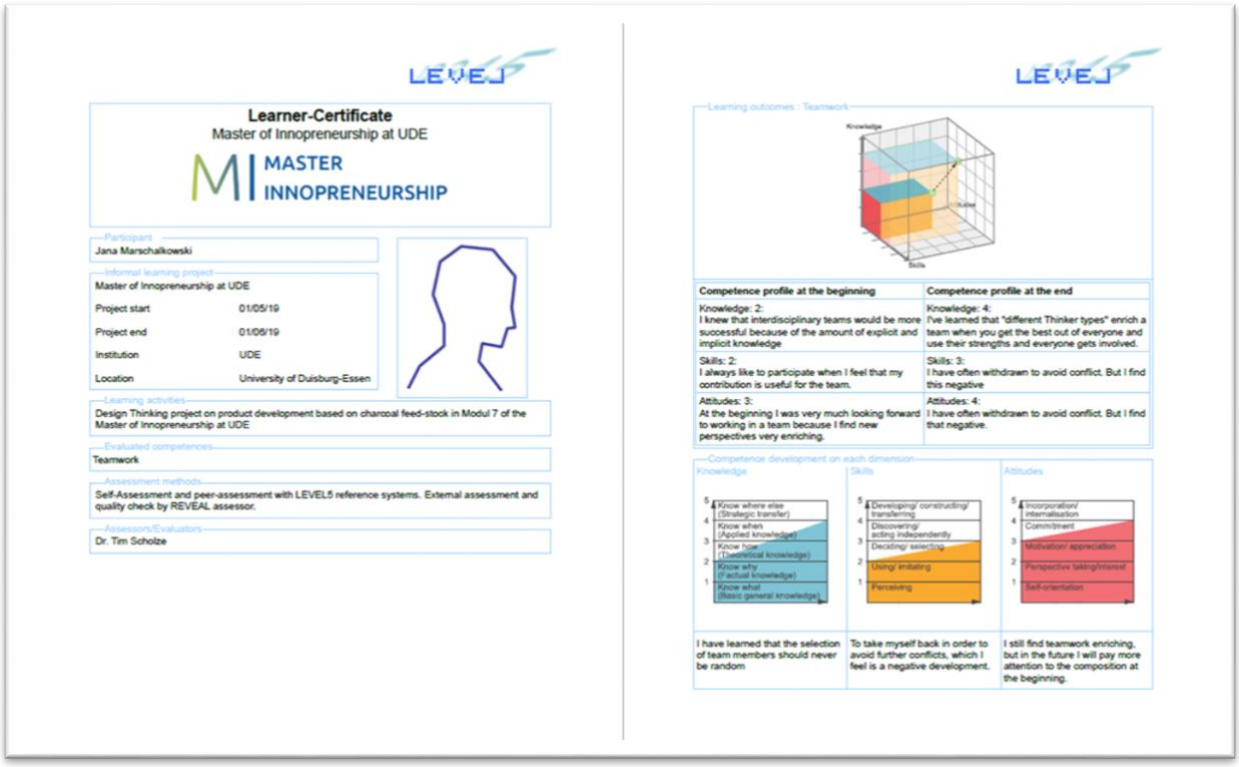

Fig. 13: LEVEL5 certificate template

The competence development is displayed in the 3-dimensional LEVEL5 cube and in the 2-dimensional visualisation of knowledge, skills and attitudes.

The learning outcomes at each stage are described to the left of the cube and below the dimensions. If needed learning outcomes related to the ECVET systems can be easily included, if the learning providers in adequate settings (e.g. in formal VET contexts) wish to do so.

Competence descriptions (learning fields with expected learning outcomes) are annexed to the certificate to describe the context and the learning environment.

8. Annex

8.1. Annex 1: ECTS Assignment

8.1.1. Developing the Course and Assigning ECTS Credits

ECTS credit assignment was based on a robust methodology developed by The Center for Education and Lifelong Learning, Aristotle University of Thessaloniki (AUTH), ensuring that all aspects of student engagement—teaching, autonomous study, group work, and assessment—are appropriately recognised.

Each module's workload was calculated based on:

- **Teaching hours** (facilitated training or live sessions)
- **Asynchronous learning** (e.g. online materials, self-study)
- **Project work** and **group collaboration**
- **Assessment activities** (e.g. reports, validations, peer feedback)

The total learning effort for each module aligns with the standard ECTS definition of 25–30 hours per credit:

- SDG Explorer: 25 hours → 1 ECTS
- Design Thinking/DBCR Project: 75 hours → 3 ECTS
- LEVEL5 Validation: 25 hours → 1 ECTS
- Context Module: 75 hours → 3 ECTS

8.1.2. ECTS calculation method (AUTh)

The ECTS attribution is based on a standardised procedure developed by the Scientific board within AUTh.

Activity	Hours of educational activity with the participation of teaching staff	Asynchronous teaching screens	Autonomous learning hours	Teaching or facilitated training hours	Total workload (hours)	ECTS
Face-to-face/Synchronous teaching	4			4	4	0,13
Autonomous Learning: Asynchronous teaching		200	16,67		16,67	0,56
Autonomous Learning: a) Study of the learning material for face-to-face and/or synchronous teaching b) Written assignment, exercises, projects, etc.			4		4	0,13
Assessment/Evaluation of the students				0	0,00	0,00
Groups				**4**	**25**	**1**

ECTS-Calculation of the SDG explorer module

Activity	Hours of educational activity with the participation of teaching staff	Asynchronous teaching screens	Autonomous learning hours	Teaching or facilitated training hours	Total workload (hours)	ECTS
Face-to-face/Synchronous teaching	8			8	8	0,27
Autonomous Learning: Asynchronous teaching		240	20,00		20,00	0,67
Autonomous Learning: a) Study of the learning material for face-to-face and/or synchronous teaching b) Written assignment, exercises, projects, etc.			40		40	1,33
Assessment/Evaluation of the students	8			8	8,00	0,27
Groups				**16**	**76**	**3**

ECTS-Calculation of the DBCL/DBCR module

Activity	Hours of educational activity with the participation of teaching staff	Asynchronous teaching screens	Autonomous learning hours	Teaching or facilitated training hours	Total workload (hours)	ECTS
Face-to-face/Synchronous teaching	4	12	3	4	7	0,23
Autonomous Learning: Asynchronous teaching		124	10,33		10,33	0,34
Autonomous Learning: a) Study of the learning material for face-to-face and/or synchronous teaching b) Written assignment, exercises, projects, etc.			2		2	0,07
Assessment/Evaluation of the students	4			4	4,00	0,13
Groups				**8**	**23**	**1**

ECTS-Calculation of the LEVEL5 Self Assessment module

Explanation:

Fill in only the cells in green

To complete cell B2: indicate the number of hours of face-to-face and/or modern distance learning.

"To fill in cell C3: calculate the hours of autonomous learning (asynchronous teaching leading to individual, self-steered learning), based on the educational material that has been posted to the students or uploaded on a platform.

Note: Learning under teacher supervision or synchronous DBCL does not count in this category but in B2/D4.

To calculate please write down the number of screens according to the following:

One (1) screen equals five (5) minutes of workload (maximum).

A 'screen' is defined as:

- one (1) slide in powerpoint (.ppt) format regardless of content
- one (1) page of text (article, book chapter, scanned page from a publication, etc.) in .pdf format, regardless of content
- one (1) photograph or one (1) video up to five minutes in length. In the case of video lectures, the screens are counted based on the total duration of the video lecture that has been posted, i.e. a 45-minute video lecture corresponds to nine (9) screens, a 60-minute video lecture corresponds to 12 screens, and so on.

Therefore, and based on this estimate, one (1) hour of asynchronous training should correspond to 12 screens, 100 hours of asynchronous training should correspond to 1200 screens, and so on."

"To complete cell D4:

a) It is recommended that the study hours required for the face-to-face/modern teaching material should not exceed twice the number of teaching hours.

b) for the hours required for assignments or other forms of independent learning (e.g. exercises, projects, etc.)."

"To complete cell B5:

Estimate the number of hours the teacher will spend on the assessment of a trainee (e.g. correcting written work, assessing a project, quiz, supervising the examination, etc.)"

8.1.3. Impact and capitalisation

This evidence-based workload estimation supports both learner transparency and institutional accreditation.

Perspective 1: Integration into Joint Programmes across Institutions

DISC's modular course design lends itself perfectly to joint academic programmes, enabling smooth integration across multiple HE institutions and countries. Because the modules are certified with ECTS, they can be embedded into existing curricula as electives, minors, or specialisation tracks within sustainability studies, teacher training, natural sciences, or social innovation programmes.

Through the Bologna Process framework, students can carry DISC credits across institutions, fostering mobility and international collaboration. Institutions can adopt shared modules, offer joint supervision, and even co-design new contextual modules, building long-term transnational partnerships. The flexible nature of DISC also allows programmes to adapt modules to local societal challenges, which enriches the learning experience while retaining the overarching ESD mission.

Perspective 2: Integration into Enterprises and Sustainability Services

The DISC course also responds directly to emerging needs in the business sector. With increasing pressure to meet sustainability and environmental standards, enterprises—particularly within the European Union—are seeking ways to train staff and implement sustainability management systems.

The course can be integrated into corporate learning frameworks as a professional development track. The SDG Explorer helps employees identify sustainability themes relevant to their roles; the

Design Thinking module (via DBCR) facilitates team innovation on green transition topics; and the LEVEL5 validation offers evidence of skills development aligned with sustainability goals.

Moreover, DISC directly supports enterprises in meeting the EU's **Corporate Sustainability Reporting Directive (CSRD)**, which mandates sustainability reporting obligations for companies:

- **Large companies** (with over 250 employees, €40M turnover, or €20M in assets) must report on ESG matters beginning in 2025.
- **SMEs listed on EU-regulated markets** are required to report by 2026.
- Reports must cover environmental impact, social responsibility, governance structures, risk management, and sustainability targets.

DISC helps enterprises respond to this by empowering internal staff to participate in sustainability action and co-create sustainability reports as part of the course output. However, there is growing concern among companies and chambers of commerce about the complexity and resource demands of these regulations. Many fear that SMEs, in particular, lack the capacity to collect and process the necessary data, and face uncertainty about audit requirements and comparability standards.

DISC addresses this fear pragmatically: it builds internal sustainability literacy, develops in-house expertise, and produces concrete tools such as sustainability maps, competence profiles, and narrative reports—all of which feed into CSRD reporting needs while advancing the enterprise's sustainability culture.

Perspective 3: Aligning Learning Outcomes with ECTS, LEVEL5, and ECVET
DISC goes beyond standard ECTS workload calculation by integrating **competence-based validation**. The use of the LEVEL5 methodology allows learners to assess not only what they know but also how they apply knowledge and reflect on values and attitudes—critical dimensions of sustainability education.

This aligns well with the **European Credit System for Vocational Education and Training (ECVET)**, which places emphasis on learning outcomes and employability skills. By blending ECTS (used in academic HE) with LEVEL5/ECVET, DISC becomes a hybrid model bridging formal, non-formal, and informal learning pathways. This supports lifelong learning trajectories and the recognition of diverse competence developments across sectors and educational levels.

The learning outcomes of DISC are structured to include:

- **Cognitive dimension**: understanding sustainability principles, systems thinking, and innovation methodologies.
- **Behavioural dimension**: capacity to engage in group work, co-create solutions, and act responsibly.
- **Affective dimension**: motivation, reflection, and commitment to sustainable action.

Through this integrated approach, DISC prepares learners not only for academic progression but also for responsible citizenship and professional engagement in sustainable development.

8.2. Annex 2: Information brochure for HEI

Pamphlet for Higher Education Institutions: Join the DISC Programme

Integrate Education for Sustainable Development into Your Curriculum

DISC is a modular, ECTS-certified course package that empowers Higher Education Institutions (HEIs) to integrate sustainability competences into diverse academic programmes through interdisciplinary, practice-based learning.

Why Join DISC?

- Ready-to-implement modular course (1 to 8 ECTS)
- Fully aligned with the Bologna Process and ECTS/ECVET frameworks
- Promotes Education for Sustainable Development (ESD) and SDG integration
- Supports internationalisation and transdisciplinary learning

DISC Modules:

1. SDG Explorer (1 ECTS) – Students learn the SDGs, reflect on their relevance, and form interdisciplinary teams
2. Design-Based Collaborative Research (3 ECTS) – Students work on real-life sustainability challenges using an innovative research model
3. LEVEL5 Validation (1 ECTS) – Reflective assessment of personal and social competence development
4. Context Modules (3 ECTS) – Flexible modules tailored to fields like tourism, education, biology, or agriculture

Benefits for HEIs:

- Adopt entire course or integrate individual modules into existing study programmes
- Enable student mobility and credit recognition through ECTS
- Collaborate with other HEIs and external partners in a transnational network
- Offer cross-sector engagement by linking to enterprises and real-world contexts

DISC Expert Network: Join our transnational expert group to co-develop new modules, exchange best practices, and co-deliver learning experiences that connect theory with sustainability action.

Let's empower the next generation of changemakers – together.

[Insert contact/email/website for HEI participation]