

*Paper*

## **Case-Based Learning in Interdisciplinary Workshops**

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Received: September 8, 2025; Accepted: September 29, 2025; Published: October 6, 2025

### **Abstract**

Our interconnected and rapidly changing world raises new demands for necessary skills and competences of the 21<sup>st</sup> century. In response, higher education institutions are increasingly integrating methods and approaches of interdisciplinary education. This article explores the design, implementation, and potential of interdisciplinary workshops conducted by the Center for Interdisciplinary Education (INTED) in a Norwegian context at the University of Oslo. Using case-based learning as a pedagogical approach, these workshops bring together students from diverse disciplinary backgrounds to address and respond to complex real-world issues. While challenges remain in facilitating integration across disciplines and assessing outcomes, this article argues for the utility of such workshops to foster not only vital interdisciplinary comprehension and competence, but also epistemological humility at the university.

*Keywords:* *Interdisciplinary Workshop, case-based learning, collaborative learning, higher education in the 21<sup>st</sup> century.*

### **1. Introduction**

In our complex world, we increasingly encounter unforeseen challenges, situations, and interconnections. Resultingly, there is a well-established recognition of the growing need for interdisciplinary, interpersonal, and agentic skills and competencies (Boix Mansilla & Duraising, 2007; Lattuca et al., 2012; Schlitz et al., 2010; Blom et al., 2020; González-Salamanca et al., 2020; Bianchi et al., 2022; Markauskaite, 2024). These skills involve, among others, critical, creative, and reflexive thinking, collaboration, adaptive skills, practical problem solving, as well as agility and stamina in the face of unfamiliar and capricious circumstances. To learn and acquire these skills requires fertile settings that actively stimulate both theoretical, practical, reflective, and moral participation. In this pursuit, the Center for Interdisciplinary Education (INTED) at the University of Oslo (UiO) uses the proven

power of Honours programs as laboratories of innovation (Wolfenberger, 2012) to design and conduct Interdisciplinary Workshops with the pedagogical approach of case-based learning. Over a period of three days, Honours students, together with students from various traditional disciplinary programs, collaborate on complex issues in a real-world context. This method has been proven to provide rich learning experiences and outcomes, fostering the development of essential skills, attitudes, and competencies (Dooley and Skinner, 1977; Friedow et al., 2012; Lattuca et al., 2012; Cörvers, 2016; Krohn, 2017). Notably, as interdisciplinary education is still in its nascent stages in most universities, there is a need for further testing and evaluation of the wide variety of interdisciplinary methods and their contextual applicability. Honours programs provide a fruitful platform to experiment with such educational innovations, as the students are highly motivated, talented and often already possess an interest in both interdisciplinarity and academic challenges (Wolfenberger, 2015). The ever-changing and entangled societal needs and dynamics demands accountability and proactive responses from both people and systems. In this regard, this explorative and collaborative approach to interdisciplinary education is crucial to ensure transferability, utility and meaningfulness of higher education.

#### *INTED*

INTED was established as an excellence center at the University of Oslo dedicated to mapping, developing and integrating interdisciplinary competence in higher education. A core aim of the center is “to support and inspire students, teachers, administration, leadership, and stakeholders to develop interdisciplinary competence and to participate in, facilitate, and lead interdisciplinary processes” (Thorstad, et al., 2023, p. 3). As a program designed with the purpose of bringing together ambitious students, the Honours program is a promising arena for interdisciplinary pedagogical experiments. Therefore, INTED works closely with the Honours program at the University of Oslo in order to test, develop, evaluate, and scale learning approaches in a social environment where interdisciplinarity is at the core. By further organizing Interdisciplinary Workshops, INTED creates platforms for experimenting with and practicing various interdisciplinary methods and pedagogies, as well as for participants to practice and develop interdisciplinary competencies in different contexts, compositions, and relations. The workshops are open to all students at the University of Oslo. Experiences and findings gained from these workshops are valuable for the further development of interdisciplinary teaching, research and collaborations, both in the Honours program as an interdisciplinary educational offer and across the university. Describing the context and aim of the workshops, INTED argues that:

“[t]he interdisciplinary workshop provides students with the opportunity to collaborate in interdisciplinary teams, develop interdisciplinary skills, and address current issues from an interdisciplinary perspective. Students get to work with so-called wicked problems, referring to numerous interdependent factors, making it highly difficult or impossible to solve the challenges. The workshops span several days, allowing students to develop interdisciplinary skills as well as gain knowledge and experience interdisciplinary teamwork” (INTED, p. 10).

*How to read*

This article is organized into three key sections. The first section, 'Case-Based Learning', explores the vital arguments supporting interdisciplinary education and pedagogies of case-based learning in the 21<sup>st</sup> century. This forms the theoretical fundament from which the ideas of the workshops sprung. The following section, 'Interdisciplinary Workshops', describes planning process of INTED's second workshop, pedagogical approaches and tools, as well as the implementation and experience of workshop in practice. Lastly, the final section 'Concluding Remarks' provides central reflections on the workshops' outcome and potential, assessment, and methods, along with further implications.

**2. Case-Based Learning**

Understandings of education in the 21<sup>st</sup> century are transitioning away from one-way knowledge transmissions of isolated disciplines, towards more inclusive and holistic approaches of complexity, entanglement and interdisciplinarity. With various pressing global issues, there is a growing recognition of the need to not only *learn* about matters of the ever-changing world, but to *engage* actively and participatorily in and with it (Dewey, 1938/1997; Sandell et al., 2003; Schlitz et al., 2010; Sinnes, 2015; Párados, 2015; O'Brien et al., 2013; Bengtsson et al., 2020; Tasquier et al., 2022). This shift emphasizes the importance of connecting disciplinary education to its broader context outside the faculty walls. Specified by Damsa and Jornet (2016: 40), "[l]earning is no longer viewed as the mastering of a given subject; it involves being knowledgeable across a variety of contexts, with the ability to connect to remote knowledge resources, communities and (work) sites no longer bound to one particular physical context". Pedagogies of interdisciplinary teaching, learning, and research are flourishing in educational institutions and academic environments (Boix Mansilla et al., 2000; Klein, 2005; Repko, 2008; Szostak, 2013; Laursen & O'Rourke, 2019; Vienni-Baptista et al., 2024). Active and interdisciplinary project-, problem- or case-based learning<sup>1</sup> offers arenas where various disciplinary perspectives, social dynamics, competences, and values are activated in the pursuits of solutions to a given issue (Helle et al., 2006; Kraicik & Blumenfeld, 2005; Jonassen & Hung, 2012; Brundiers & Wiek, 2013; Cörvers et al., 2016; Klaassen, 2018; Kaufmann et al., 2019; Lindvig & Ulriksen, 2020; Solis, 2023; Jornet et al., 2024). These approaches allow disciplinary education to transform from isolated activities into interconnected, interactive and integrative processes. By structuring the learning activity around a specific issue in need of solutions, rather than a certain disciplinary paradigm, they are prominent interdisciplinary pedagogical methods (Stentoft, 2017). As Krohn (2017: 31) argues, "the problem-solving power of disciplines is strong only with respect to theoretically simplified versions of problems. If complexity is added, interdisciplinarity is needed". This is supported both by Helle et al. (2017) and Vandenhouten et al. (2017) who state that these pedagogies are interdisciplinary in nature as real-life problems transgress disciplinary boundaries. Coming from different disciplinary backgrounds, students are therefore required to integrate their perspectives and collaborate productively with one another in order to produce a solution that responds adequately to the issue.

Much in line with experiential and ecological perspectives of learning, Helle et al., (2017: 294) argue that cases bridge different forms of representations as students are encouraged

to actively “see and feel the reality to which difficult concepts and interactions are related”. Interdisciplinary and interactive practices of case-based learning paint a richer picture of the dynamic and social activity of learning, involving the environment, its participants, processes, and outcomes (Dewey, 1938/1997; Friedow, et al., 2012). Damsa and Jornet (2016: 40) advocate for an ecological perspective of learning, emphasizing that: “(a) learning is not a private, internal process, but involve transactions between people and their socio-material environment, in which both people and environments are transformed; and (b) learning involves not only intellectual dimensions, but also practical and affective ones.” Introducing a case in familiar contexts can significantly enhance the understanding of new and unfamiliar elements. Recognizable patterns and elements in the known context serve as bridges, allowing individuals to observe, interpret, and deal with the unknown, which, as mentioned initially, is an important interdisciplinary skill. Further, it provides expanded views and in connections with subject matters (Blumenfeld, et al., 1991). Kraicik and Blumenfeld (2005: 318) agreeingly suggest that “students gain a deeper understanding of material when they actively construct their understanding by working with and using ideas”. Connectedly, Krohn (2017) argues that an interdisciplinary case requires recognizing the unique aspects of each case while identifying patterns and similarities across several cases. This demands both disciplinary depth and interdisciplinary breadth, as well as qualitative and quantitative approaches. He further claims that interdisciplinary cases challenge some common core values, stating that “[r]eal problems are problems because values are at stake. Solutions are only accepted if they address these values” (Krohn 2010, p. 35). Relating cases to central values can stimulate engagement and active participation in learning activities that ask the students to find solutions to the given issue. This way, teaching and learning interdisciplinarity can be experienced as purposeful for the real-world issue, rather than an education constructed for the sake of interdisciplinarity (Helle et al., 2006). In these learning situations, students can practice *applying* their disciplines competently, ethically, and *interactively* with each other.

### 3. The Interdisciplinary Workshops

When designing interdisciplinary education, certain key elements are important to take into consideration, like the choice of interdisciplinary problems, the level of interaction between the disciplines and constructive alignment (Klaassen, 2018). This section will elaborate on some of these choices of theoretical and pedagogical tools in the planning as well as execution of the Interdisciplinary Workshops. Since the establishment of the center, INTED has arranged two workshops, the first one in the fall semester of 2023 and the second one the following spring semester of 2024. The concepts driving the workshops were primarily inspired by Krohn's perspectives (2010; 2017), as well as the extensive contributions of acknowledged researchers discussed in the previous section. In the fall of 2023, the first workshop was arranged with the topic of ‘sustainability in fashion industry’ (INTED, 2023). One of the core learning goals of this workshop was to explore and develop system thinking, meaning to understand the various dynamics and forces, their interplay and consequences. As a pilot project, this workshop provided important lessons for further development of Interdisciplinary Workshops. As illustrated by Dooley and Skinner (1977), the educator’s level of instruction is a delicate balance that must be tailored to the specific educational context. Based on our experiences from the pilot workshop, it became evident that there was a need to further concretize the case, as well as clarifying expectations through a guiding task

description. Asking the participants to ‘produce a specific outcome that can be presented’ aids them in planning and setting purposeful goals while minimizing instruction or control over their process (Laursen & O’Rourke, 2019; Barrett, 2019). Consequently, for our subsequent workshop, we framed the case more clearly and provided the following task description: ‘Develop something that can be conveyed in accordance with the criteria that it must be 1) realistic, 2) responsive to the case, 3) engaging, and 4) interdisciplinary’.

The workshop ‘Oslo Fjord’ was conducted in spring of 2024. With the task description above, ‘improving the state of the Oslo Fjord’ was added to the second point. Several factors make the Oslo fjord a relevant interdisciplinary case that requires perspectives and expertise from both scientific, social, and ethical fields. The Oslo fjord is an extremely complex and intricate ecosystem that supports a diversity of life both above and below water, including humans. The fjord is therefore unique in its local context, distinctive characteristics, and the composition of influencing forces. Simultaneously, the challenges facing the Oslo fjord are connected to a larger global context, namely human exploitation of the oceans, marine life, nature, and climate. In light of the 14th Sustainable Development Goal, Life Below Water (UN, 2023), the Oslo fjord stands as one of Norway’s local representatives of serious marine-related sustainability crises. There is a growing recognition of the severity of these challenges, and various measures have been and are being implemented. However, there are a variety of needs, interests, and values that must be considered. This underscores the complexity of the case and, consequently, the need for interdisciplinary approaches. Natural sciences shed light on the physical, chemical, and biological aspects of ecosystem functions. Social sciences, on the other hand, can focus on the political, social, economic, legal, and cultural forces that may be both causes and solutions to these challenges. Finally, an ethical and philosophical perspective will be essential for asking moral questions about our values, attitudes, and actions. Thus, the case itself is both complex and challenging but also something near and tangible that one can relate to, experience, feel, *and* learn from in practice (INTED, 2024).

#### **4. Pedagogical Methods, Design and Planning**

The specific case was presented as ‘unfolding cases’, where new information is introduced each day. The objectives for the first day were to 1) present and establish the purpose of the workshop, and 2) define the problem of the case. The topic of the workshop was introduced in a comprehensive manner through visual presentations, a documentary, and explorative conversations, to allow all participants to familiarize themselves with the issues at hand. The second day, we invite ‘experts’ from either academia or the business world to give short lectures on the topic from their point of view. In the Oslo Fjord workshops, two PhD students, one from social sciences and one from biology, presented their projects which in different ways addressed the environmental state of the Oslo Fjord. Moreover, to the extent that it is feasible, participants are brought out of the university to a site where the case can be experienced directly. In the Oslofjord workshop, participants were taken downtown to the Oslofjord to meet and work with a non-profit cleanup organization. By first, and gradually, presenting the problem of the case before the students are engaged in an active problem-solving activity, INTEDs workshops align with Cörvers’ et al. (2016) hybrid between problem-based learning and project-based learning (see Figure 1).

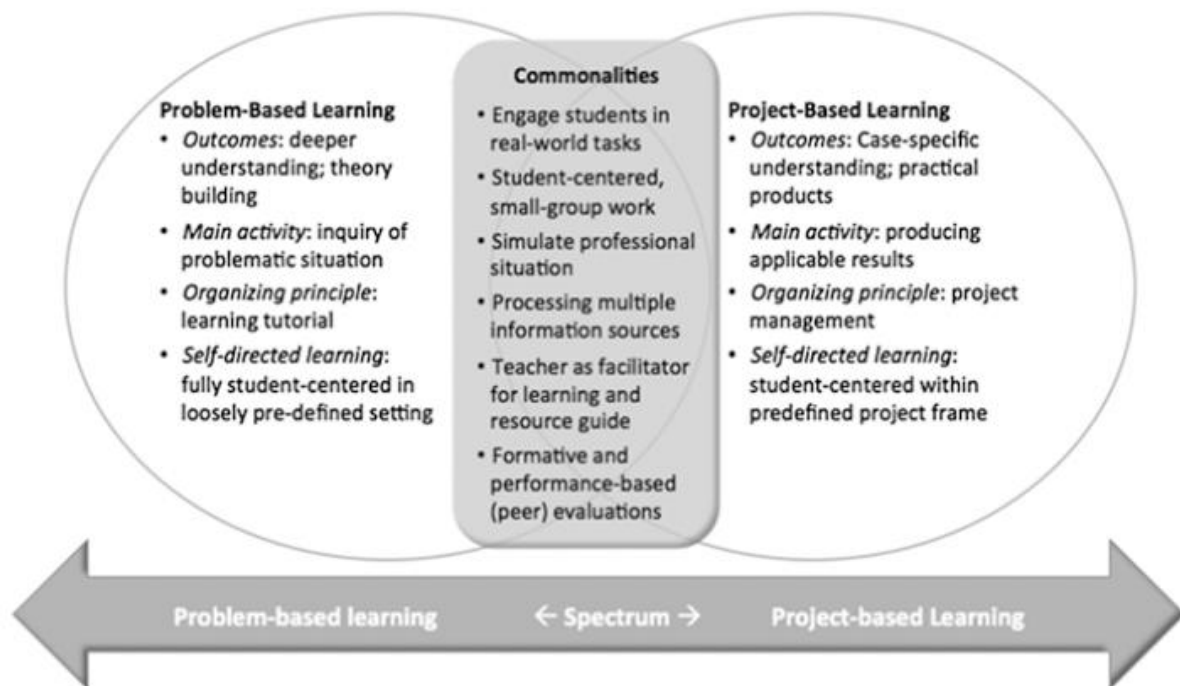


Figure 1. Commonalities and differences between problem-based learning and project-based learning (Brundiers and Wiek 2013 in Cörvers et al., 2016)

Boix Mansilla and Duraising (2007) emphasize the importance of 'integrative framing devices', both in aiding and assessing students' integrative processes. The authors describe these devices as "conceptual frameworks, graphic representations, models, metaphors, complex explanations, or solutions that result in more complex, effective, empirically grounded, or comprehensive accounts or products". Both the documentary, presentations and interactions with on-site stakeholders contributed to broader and more in-depth understanding of the complexity and entanglement of the case at hand. To further guide the students' process, we introduced the method brainwriting and Repko's (2008) stepwise model for interdisciplinary research processes. This model serves as a useful tool for guiding interdisciplinary group work from defining a complex problem to developing an interdisciplinary solution. Argued by Barrett et al. (2019), such scaffolding ensured more success in both design and outcome of interdisciplinary education.

### **Repko's (2008) steps**

1. Define the problem.
2. Explain why solving this problem requires an interdisciplinary approach.
3. Identify the possible contributions of the various disciplines.
4. Conduct a literature review.
5. Identify the differences and similarities between the various disciplinary understandings.
6. Create a common ground.
7. Integrate the different understandings and draw conclusions.

Moreover, creating safe and encouraging learning environments is especially crucial in interdisciplinary groups where the participants have little to no previous experience of working with people with other disciplinary backgrounds, research methods and approaches or ways of knowing. There are many moments where misunderstandings or disagreements can lead to a discouraging or negative atmosphere. Therefore, we put emphasis on a set of ground rules titled 'Brainstorming rules', outlined by Transition Makers<sup>2</sup>.

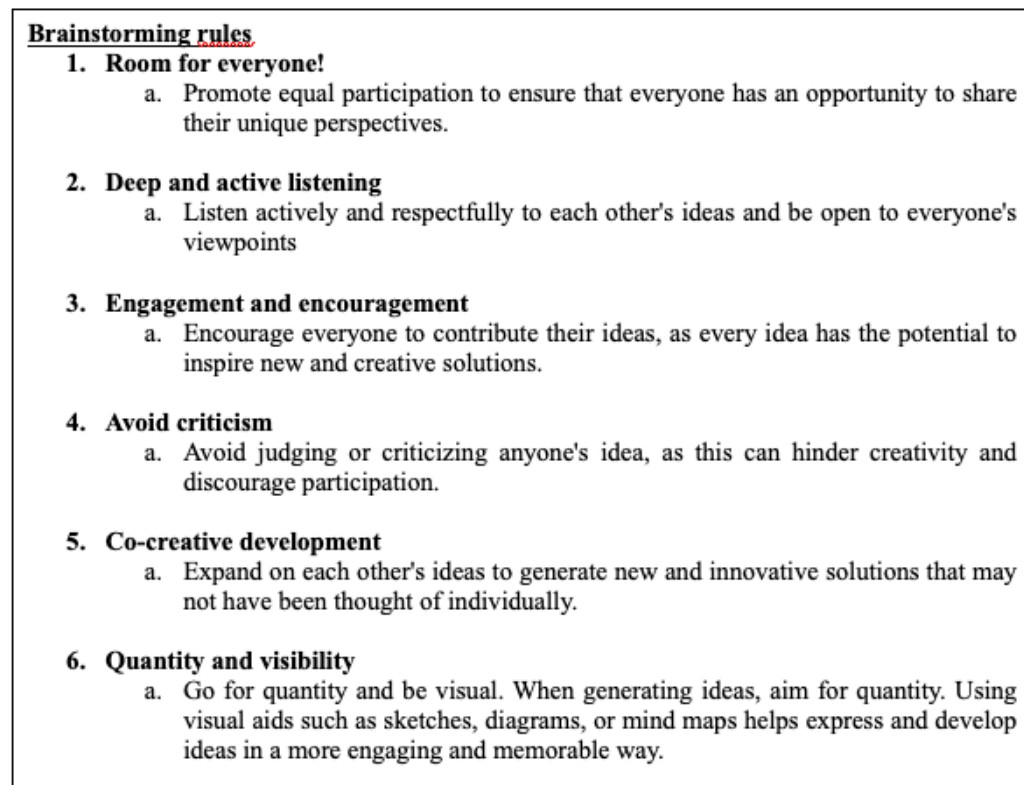


Figure 2. Rules for Brainstorming. (Transition Makers, n.d.)

Another valuable tool from Transition Makers that was tested was the method of Brainwriting (Transition Makers, n.d.). This was an effective way to initiate an active and collaborative process of brainstorming ideas, while at the same time breaking the ice among the participants. The students begin with a 5-minute individual brainstorming, where they write down three ideas on Post-its. These notes are then passed around for others to add elaborations, until everyone has contributed to each idea. This is followed by a group discussion to narrow down and select the most promising ideas. The traffic light method can be used at this stage, where students mark the ideas with green, yellow, or red stickers. The group gathers the ideas with the greenest marks and discusses which should be explored further or possibilities of combining different ideas. Ultimately, the group should arrive at a final idea. Concluding reflections and feedback, both individually and collectively, enhance the learning outcomes from the activity for both participants and facilitators.

*Students' group work*

In smaller groups of three to five, the students worked together on the task of 'develop something that could be conveyed with the criteria that it should be 1) realistic, 2) improve the environment/conditions/relate to the case, 3) activating, and 4) interdisciplinary'.

One group developed the idea of an interactive digital map of challenges related to the Oslo Fjord, connected to existing or potential solutions, expert knowledge, and knowledge gaps. The intention is for the map to evolve constantly with added knowledge and connections. The group addressed the lack of awareness of the deep entanglement of environmental issues. As part of a solution, the group envisioned this map to be designed for different levels to meet different target groups – both researchers, politicians, and the general population.

The second group wanted to address enhance awareness of who has relations to and influence on the Oslo Fjord. They wanted to move away from a perspective of the fjord's declining health being an 'Oslo problem'. To create a sense of belonging to the fjord, the group proposed to arrange a decentralized festival. The students recognized a total of 118 municipalities that have influence on the Oslo Fjord and that there are already political incentives for these municipalities to implement measures to improve the environmental condition of the Oslo Fjord. By naming the festival "Festivalen Folke-fjorden" (The People's Fjord Festival), they aimed to promote a broader sense of belonging and positive relationships with the Oslo Fjord.

## 5. Concluding Remarks

*Exploring disciplinary perspectives*

Students' reflections from the workshop provides insightful and positive feedback to our experimental research on interdisciplinary education. The students expressed that working interdisciplinary was both instructive, engaging, and challenging. They particularly enjoyed learning about each other's disciplines and their viewpoints of the case and found it useful to describe their own. Facilitating a space for Honours students, as well as students in other programs, to participate in collaborative academic activities allow students of all levels to both learn from and with others, to gain deeper understanding of their own discipline and its relation to other disciplines in a real-world context. Students gain valuable experience in explaining both their academic field, as well as their arguments and viewpoints in the group work, to others outside of their discipline and to students at different levels. Students' reflections indicate gaining deeper understandings of both their own and others' knowledge, which contributes to interdisciplinary comprehension. However, understanding and applying one's discipline within an unfamiliar context can be challenging. This underscores the importance of facilitators' preparation to meet and guide the students within the group. A few students in the Oslo Fjord Workshop struggled to see how they or their disciplines could contribute to the case. In this situation, the facilitators aided the students, either by providing helpful disciplinary materials to illustrate possible angles of their disciplines or by helping the students identify their personal skills and competences, rather than the ideals of their discipline. Through such guidance, along with group discussions and collaborations, the students reported increased feelings of usefulness and relevance of their discipline.

The short time span of the workshop, the setting of case-based group projects, as well as a clear requirement of an interdisciplinary product, forced students to work interactively and integrated, rather than in parallel. Although the students found it challenging, they also described the process as fun and educational. Changing the scenery and bringing the students outside of the university also provided a helpful dynamic. One student explained how they particularly liked the excursion as it made it easier to become acquainted with one another within the group, which again helped in solving the task together afterwards. Students in general described the learning environment as open and friendly, that there was room for everyone, and each person had something to contribute. As widely supported in research, learning together in group work can provide better experiences with learning and studying. Especially after covid, students have increasingly reported experiencing isolation and loneliness (Nes et al., 2020; Phillips et al., 2022). Inclusive, interactive and collaborative workshops can therefore play an important role in stimulating social and personal wellbeing. Additionally, learning physically on campus with both the built environment of the university, other students and academics, can contribute to building university culture and students' feelings of belonging. As mentioned, introducing cases with issues and dilemmas from the real world can contribute to building bridges between the university and the world it is a part of, thus further actualizing the educational content students learn. Together, these elements can stimulate motivation and drive to engage in, rather than shy away from, interdisciplinary and academically challenging situations and issues. As previously mentioned, Honours programs typically attract highly talented and ambitious students, thus enabling a prime opportunity to leverage these qualities to further cultivate and encourage students' agency through interdisciplinary pedagogies.

### *Assessment*

Although the challenge of assessing interdisciplinary competence is still an ambiguous and unresolved task, some scholars have proposed guiding models and schemas (Boix Mansilla & Duraising, 2007; Lattuca, 2012; Schijf et al., 2022; Sonnenberg-Klein & Coyle, 2024). These frameworks have guided our formulation of learning outcomes and goals.

In the planning process of the workshop, we used 'constructive alignment' to ensure that methods, activities and procedures supported our objectives and the interaction between the disciplinary different students (Biggs & Tang, 2011).

*Table 1. Descriptions of Learning outcomes and assessment.*

<b>Learning Outcome</b>	<b>Assessment</b>
1: Integrate your expertise with other disciplines	Do they build on each other's ideas?
2: Translate from theory to practice	Do they use their disciplinary competence to analyze current issues?
3: Utilize methods to solve current issues	Do they approach the issue systematically and methodically?

For each learning outcome description, we defined several specific learning goals (Appendix 1) which were implemented through activities related to the presented case (Appendix 2). To

assess students' achievement of these goals, we carefully monitored their ability to work interdisciplinary within their groups and their development of interdisciplinary competence. This evaluation was further supported by analyzing questionnaires and reflection notes completed by the students at the end of each day.

Nevertheless, development and embodiment of interdisciplinary skills cannot be measured from participation in one single interdisciplinary activity. Rather, the purpose of these workshops is to experiment with interdisciplinary pedagogies that could foster such skills if implemented in courses and programs. We evaluated whether the students achieved the learning goals based on observation of their work, dialogue with the students, and analysis of their reflections and feedback. Based on this evaluation, we discussed and agreed on the utility and potency of the pedagogical methods.

### *Methods*

As stated, the design and framing of the workshops ought to be adjusted to the topic at hand. When made into a case for learning purposes, each specific wicked problem raises different demands in terms of approach, compositions of interdisciplinary collaborations between and satisfactory end result or response. Based on the students' feedback and the flow of the process during the Oslo Fjord workshop, Repko's (2008) steps worked well as a guiding tool to facilitate the interdisciplinary group work, both for the organizers and for the participating students. The steps provided purpose and direction through the various phases of the collaboration. The brainwriting method was also particularly useful in situations and stages where the students expressed a need for support in finding common ground and passages for integration between the disciplines. The composition of the represented academic disciplines among the students also determines what is needed in terms of framing and presentation of the topic, instruction and guidance, information and other resources. In the Oslo Fjord workshop, none of the students had a disciplinary background in the natural scientific field. This could have added another dimension and dynamic to the group work. Nevertheless, this was not crucial for the purpose of having the students practice interdisciplinary collaboration and learning to apply their respective disciplines in a real-world context. Furthermore, the natural scientific perspective was satisfactorily covered in the lectures by the PhD students.

### *Further implications*

Though highly acknowledged, interdisciplinary education and teaching is still uncommon practice among most universities and academic educators. Therefore, more empirical and practical research, along with experiments involving interdisciplinary pedagogies and educational methods like workshops, are crucial. Interdisciplinary project-based learning is valuable for both students and educators. These co-creative processes are designed to be purposefully engaged in the real-world, allowing participants to practice taking accountability and responding to existing demands and pressures. As stated initially, unprecedented and unforeseeable challenges worldwide change what skills and competences are viewed as valuable and necessary in the 21<sup>st</sup> century. These skills are both theoretical and practical, social and personal, cognitive and emotional, logical and creative. Interdisciplinary project-based learning creates a learning platform where participants from different disciplines and ways of doing can learn these skills with and from one another, thereby also enhancing the transferability of practiced skills. As a collaborative exploration of

unfolding cases, neither learners nor educators can predict what emerges throughout the process. Educators are trained in leadership and flexibility, ensuring constant relevancy of higher education. Thus, while maintaining different roles, both students and educators develop and embody a multifaceted praxis through their participation in these co-creative processes.

There is no single right way of conducting interdisciplinary education, but rather ample examples and guidelines to gather inspiration from. The Workshops arranged at UiO by INTED have been especially educational in terms of gaining understanding of the Norwegian context, for instance in terms of institutional structures and systems, socio-cultural factors, student body, and status quo of interdisciplinarity at the university. Yet, to ensure longevity and broader integration of interdisciplinarity within higher education institutions, as well as students' acquisition of interdisciplinary skills through education, these methods need to be systematically implemented in university courses and programs. This raises more and higher demands of collaborative interdisciplinary processes within and across all university levels, involving both academics, faculty leaders, administrative employees, and other educational staff. Interdisciplinary education is both a structural and pedagogical challenge at traditional universities. Hopefully, however, through increasing experiences, engagement, and efforts, higher education can enact the necessary measures to generate interdisciplinary transformations.

### Endnotes

<sup>1</sup> These pedagogical approaches are often referred to and discussed interchangeably and are not always easy to differentiate. Dahl & Alami (2023) discuss this matter in their paper on interdisciplinary teaching methods, portraying differences between project-based and problem-based learning. While avoiding differentiating between the approaches, this article will refer to them as case-based learning.

<sup>2</sup> Transition Makers Toolbox. <https://tijdelijk.transitionmakers.nl/>

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## Appendix A.

Table 2.1 Learning Outcome 1 with learning goals.

Learning outcome:	Integrate your expertise with other disciplines
Assessment	Do they build on each other's ideas?
Learning goals	A: That they collaborate to find problem statement (integrate)
	B: That they communicate with respect and intention of understanding (active listening)
	C: That they <u>include</u> each other and <u>wait</u> their turn (attitudes)
	D: That they <u>develop</u> resilience to the process and multiple iterations (integration according to Krohn, 2017)

Table 2.2 Learning Outcome 2 with learning goals.

Learning outcome:	Translate from theory to practice
Assessment	Do they use their disciplinary competence to analyze current issues?
Learning goals	A: That they <u>raise</u> perspectives from their discipline
	B: That they <u>examine</u> relevant sources and literature from their discipline
	C: That they <u>recognize</u> theory in practice
	D: That they <u>familiarize themselves</u> with the challenges of the case

Table 2.3 Learning Outcome 3 with learning goals.

Learning outcome:	Utilize methods to solve current issues
Assessment	Do they approach the issue systematically and methodically?
Learning goals	A: That they <u>create</u> /follow a plan for how to proceed with the 'task/case' (the method either provided by us or one they find themselves)
	B: That they <u>reflect</u> on the purpose of the plan and how it worked

## Appendix B. Learning Goals with Supporting Activities

Learning goal 1	Activity	Instruction for students	Preparation for teacher
A: That they collaborate to find problem statement (Integrate)	Sit together to define what the problem statement should be? <del>Brainwriting?</del>	Present rules for collaboration	Introduction to interdisciplinary collaboration, presentation of rules that will support the collaboration. This can be done through an ice breaker, first by finding a solution without rules (everyone gets a task and works against each other - afterwards introduce the rules)
B: That they communicate with respect and intention of understanding (active listening)	In the various situations where they <del>have to</del> speak, they follow rules	#	<del>Opportunities for group discussions.</del>
C: That they <u>include</u> each other and <u>wait</u> their turn ( <u>attitudes</u> )	In the various situations where they <del>have to</del> speak and follow rules	#	<del>Opportunities for group discussions.</del>
D: That they <u>develop</u> resilience to the process and multiple iterations (integration according to Krohn, 2017)	<del>Throughout all the activities.</del>	#	Facilitator presents the integration process iterations which can be lengthy and inefficient (until a common language is established).  But it is here that innovation occurs/the new solutions that break barriers.
Learning goal 2	Activity	Instruction for students	Preparation for teacher
A: That they <u>raise</u> perspectives from their discipline	Introduce them to the case through: - video - mini- <del>lectures</del>	Understand the challenge of the case	Introduce them to case, video/data equipment, lectures, prepare materials.
B: That they <u>examine</u> relevant sources and literature from their discipline	Use knowledge from one's own discipline to explain or support one's thoughts.	In order around the room, each student explains what they are studying and what that discipline involves. When they begin to discuss, they should distinguish between their own perspective and what they believe their discipline might highlight.	Facilitate a round where everyone gets the opportunity to talk about their discipline.  Listen during <del>group discussions.</del>
C: That they <u>recognize</u> theory in practice	The students must <del>find</del> relevant literature from <del>on</del> <u>their</u> own discipline.	Investigate where they feel it may be relevant to themselves.	Time to explore on their own.  Observe whether the students <u>are able to</u> explain more from their own discipline before and after they have investigated.
D: That they <u>familiarize themselves</u> with the challenges of the case	The case in practice, where can we identify theory?	Use transition tools to aid the connection between theory to practice?	Should we introduce a simple concept to raise awareness of the theory/practice divide?
Learning goal 3	Activity	Instruction for students	Preparation for teacher
A: That they <u>create</u> /follow a plan for how to proceed with the 'task/case' (the method either provided by us or one they find themselves)	That they find a "solution" by following Repko's steps?	Introduce <del>Repko's model</del>	Show students the model that facilitates interdisciplinary problem solving
B: That they <u>reflect</u> on the purpose of the plan and how it worked	<del>Answer reflection</del> survey	Group discussion, reflection notes	Prepare and send out reflection note