CBL Challenge Evaluation Rubric

Introduction

This rubric provides a systematic approach to evaluate the suitability and quality of challenges intended for Challenge-Based Learning (CBL) courses and activities, while helping to reflect on how multi-, inter-or transdisciplinary the challenge might be. It enables alignment with CBL principles, supporting teachers and course designers in refining their challenges.

Please be aware: While the scoring can provide valuable insights, it is prone to subjectivity and should be complemented by expert consultation where needed.

With the rubric, you can evaluate challenges across five important CBL components (adapted from Van den Beemt, et al., 2022). Scores guide categorization into three levels of alignment:

- **Strong Alignment (21–30 points):** Recommended for inclusion.
- **Moderate Alignment (11–20 points):** Requires adjustments or guidance.
- **Limited Alignment (0–10 points):** Not recommended without significant revisions.

The rubric can be used iteratively, refining challenges to achieve stronger alignment over time. If desired innovation Space experts from the Business Collaboration (business.innospace@tue.nl) and/or Education Cluster (education.innospace@tue.nl) can provide tailored support to collect challenges or redesign your education.

No-go criteria

Please consult the right ground rules for TU/e cooperation with industry to ensure compliance with institutional policies and responsible collaboration practices.

In this rubric, a no-go criterion is the authenticity of the challenge, if challenge is not grounded in a real-world problem, renders the challenge unsuitable for Challenge-based Learning.

If refinement is not feasible, these challenges might be better suited for other teaching methodologies.

Reference

Van Den Beemt, A., Van de Watering, G., & Bots, M. (2022). Conceptualising variety in challenge-based learning in higher education: the CBL-compass. *European Journal Of Engineering Education*, 48(1), 24–41. https://doi.org/10.1080/03043797.2022.2078181

Scoring Components

Authenticity and impact

Score	Description
0–1	The challenge is theoretical or abstract, with little to no real-world application or societal relevance. There is no clear connection to ongoing societal, technological, or environmental issues, nor sustainable development goals.
2–3	The challenge shows connection to real-world applications but lacks societal urgency.
4–5	The challenge is grounded in an urgent, meaningful societal need. It presents a real-world context in collaboration with stakeholders, making the learning experience highly authentic.

Disciplinarity

Score	Description
0–1	The challenge is framed from a single disciplinary perspective, requiring little to no engagement with other disciplines; i.e. the challenge can be solved by a monodisciplinary group.
2–3	The challenge includes multiple disciplines in a parallel manner. The different disciplines are not required to integrate various perspectives. The required disciplines and their specific roles in addressing the challenge are clearly defined.
4–5	The challenge demands inter- or/and transdisciplinary collaboration. Students must actively integrate knowledge, expertise, and insights from various disciplines and non-academic sources to generate innovative solutions.

Complexity

Score	Description
0–1	The challenge is straightforward and linear, requiring minimal analysis or exploration. No consideration of systemic interrelations or trade-offs is needed.
2–3	The challenge presents moderate complexity, involving a few interacting elements or dependencies. There is a need for limited systemic thinking, such as considering multiple factors or constraints without deeply integrated decision-making.
4–5	The challenge is highly complex and non-linear, requiring systems thinking, balancing competing factors, and managing feedback loops. Students must analyze how variables influence each other across different domains and navigate uncertainties through iterative reasoning.

Open-endedness & Freedom of Inquiry

Score	Description
0–1	The challenge has a narrow, closed scope with a predetermined problem statement and solution path. Students have little to no opportunity to interpret the problem or make autonomous decisions.
2–3	The challenge allows limited autonomy. While the problem and outcomes are mostly predefined, students can make decisions in methods or framing. Exploration is possible but remains within set boundaries.
4–5	The challenge encourages full ownership and exploration. Students have the freedom to define the problem within the larger challenge, identify sub-problems, and tailor their inquiry paths. The open-ended framing supports diverse interpretations and encourages innovation, creativity, and strategic thinking at a systems level.

Stakeholder involvement

Score	Description
0–1	The challenge requires no involvement of additional stakeholders. It is developed and explored entirely from a single perspective, without additional collaboration or support.
2–3	Some additional stakeholder involvement is present, such as offering initial input or feedback at a single stage. Although support will be provided, engagement will be limited, infrequent, or non-essential.
4–5	The challenge allows co-creation and involvement of multiple, diverse external stakeholders. It requires ongoing collaboration and co-learning, with stakeholders contributing throughout the process, offering feedback and insights.

Challenge Framing – Disciplinarity

Score	Description
0–1	The challenge is framed from a single disciplinary perspective, requiring little to no engagement with other disciplines; i.e. the challenge can be solved by a monodisciplinary group.
2–3	The challenge includes multiple disciplines in a parallel manner. The different disciplines are not required to integrate various perspectives. The required disciplines and their specific roles in addressing the challenge are clearly defined.
4–5	The challenge demands inter- or transdisciplinary collaboration. Students must actively integrate knowledge, expertise, and insights from various disciplines and non-academic sources to generate innovative solutions.

Mono-Disciplinary The challenge is framed as a problem from a single disciplinary perspective, requiring little to no engagement with other disciplines. The problem can be solved by a monodisciplinary group.

Multi-disciplinary The challenge is still framed as a problem addressing multiple disciplines. The disciplines work in parallel, and no integration of disciplinary knowledge is required. A solution to the problem is part of the expected outcome.

Interdisciplinary The challenge demands collaboration of several disciplines and active integration of knowledge by the students. The outcome still involves an expected solution. Non-academic actors, if involved, give direction to the students and guide them toward the solution.

Transdisciplinary The challenge is framed as a shared societal issue and as a co-creative process involving students, academics, and non-academic actors as equal partners. The focus is on joint problem framing and mutual learning rather than arriving at a predefined solution. The process is non-hierarchical and open-ended, allowing stakeholders to collectively scope, redefine, and shape both the problem and potential pathways forward.

Time allocation example in a one quartile course:

Multi-disciplinary education

Interdisciplinary education

Transdisciplinary education

	Understanding the problem/challenge (diverging phase)
	Framing/scoping the problem/challenge (converging phase)
	Integration of knowledge
	Elaborating a research question (how may we question) guiding the solution
	Developing a solution (diverging phase)
	Developing a solution (converging phase)

I, T, TT and OT shaped engineers

Shape	Format	Description
I	**Multi-disciplinary**	Challenge is framed in a way that leaves space for contribution from individual disciplines. Engineers working on this challenge get a chance to further develop their disciplinary competencies irrespective of the other disciplines.
T, TT	**Interdisciplinary**	Challenge is framed in a way that the integration of knowledge is required to understand it and develop a solution. Own disciplinary knowledge of the student is further developed in relation to the other disciplines. Broader, transversal knowledge is also added.
OT	**Transdisciplinary**	Challenge framing is dependent on the broader societal context. Its understanding requires a broader recognition and acknowledgement of the systems that surround the challenge, and the complex interactions across systems. Students working on this challenge further develop their disciplinary knowledge in relation to other discipline, and are able to further contextualize it in the broader societal context. *Ref: OT-shape (Koretsky & Wieczorek, 2026)*