ENVIHEI

Title of the PBL challenge:
How can we improve the functioning and sustainable development of the academic environment?

Name of the responsible lecturer

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University / Department / Degree program

Silesian University of Technology / Department of Management / Master's Degree in Project Management

Course / Subject in which implemented

1st Course / Managing the Project Team

Implementation period (dates)

March 4, 2026 – April 22, 2026

Total duration (weeks/hours)

7 weeks / 15 hours

Number of students involved

13 students

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1. Project Design

1.1 Brief description of the project and the challenge proposed

The project was carried out as part of the 'Project Team Management' module on the Master's degree programme in Management. Thirteen students, working in four teams, took part in the pilot. Each team tackled a separate challenge relating to the academic environment: improving attendance at student events, improving the parking situation around the faculty, improving the integration of first-year students, and encouraging students to use bicycles or public transport.

The aim of the project was not only to propose a solution to the selected problem, but also to go through the process of planning and implementing a project as a team, taking into account the principles of cooperation, division of roles, communication, motivation, decision-making, responding to changes and conflicts, and linking the project to sustainable development. Teams were formed after the students had completed 'Project Personality Cards' and identified their preferences regarding team roles. On this basis, leaders were selected, who then chose their team members, taking into account their preferences regarding the roles they wished to fulfil. Teams could choose a problem from a list proposed by the teacher or suggest their own problem to be solved.

1.2 Expected learning outcomes (academic and transversal competences)

The intended learning outcomes included the development of the following skills:

- Selecting the structure and composition of a project team, defining the required competences and allocating responsibilities and tasks within the team.

- Developing a communication plan and selecting methods to motivate team members.
- Teamwork, providing feedback and resolving conflicts.

Another key element was raising awareness of sustainable development by identifying links between the projects undertaken and the Sustainable Development Goals (SDGs), and taking into account the social, ethical and environmental aspects of the proposed solutions.

Furthermore, PBL was used to develop cross-cutting competences: problem analysis, reasoning and decision-making, work planning, adapting to change, communication, reflection on one's own role within the team, and presenting project results.

1.3 Targeted sustainability competences

The project developed competences related to sustainable development by making it compulsory to link each project to the relevant Sustainable Development Goals (SDGs) and to analyse the social, ethical and environmental risks of the project. Students were required to identify how the proposed solution could support the achievement of selected SDGs and to take the stakeholders' perspective into account. Project topics addressed real-world issues within the academic environment, including social inclusion and sustainable mobility.

1.4 Sustainability approach and how it is integrated into the project

Sustainable development was directly integrated into the project process. In the collaboration contract, students defined the problem and objectives of the project, identified the project's link to the SDGs, prepared a Work Breakdown

Structure (WBS) and analysed risks, with particular emphasis on social, ethical and environmental risks. They also carried out a stakeholder analysis. The project's link to the SDGs was subsequently one of the six criteria for the final project assessment.

1.5 Methodologies and tools used (PBL structure, facilitation techniques, etc.)

The primary method was Project-Based Learning (PBL), implemented through a series of individual and team tasks. The course began with an icebreaker task in which the team had to build the tallest tower possible using 10 sheets of paper. The students then prepared an individual 'Project Personality Profile' based on four tools: 16Personalities (MBTI), Belbin's team roles, the Hartman test and the Big Five. They identified their own strengths, areas for development and a possible role within the team.

Once the Project Personality Cards had been completed and preferred roles identified, project teams were formed. The selected leaders chose team members, taking into account their preferences regarding team roles. The teams then selected a project problem from a list proposed by the facilitator or put forward their own problem to be solved.

Once a problem had been selected, the teams drew up a comprehensive collaboration contract covering, amongst other things, the team structure, objectives, problem, SDGs, WBS, risks, stakeholders, timetable, roles and responsibilities, rules for reporting, meetings and communication, decision-making, conflict resolution and a motivation plan. Team dynamics were observed during the project work. Simulations of changes and conflicts were also used. In the exercise 'A leader's decision under pressure', the teams were informed that the available time had been halved and had to set priorities, make

a decision and justify it. In the conflict simulation, a selected student raised a previously prepared concern regarding, for example, a solution, the quality of the project, the division of labour or the leader's decision. The team held a discussion, reached a decision and then analysed the communication style, the leader's role and the decision-making process. Short team retrospectives were also used.

1.6 Organization of the project (group formation, timeline, milestones)

The project ran from 4 March to 22 April 2026 and comprised 15 hours. Thirteen students took part, divided into four teams. The schedule was as follows:

- 4 March 2026 – introduction to the course, discussion of requirements and assessment criteria; team-building exercise for students: building the tallest tower from 10 sheets of paper.
- 11 March 2026 – identifying preferred roles and forming teams: (1) completing an individual 'Project Personality Profile' based on personality and team role tests, (2) selecting team leaders who chose team members taking into account previously identified preferences.
- 18 March and 25 March 2026 – selecting a problem from a list proposed by the facilitator or proposing one's own problem to be solved; drawing up a collaboration agreement and defining and planning the project, including drawing up a timetable and setting milestones.
- 25 March 2026 – 15 April 2026 – teams worked on solving the chosen problem; during this work, simulations of changes to the task conditions and conflicts were also carried out.
- 22 April 2026 – presentation of the teams' results.

Milestones:

1. Each student in the group specified their preferred role within the team.

2. Team composition finalised
3. Problem selected for resolution
4. A collaboration agreement drawn up, and the project defined and planned
5. A solution to the project problem developed and justified
6. A final project presentation prepared
7. Presentation delivered

1.7 Deliverables requested from students (type, format, deadlines)

Students prepared the deliverables in stages:

1. A 'project personality profile', containing test results and interpretations, a personality map, strengths, areas for development and a reflection on a possible role within the team – format: .doc; deadline: 11 March 2026.
2. Collaboration agreement and project definition and plan (covering, amongst other things: team composition and structure, roles and required competencies, objectives and success metrics, a precise formulation of the problem, links to the SDGs, WBS, risk and stakeholder analysis, timetable, responsibility matrix, rules for reporting and knowledge archiving, organisation of meetings, communication standards and plan, decision-making and conflict resolution procedures, accountability rules, equity and inclusion issues, and an incentive plan) – format: .doc; deadline: 25 March 2026.
3. Worksheet: changes to the project – format: doc or pdf, deadline: 1 April 2026.
4. Worksheet: conflict within the project – format: doc or pdf, deadline: 15 April 2026.

5. Presentation of a solution to the selected problem – format: PDF or PPTX, deadline: 22 April 2026 and additionally (but not mandatory): programme prototypes/simulations – deadline: 22 April 2026.

1.8 External collaborators involved (mentors, companies, experts...) and their role

No external company, mentor or expert was formally involved in the pilot project. The projects addressed real-world problems within the academic community and were carried out as part of the course under the supervision of the lecturer.

2. Project Evaluation

2.1 Assessment criteria and methods used

The project was assessed using an evaluation form comprising six criteria, scored on a scale of 1–5 points (maximum 30 points). The following were assessed: (1) the approach to solving the problem – the quality of the analysis and the search for a solution; (2) the project management process – the quality of the contract, the project plan, progress monitoring and the adjustment of activities; (3) the project's link to the SDGs; (4) the quality and usefulness of the proposed solution; (5) the quality of the project presentation; (6) teamwork and learning within the team. The evaluation therefore took into account both the final outcome and the team's working process (see evaluation rubric here).

2.2 Evidence of student learning (examples, outputs, results)

Evidence of learning was provided by the materials produced at successive stages of the work: (1) individual Project Personality Profiles, (2) team collaboration agreements, problem and objective definitions, links to the SDGs, WBS, risk and stakeholder analyses, timetables, allocation of roles and

responsibilities, and communication and motivation plans; and (3) developed problem-solving strategies presented in the form of presentations. An additional source of observation of the learning process was the teams' reactions to simulated changes and conflicts: the need to reprioritise, to argue their case, to make decisions, and to reflect on leadership and communication. The final evidence was the presentations of solutions delivered on 22 April 2026. The assessment of the learning outcomes achieved by each teams is detailed in Table 1.

Table 1. Assessment of the learning outcomes achieved by each team according to six evaluation criteria.

Criterion	Group A	Group B	Group C	Group D
1. Approach to solving the problem	3	5	5	4
2. The project management process	5	4	3.5	5
3. Linking the project to the SDGs	2	5	5	5
4. Quality of the solution and its usefulness	5	3.5	2.5	4
5. Quality of the project presentation	4	4.5	4	3.5
6. Teamwork and learning within the team	5	4	3	3.5
TOTAL:	24/30	26/30	23/30	25/30

The teams' work was assessed on the basis of six criteria covering both the quality of the solution developed and the course of the design process, the project's link to the SDGs, the solution's usability, the quality of the presentation, and teamwork and learning within the team. Each criterion was assessed on a scale of 1 to 5 points, resulting in a maximum total of 30 points.

The final scores for the teams were as follows: Team A – 24/30 points (80 per cent), Team B – 26/30 points (86.7 per cent), Team C – 23/30 points (76.7 per cent) and Team D – 25/30 points (83.3 per cent). These results, analysed in conjunction with the project materials prepared by the students and observations of their work during the sessions, provided measurable evidence of the achievement of the intended learning outcomes. The variation in results across the individual criteria also made it possible to identify areas in which the teams demonstrated varying levels of achievement, including in the areas of project management, teamwork, the project's link to the SDGs, and the quality and usefulness of the proposed solutions.

Table 2. Results of the peer assessment of each project group, including the scores awarded, total position.

Group	Punctuation			**Sum**	**Position**
A	1	1	3	5	2
B	1	2	1	4	1
C	3	3	3	9	3
D	2	2	2	6	2

A complementary element of the assessment was peer assessment (Table 2). Each team assessed the solutions presented by the other three teams. As a result of the peer assessment, Team B was awarded 1st place, Teams A and D with the 2nd place, and Team C with the 3rd place. Peer assessment provided further evidence of learning, as it required students to analyse and compare the

solutions developed by other teams and to evaluate them. The results of the peer assessment complemented the assessment carried out by the tutor

3. Reflections and Recommendations

3.1 Main achievements and strengths of the project

One of the main strengths was the integration of the course content with practical experience of teamwork. Students not only learnt about team management tools but also applied them in their own project: they identified their preferences and roles, established rules for collaboration, planned communication and responsibilities, and worked on a real-world problem within the academic environment. A valuable element was the fact that team formation was preceded by students' self-reflection on their aptitudes and preferred team roles, followed by the use of this information in selecting leaders and team members. It was also important to allow teams to choose a problem from a proposed list or to propose their own problem, which gave students a say in the direction of the project. Furthermore, incorporating the SDGs and social, ethical and environmental risks into the mandatory structure of the project drew the students' attention to the importance and relevance of these issues. Simulations of time pressure and conflict allowed the previously established rules of cooperation to be tested in situations requiring decision-making and adaptation. The final presentation provided a clear conclusion to the entire cycle of work.

3.2 Challenges faced and how they were addressed

A significant challenge was carrying out the full project work process within the limited timeframe of 15 hours. For this reason, the work was divided into successive, clearly defined stages: team building, self-reflection on one's role within the team, the project contract, solution development and the presentation. A key factor supporting the implementation of PBL was the fact

that the same lecturer was simultaneously teaching the module 'Project Environment Management'. This enabled students to apply the knowledge and outcomes developed in that module to the project at hand, in particular the stakeholder analysis they had carried out. Consequently, it was possible to link the content of both modules and apply it practically in the project work.

The second challenge was the transition from project planning to developing a concrete solution to the problem. In previous modules, students had focused primarily on project planning, without the opportunity to move on to the stage of developing and presenting their solution, for example in the form of a mock-up, prototype or pitch. Under the PBL approach, however, the teams had to take their work to a stage where the proposed solution could be presented, justified and assessed in terms of its usefulness and practical applicability.

An additional challenge was moving away from static planning and observing how teams reacted to changing conditions or differences of opinion. This was deliberately introduced through an exercise involving a shortened timeframe and conflict cards. Teams had to reprioritise, discuss the problem and reach a decision. Following the exercises, a discussion and retrospective were held concerning, amongst other things, the decision-making process, the role of the leader, communication, and the changes that needed to be introduced in future work.

3.3 Lessons learned for future implementations

In future editions, it is worth retaining the phased structure of PBL and combining the project with tools relating to team dynamics. It is particularly useful to move from an individual assessment of preferences and roles to the conscious establishment of rules for collaboration in a contract, and then to test these rules during actual project work. It is also worth retaining simulated

changes and conflicts, as they provide an opportunity to observe the decision-making process, leadership and communication, rather than just the final outcome.

In future editions, it would be worth considering giving teams access to a small project budget, which would allow them to purchase the materials needed to develop or test the proposed solution. This would enable the PBL process to be expanded to include a more practical element of project implementation, such as the preparation of a mockup, prototype or other form of demonstration of the solution.

For the next iteration, consideration could also be given to systematically archiving the assessment results based on the six criteria, along with short student retrospectives, so that the final report can include aggregated data on the outcomes of the PBL implementation.

4. Supporting Material

4.1 Lecturers' materials and project documentation

Lecturers' materials and project documentation are available in the following link:
https://drive.google.com/drive/folders/1k998f2N4JdTXXVcwosejQb55LOnz8A8S?usp=drive_link

4.2 Deliverables produced by students, final presentations or pitch materials

An example of deliverables produced by students is available in the following link:
https://drive.google.com/drive/folders/1QQcoZZID84JkY66lY79KiWpAlCTQ18yn?usp=drive_link

The personality test deliverable has been excluded from the folder due to the sensitive personal data contained in the document.

Students' final presentations are available in the following link: https://drive.google.com/drive/folders/1mqBk-ANnYYvYlxAD_xyTJeaHN5BICjcP?usp=drive_link

4.3 Images/videos (with consent)

Photographic and video records were captured with the explicit consent of the participating students, and are available in the following link: https://drive.google.com/drive/folders/1IwSWitKC33-zJvXG9R-pmZsXjbHuUqny?usp=drive_link

4.4 Any other relevant material

All the materials, including this report, are available in the following link: https://drive.google.com/drive/folders/1eNToxyrnHp_dbNtIblSU3qN-_vKJOvAd?usp=drive_link