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Education and Study Concepts at the European University Alliance EURECA-PRO

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Abstract: Education is an essential core task of EURECA-PRO and consists of designing and implementing new study programmes at all levels (Bachelor’s, Master’s, and doctoral), developing new, supplementary modules and promoting innovative teaching methods. While spreading and encouraging excellence in learning and teaching is a fundamental part of all higher education institutions, it is especially important for EURECA-PRO in the development of new programmes, courses, and educational concepts across all partner universities. This development presents an opportunity to cement and enhance excellence in teaching and learning across the alliance and to prioritise students’ educational experience.

Keywords: Responsible Consumption and Production, European Universities, Joint programmes, Student-centred learning, Problem-based learning, Project-based learning, Summer school, Lecture series

Bildung und Studienkonzepte der Europäischen Hochschulallianz EURECA-PRO

Zusammenfassung: Die zentrale Kernaufgabe von EURECA-PRO ist Bildung. Dies beinhaltet neue Studienprogramme für alle Ausbildungsstufen (Bachelor, Master und Promotion) zu konzipieren und umzusetzen, neue Zusatzmodule zu entwickeln und innovative Lehrmethoden zu fördern. Die Förderung von Kompetenzen und deren Verbreitung im Bereich des Lehrens und Lernens ist zwar ein grundlegender Bestandteil von Hochschuleinrichtungen, für EURECA-PRO ist dies jedoch von besonderer Bedeutung, da diese neu entstehenden Programme, Kurse und Bildungskonzepte von allen Partneruniversitäten entwickelt werden. Dies stellt eine Gelegenheit dar, die Qualität des Lehrens und Lernens in der gesamten Allianz zu verbessern und zu fes-

tigen und die Studierenden in den Mittelpunkt ihrer Bildungserfahrung zu stellen.

Schlüsselwörter: Verantwortungsvoller Konsum und verantwortungsvolle Produktion, Europäische Universitäten, Gemeinsame Programme, Studierendenorientiertes Lernen, Problemorientiertes Lernen, Projektorientiertes Lernen, Sommerschule, Vorlesungsreihen

1. Introduction

As a newly established European University, the European University on Responsible Consumption and Production (EURECA-PRO) has a two-fold societal and planetary mission. EURECA-PRO seeks to contribute directly to responsible consumption and production (RCP) in alignment with Sustainable Development Goal (SDG) 12 [1], and to become a global educational hub and interdisciplinary research and innovation leader while transforming the European Higher Education Area (SDG 4).

One of EURECA-PRO’s essential milestones is the development and implementation of RCP study programmes. EURECA-PRO’s mission is to substantially contribute to European higher education while creating future, highly-skilled “RCP professionals”. Through education focused on sustainable consumption and production, teachers and students will be empowered to learn, study, and analyse current patterns, to identify deficiencies, and to develop both systemic and individual solutions.

EURECA-PRO’s mission is being developed within Work Package 2, “Education and Studies” led by one of EURECA-PRO’s partner universities—TU Bergakademie Freiberg (Germany). To date, the following education-based tasks have been included:

- Establishment of European Studies and “Virtual European Faculty” in cooperation with all EURECA-PRO partners as a legal basis for the EURECA-PRO Virtual University Campus. The “Virtual European Faculty” is respon-

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sible for the organisation of study programmes (Bachelor's, Master's, and PhD levels), the monitoring of course quality standards, and assuring the mutual international recognition of study certificates;

- Establishment and implementation of the "BEST RCP Study Programme: Bachelor of European Studies in Sustainable Production and Consumption" to educate high school graduates from a variety of backgrounds for the purpose of acquiring academic knowledge in an interdisciplinary way to create their preferred expert profiles in specific RCP areas;
- Establishment of the "MEST RCP Study Programme: Master of European Studies in Responsible Consumption and Production" based on the individual study tracks and education profiles of EURECA-PRO partner universities (students will either physically or virtually attend courses offered by designated partner universities);
- Development of a PhD Research School with a PhD programme called "Doctoral Degree in Responsible Consumption and Production" for excellent researchers from EURECA-PRO's eight partner universities and other higher education institutions;
- Establishment of "Supplementary European Studies module—SUPPLESt";
- Establishment of UniQuEst (University Quarries for European Studies) Introductory Summer School where students receive an interactive introduction to EURECA-PRO universities and their philosophies as well as to history, concepts, and cultural values of Europe, the Sustainable Development Goals, basic Circular Material Flows concepts and associated complexities, problem-based learning approaches, and Innovation and Social Entrepreneurship;
- Design and implementation of a "PhD Journey" for EURECA-PRO doctoral programme students. Over the course of a few weeks, students from all universities can participate in structured lectures, seminars, lab sessions, excursions, and micro courses on a variety of topics before presenting their findings at the annual PhD EURECA-PRO conference;
- Production of a module study outline problem and project-based learning guidelines for implementation in RCP study programmes offered by EURECA-PRO partner universities. Concrete challenges for these teaching methods are being addressed in cooperation with the Research Task Force and according to the Lighthouse Missions;
- Implementation of EduPlat, a learning management platform for pedagogics and education that includes digital courses offered within the EURECA-PRO study programmes and supplementary studies.

Two key bodies of EURECA-PRO are being led by Work Package 2, "Education and Studies": the Education Council and the Student Centred Co-Creation Group. These groups jointly analyse documents, reports, and presentations to vote on decisions together during regular meetings.

The Education Council is composed of two academic members with decision-making authority in the field of ed-

ucation and studies from each of the eight EURECA-PRO partner universities. The Education Council provides advice and ensures that overall educational development is aligned with EURECA-PRO's goals.

The Student-Centred Co-Creation Group (SCCG) consists of Bachelor's, Master's and doctoral students from each partner university. The SCCG is simultaneously a supervisory and an executive team. Students participate in the design of new education, research, and transversal programmes and provide advice to relevant bodies (including the Education Council, the Research Task Force, the Communication Task Force, the Innovation Task Force, and the External Advisory Board) as necessary.

Educational tasks and milestones of Work Package 2 are being developed in close cooperation with partner universities and other Work Packages especially, 3 "Research"; 4—"Innovation"; 5—"Transversal Skills and Tools"; and 6—"Governance".

It is important to note that the German Academic Exchange Service DAAD is providing substantial support to German Universities which are a part of European Alliances with accompanying national programmes within the framework of European University Networks (EUN)—a German initiative. EURECA-PRO universities which are a part of the EUN include TU Bergakademie Freiberg and Mittweida University of Applied Sciences. Their activities focus on the development of networks within each university as well as with industry and societal partners, achieving comprehensive teacher competency in new teaching methods and digital tools and ensuring a "welcoming culture" for international students. Special attention is given to enhancing on-campus, language centre competence in teaching foreign languages (English for Specific Purposes along with German as a Foreign Language for students and staff); this support serves the development of multilingualism as one of the cornerstones of European Universities.

2. Establishing Educational Programmes within EURECA-PRO

A primary aim of EURECA-PRO is to develop higher education programmes on responsible consumption and production (RCP) at all levels of study, leading to alliance partners leading new multiple and joint programmes. The programmes will consist of brand-new degrees and new RCP specialisations; with mandatory mobility to a partner university during their studies. The first doctoral researched EURECA-PRO programmes have already started and the first undergraduate and postgraduate programmes are due to start in the winter semester of 2022.

The complexity of commencing joint programmes across multiple languages, educational cultures, and universities within varying local and national legislative frameworks has resulted in a phased approach to the development of new programmes (see Fig. 1). In this way, each partner university is able to proceed at their own pace as they develop mechanisms to allow for the eventual

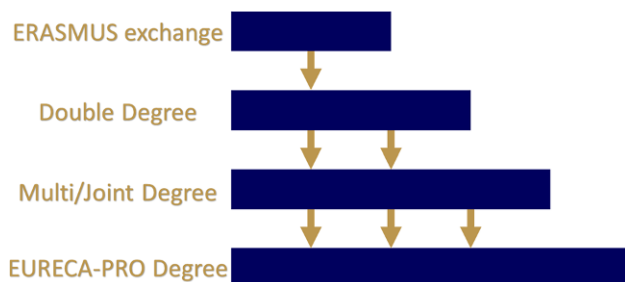


Fig. 1: Schematic representation of degree programme development from ERASMUS exchange to a EURECA-PRO degree

adoption of a EURECA-PRO joint programme under the auspices of EURECA-PRO as a legal entity.

Student-centred learning is being integrated from the beginning into each EURECA-PRO programme. Student-centred learning has been shown to improve student visibility and student-teacher communication while enforcing the importance of learning outcomes [2]. Student-centred learning involves hearing the comments and feedback of current students at EURECA-PRO partner universities through the Student Centred Co-Creation Group (SCCG). By interacting with the Education Council and with the EURECA-PRO project as a whole, the SCCG is then emboldened to provide study programme feedback and to comment on national and international mobility to inform programme development.

Secondly, student-centred learning empowers students to maximise their choice of educational path. In collaboration with mentors who provide expert guidance, students are encouraged to take the lead in their studies at all stages of their education. Across EURECA-PRO, each university has produced a database of RCP and European cultural studies modules to help support the design of new study programmes, explore EURECA-PRO strengths, and identify new areas of opportunity for innovative courses. This inventory consists of 580 individual modules comprising 2514 ECTS. One ECTS is equivalent to 25 to 30 h of study; in total, there are at least 62,850 h of study in our inventory, which is more than seven years of 24/7 learning!

3. Bachelor's and Master's Programmes On Responsible Consumption and Production

New RCP programmes and specialisations within current programmes are being developed across EURECA-PRO. Currently each Bachelor's and Master's programme is being hosted by a single university, with compulsory mobility to an additional university either physically, in hybrid mode, or entirely online as defined in each study programme. Each programme includes general modules (for example languages), introductory modules into mathematics and natural sciences, general modules in science and engineering subjects, RCP elective and specialisation modules, and individual work and placements. As part of this programme, new modules have been developed by different partner universities to ensure that all students are able to develop expertise in EURECA-PRO's core topics. Thus, for example, new modules on European Values and Culture and Responsible Consumption will be offered at TU Bergakademie Freiberg beginning in the autumn of 2022.

To facilitate student mobility and make the best use of the educational strengths of each partner, EURECA-PRO partner universities will contribute tracks to other universities' Bachelor's and Master's programmes. Tracks are defined as a full semester of courses focused on a particular subject area and are offered by one partner university for a programme at another partner university. Some tracks will form obligatory parts of study programmes, ensuring that students cover certain subjects, while other tracks will be chosen by students.

3.1 Bachelor's Programmes

Four Bachelor's programmes are being developed by EURECA-PRO, as shown in Table 1. The programmes being developed are of six, seven, or eight semesters in length depending on the structure and legislative boundaries of current programmes. As an example, the BSc in Management and Production Engineering with specialisation in Management of Sustainable Consumption and Production implemented by the Silesian University of Technology is

TABLE 1
Summary of newly developed Responsible Consumption and Production Bachelor's and Master's programmes

Name	Host University	Start date
BSc Management and Production Engineering with specialisation, Management of Sustainable Consumption and Production	Silesian University of Technology, Poland	Oct 22
BSc Engineering with specialisation in Responsible Consumption and Production	TU Bergakademie Freiberg	Oct 22
BSc Responsible Consumption and Production	Montanuniversität Leoben, Austria	Oct 22
BSc in Electrical engineering – automation with specialisation in Responsible Consumption and Production	Mittweida University of Applied Sciences, Germany	Sep 22
MSc Management and Production Engineering with specialisation, Management of Sustainable Consumption and Production	Silesian University of Technology, Poland	Mar 23
MSc Responsible Consumption and Production	Montanuniversität Leoben, Austria	Oct 22
MSc Mechanical Engineering with specialisation in Responsible Consumption and Production	University of Petrosani, Romania	tbc

seven semesters in length, includes basic, general, and introductory modules in the first four semesters and specialised RCP modules in the last three semesters with a significant focus on problem-based learning.

3.2 Master’s Programmes

Three EURECA-PRO Master’s programmes are currently being implemented (see Table 1). These programmes are three or four semesters in length and, as is to be expected, focus primarily on specialist RCP modules and a student thesis or project. As an example, the MSc in Responsible Consumption and Production being implemented by Montanuniversität Leoben includes a first semester focused on sustainable development, a second semester focused on responsible production, a third semester focused on responsible consumption, and a thesis in the final semester.

In addition, a joint programme based on this master’s programme is currently being developed by Montanuniversität Leoben, TU Bergakademie Freiberg, and the University of Leon. This programme consists of one semester at each partner university with the thesis completed at a university of the students’ choice depending on their research topic. Though this joint programme includes three universities, each EURECA-PRO university is fully committed to implementing double, multiple, and joint RCP programmes as their national regulations allow.

3.3 The EURECA-PRO Doctoral School on Responsible Consumption and Production

As part of EURECA-PRO’s educational offering, a joint doctoral programme will be developed using capacities of the doctoral schools from all partner universities. This pro-

Fig. 2: Summary of courses and modules offered within EURECA-PRO Doctoral Programme

	Module or course name and short description	Module or course size/ECTS		Possible repetitions
		Minimum	Maximum	
Organised under the auspices of EURECA-PRO	PhD Journey	3	6	Once
	Yearly mobility hosted by all partner universities simultaneously to provide students with training and coaching on a variety of topics relating to RCP, European cultural studies, innovation, soft and academic skills in addition to networking opportunities.			
	Lecture Series	3	5	Multiple
	Bi-annual series of lectures presented online by academics from across EURECA-PRO on topics related to RCP, European studies and innovation.			
	Summer School	2	3	Once
	Annual summer school hosted by a single partner university on topics related to RCP, European studies and innovation.			
	Young Researchers Colloquium	2	4	Multiple
	Annual meeting of young researchers (MSc and PhD) to present research topics and network.			
	EURECA-PRO Conference	2	4	Once
	Annual conference for EURECA-PRO researchers, associated projects and industrial partners.			
	PhD Seminar series	1	1	Multiple
	Virtual seminar series run by PhD students to present and discuss their work.			
Organised by local/home Universities	Transversal skills microcredits	0.5	3	Multiple
	Micro-credentials on transferable and ‘soft-skills’. Could be undertaken in person or online.			
	Innovation skills microcredit	0.5	3	Multiple
	Micro-credentials on innovation, entrepreneurship and knowledge exchange. Could be undertaken in person or online.			
	Responsible Consumption and Production Module	3	10	Multiple
Courses and modules currently offered by partner universities on RCP and sustainability. Could be undertaken in person or online at a partner university.				
Language Courses	3	8	Multiple	
National and international language courses. Could be undertaken in person or online.				
Research-related courses	2	4	Multiple	
Courses and training related to research and study skills if deemed appropriate for inclusion.				

gramme will define key doctoral studies aspects in collaboration with the Education Council and Research Task Force. To enhance collaboration and networking, a non-binding doctoral programme under the EURECA-PRO umbrella is initially being implemented. Participation in the EURECA-PRO Doctoral Programme is open to all students of EURECA-PRO partner universities studying a topic related to responsible consumption and production or European cultural studies.

During the course of their studies, EURECA-PRO doctoral students complete modules and courses totalling around 15 ECTS according to the European Credit Transfer System as defined and certified by the EURECA-PRO Doctoral Programme (see Fig. 2). These courses include the EURECA-PRO lecture series, summer school, and modules in RCP and European cultural studies. This requirement does not replace any home university requirements, but some requirements from both the home university and the EURECA-PRO Doctoral Programme can be met with the same courses or modules.

One key aspect of the programme is the two (or three) week mobility PhD Journey. During this mobility, students will receive training and coaching on a variety of topics including scientific work, laboratory practice, academic writing, and scientific conference presentations. They will be encouraged to maintain contact with each other through short courses, joint seminars, and online as well as physical meetings. The group mobility will be organised annually and hosted simultaneously by all partner universities, with each partner sending approximately three students to each other partner. This will result in around 130 students participating in the programme each year. Running each PhD Journey at the same time will allow for teaching and learning activities to be conducted in a hybrid model across partner universities, easing the administrative burden and encouraging interaction between students.

The other components of the doctoral programme include the annual EURECA-PRO Conference, summer school, the PhD seminar, and the biannual lecture series. Upon completion of their studies, each student will receive a certificate indicating the courses, modules, and ECTS accomplished in order to fulfil this requirement.

4. Supplementary RCP Modules Offered by EURECA-PRO

EURECA-PRO has not only committed to establishing joint Bachelor's, Master's and PhD degrees in European Studies, but to offering students of all disciplines the opportunity to further educate themselves on the challenges related to SDG 12 (United Nations General Assembly, 2015), "Responsible Consumption and Production". To realise this objective, additional "Supplementary European Studies Modules" are being created. These modules can be completed in any study programme at any partner university or other university eligible for student exchange. These modules provide knowledge on RCP topics within UNESCO-defined key competencies for sustainability (United Nations Educational, Scientific and Cultural Organisation, 2017), including

systemic thinking, integrated problem-solving and the inclusion of suitable teaching methods in the broader context of education for sustainable development. These modules, and all other educational offerings of EURECA-PRO, are hosted on the EURECA-PRO platform EduPlat. Courses, modules and training sessions are all run through a dedicated Learning Management System (LMS) within EduPlat based on Moodle. This online-accessible platform allows educators to easily create and upload course materials and streamlines student access to these materials. Educational offerings on the LMS are produced for different target groups, for example teacher training courses for educators, language courses for partner university students and introductions to RCP for broader society.

4.1 EURECA-PRO Summer School

Once a year, a five-day summer school is organised by one of the partner universities. After completion of the summer school, students acquire a deep level of expertise in the field of RCP taught or an associated topic. Through interactive working practices, students attain a set of transferable skills and key competencies in the field of sustainability (for example critical thinking and integrated problem-solving). In EURECA-PRO's Summer School, students are also introduced to the aims and objectives of EURECA-PRO, the philosophy, history, concepts and cultural values of Europe, the Sustainable Development Goals, concepts and challenges of Circular Material Flows, problem-based learning approaches, innovation and entrepreneurship.

In summary, the Summer School supports:

- Knowledge transfer related to SDG12 topics
- Promotion of interdisciplinary thought and research
- Improvement of participants' academic skills
- European exchange of experiences
- Networking
- Improving understanding of European culture

Students from a broad variety of disciplines from all EURECA-PRO partner universities and degree levels (Bachelor's, Master's and doctoral) can participate. Up to 3 ECTS credits are awarded conditional on completion of the required tasks, which comprise a workload of 90h including prior tasks, an online pre-school (including a kick-off seminar and language course), active participation in the summer school week, and completion of a final report.

The first EURECA-PRO summer school took place in September 2021 at TU Bergakademie Freiberg (Germany) with the title "Responsible Consumption and Production for Digitised Higher Education". Beginning from their own life experiences, students considered the sustainability of their behaviour and applied principles of sustainability assessment to different modes of studying (from studying in one place with no digital offerings through to studying purely online). Based on their findings, the students drew up recommendations for improving digitised higher education.

The second summer school has been organised by the Technical University of Crete and takes place in Chania in September of 2022. The main purpose of the “Innovation and Entrepreneurship Summer School” is to nurture students’ creative and innovative thinking capacity by providing practical knowledge and skills in business and market basics, offering business plan orientation, promoting problem-solution thinking, and fostering leadership skills.

In addition, EURECA-PRO together with the Montanuniversität International Relations Office—MIRO organised a joint summer school on the topic “Responsible Material Flows”, which was offered as a Blended Intensive Programme in July 2022.

4.2 EURECA-PRO Lecture Series: Introduction to SDG 12 in Its Economic, Social, Environmental, and Technology Dimensions

A bi-annual lecture series on the topic of “Responsible Consumption and Production” that began in April of 2021 provides an introduction and initial overview of the topic. The lecture series is also offered as a module for students and staff at partner universities and beyond. The series is suitable as an introduction to RCP and is thus intended to be accessible to students of all backgrounds. The lecture series consists of 14–16 lectures held by leading professors and researchers at EURECA-PRO partner universities. The series is also offered as a study module with 3 or 5 ECTS, which includes participation in the lectures, an online exam, and a paper written on the topic of the series.

Themes that guide the topic areas of the lecture series include European Union Culture, sustainable resource economics, sustainable business, responsible consumption, and circular economy. Case studies are presented in waste management, material science, recycling, mining, and energy technologies.

Upon completion of the lecture series, students are able to explain the SDGs of the United Nations with an emphasis on SDG12, Responsible Consumption and Production.

They also understand different research approaches that contribute to this goal and learn innovative solutions to address current issues in society and industry.

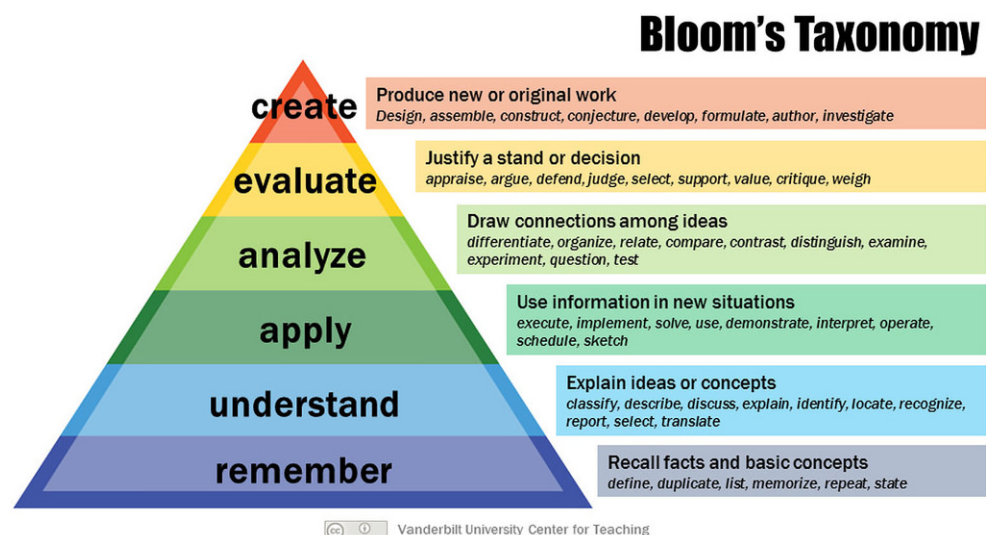
Since April 2021, two lecture series have been run by TU Bergakademie Freiberg (LSI focused on Responsible Consumption and Production and LSII focused on Geosciences, Technologies for a Circular Economy and European Values and Culture). A further lecture series (LS III focused on Innovation and Entrepreneurship) was hosted by the Technical University of Crete. These series have attracted considerable interest from participants at EURECA-PRO partner universities, other European universities, and globally; each series has had 300 to 400 participants.

5. Innovative Educational Methods and Tools

Excellence in higher education is at the heart of EURECA-PRO. In line with Sustainable Development Goal 4—Quality Education—Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (United Nations General Assembly, 2015), EURECA-PRO is dedicated to spreading best practice teaching and learning within higher education. This includes implementing innovative teaching methods into current and future study programmes and courses to enhance student experiences and learning outcomes.

To achieve this, EURECA-PRO is developing a number of different approaches. All methods and tools aim to integrate the higher level activities of Bloom’s taxonomy, which seek to engage each student and to make them a partner in their own learning process. Originally defined in Bloom [3] and updated in Anderson and Krathwohl [4], such higher-level activities include analysing, evaluating and creating knowledge, as opposed to simply remembering or understanding (See Fig. 3). Operating within this framework brings numerous benefits to the teacher and student [5]. Some methods that EURECA-PRO is focused on are described below.

Fig. 3: Bloom’s Taxonomy. Adapted from [5]



5.1 Case Studies in Education

Case studies are a tool to illustrate best (or worse) practice, invite discussion and develop skills in critical and creative thinking [6]. The benefits of exploring case studies come from the interaction between the problem, the task and the setting. This provides students with real-world examples of knowledge being put into practice that can be discussed in the classroom. Although this method is a common part of many degree programmes and the numerous benefits of this active learning approach are many, take-up is not universal [6].

5.2 Problem-based Learning

Problem-based learning is a structured approach where students focus on how to solve a teacher-defined problem or case [7]. This involves considerable preparation by the educator(s) to ensure the solution to the problem is 'ill defined' and sufficient for learning aims. Following an introduction to the problem, students form groups and work on producing a methodology to solve the problem. Regular meetings with the educator guide and steer this process. The solution to the problem is then presented orally or as a report by each student group [7].

5.3 Project-based Learning

Project-based learning builds upon problem-based learning, where groups of students not only plan a solution to a problem but also implement it within a project management framework [8]. This method has been implemented at the Silesian University of Technology since 2013, with almost 200 projects implemented to date [9]. In project-based learning, case studies are defined in collaboration with external partners and industry with an interdisciplinary focus. To produce a solution, students require significant support in terms of academic supervision, external expertise, and the managing of costs associated with equipment and consumables. Using a project management framework helps students to plan their time and efforts while simplifying the monitoring required by supervisors. The analysis of the uptake and implementation of problem-based learning and project-based learning across EURECA-PRO found that all partners have some, although inconsistent, experience with these methods. The most common applications of this approach to learning are in science, technology, engineering, and mathematics courses, with both mandatory and optional modules in many study programmes.

5.4 Intercultural Activities

In addition, through acknowledgement that teaching does not take place solely in formal educational settings, students' future contributions to society is beyond purely economic [10] and employers appreciate 'soft skills' in addition to academic qualifications [11], EURECA-PRO focuses on in-

tercultural activities. In this vein, activities that encourage intercultural awareness and communication skills are being implemented. In the "EURECA-PRO International Week" run in May 2022, for example, a number of intercultural activities including green movie nights, sustainable cooking, and an introduction to Greek dancing were offered.

6. Concluding Remarks

The programmes, courses, and educational methods described above only represent some of the educational aims and objectives of EURECA-PRO Work Package 2, "Education and Studies". As the alliance continues to grow and evolve, new opportunities for furthering the educational offerings of each partner university will be realised. Ultimately, EURECA-PRO seeks to become the number one European institution for education and research relating to the United Nations Sustainable Development Goal 12, Responsible Consumption and Production, in order to improve the lives of European and global citizens.

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