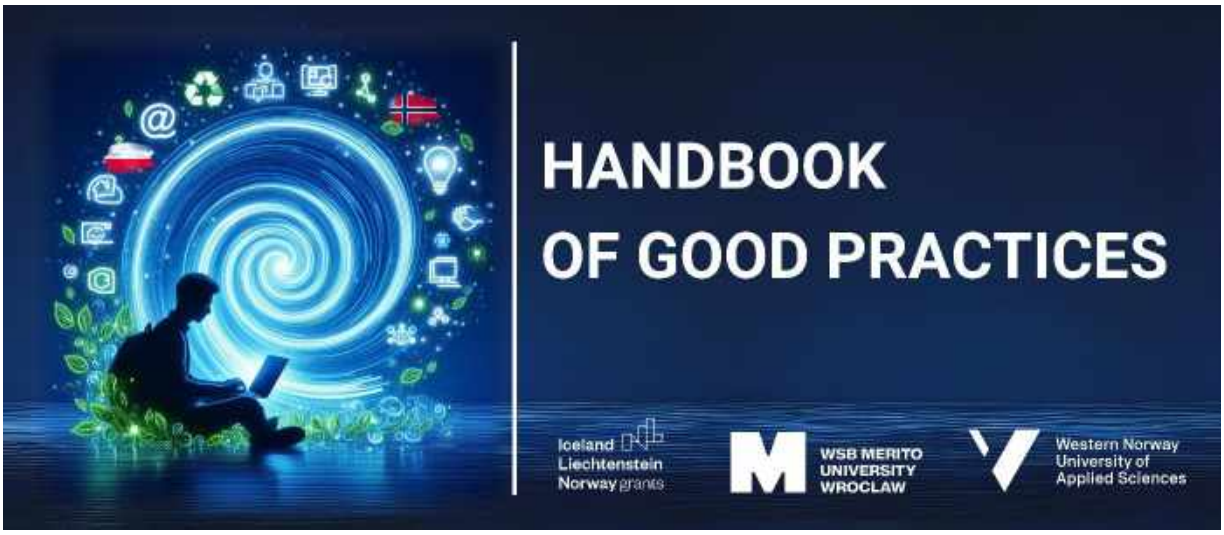

HANDBOOK OF GOOD PRACTICES

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About the project

The concept of sustainable development in the innovative education of students project funded under the EEA Financial Mechanism 2014-2021 Education Programme was carried out in the period: February 1, 2023 till April 30, 2024 by The University WSB Merito Wroclaw (UWSB Merito Wroclaw), Poland in cooperation with The Western Norway University of Applied Sciences (HVL), Norway. The project coordinators: Marcin Fojcik (HVL, Norway) and Anna Zaslona (UWSB Merito Wroclaw, Poland).

Partner - HVL

Western Norway University of Applied Sciences (HVL) is one of the largest universities in Norway, educating approximately 17,000 students, located on 5 campuses: Bergen, Førde, Haugesund, Sogndal and Stord, offering a wide range of Bachelor, Master and PhD programmes. HVL specializes in education in health sciences, social sciences, engineering, teaching, environmental sciences, physical education, economics and management. In the context of the preliminary analysis and the e-courses planned for implementation, the above-mentioned experience and specialization determined the choice of HVL as the project partner. The experience in cooperation with the Norwegian university is based on the implementation of 4 projects by Philological School of Higher Education (which on the 1st October 2020 merged with the WSB University in Wroclaw – a former name) carried out in 2014-16 within the Scholarship and Training Fund (Institutional Cooperation, Development of Polish universities, Mobility of students and University employees) and one in 2017-20 within the Erasmus+ Strategic Partnerships programme (2017-1-PL01-KA203-038535). Past collaborations with HVL (formerly Sogn og Fjordane University College) involved, among others: development of new curricula (3 projects), development and implementation of e-courses (2 projects), including sustainability courses (1 project) as well as mobility and innovative teaching tools – one project dedicated to those issues.

HVL project team (lecturers, authors of e-courses):

Prof. Marcin Fojcik, the Coordinator of the HVL Team and one of the authors of the e-course "Edu-Tech". He has been working at HVL since 2006 at the Faculty of Engineering and Science; lecturer, supervisor of BA, MA and PhD, participant of over 20 research projects, and the author of 51 publications. Prof. Fojcik's research interests are in communications and automation. This includes both basic and applied research through national and international projects in different types of industrial communication, *Quality of Service*, *Service Oriented Architecture* - from real-time protocols, *Factory 4.0* to the *Internet of Things*. Besides, he works on didactics and dissemination methods in Science, Technology, Engineering, and Mathematics (STEM).

Prof. Valeria Jana Schwanitz, Department of Environmental Sciences, an energy economist with experience in first-principle models, energy system modeling, and empirical analysis of coupled human-nature systems in the context of climate change and sustainable development; a Distinguished Fellow at the Schumacher Institute for Sustainable Systems, Bristol, UK, a member of the European Energy Research Alliance (EERA), a leader of the sub-program on 'Data science and artificial intelligence" of the EERA Joint Program 'Digitalization'.

Prof. August Hubert Wierling, Department of Environmental Sciences, his scientific background is theoretical physics with applications in astrophysics, plasma physics and solid-state physics. The common thread of my research interests is properties of complex systems with many components. His PhD dealt with nuclear reactions in stars. He also worked on diagnostic methods for high energy plasmas, but also on structural properties of dusty plasmas. Lately he has been interested in continued fractions and their application to reduce dimensions of stochastic systems.

Jon Øivind Hoem, Associate Professor at Department of Arts Education, teaching and research mainly within new, digital media. Projects in robot assisted education, spherical media, interactive installations and the use of mobile technologies.

Joar Sande, Associate Professor, Department of Computer science, Electrical engineering and Mathematical sciences, in the centre of interest: linear systems and control systems for electrical engineering; research in flipped learning and development of various learning resources, to get student-active forms of learning.

Lars Kyte, Associate Professor, Department of Health and Caring sciences; work and expertise in health professions; teaching in medical and natural science subjects Research on the importance of the pre-visit for treatment and care; digital learning aids in the classroom, Implementation of medical natural scientific knowledge in nursing.
Bjarte Pollen, Assistant Professor, Department of Computer science, Electrical engineering and Mathematical sciences; work and research areas: telecommunications, radio development such as the mobile service and the fiber network; underwater technology; teaching methodology: making video clips, applying animations etc.

Leader – UWSB Merito Wroclaw

University WSB Merito Wrocław is the largest non-public university in the Lower Silesian and Opole Voivodships, providing BA, MA and postgraduate studies, MBA programme and traineeship opportunities. UWSB Merito has considerable experience in implementing EU projects (about 15 years) and in international cooperation schemes. The Project Management Department is responsible for raising grants and supervising project realization, the Centre for International Cooperation is responsible for international cooperation (Erasmus+ programme and other international projects involving and dedicated to both students and staff). Currently, the university is implementing 11 projects on national and international level. For several years UWSB Merito in Wroclaw has been investing in the development of technical resources and practical solutions in the area of remote education and work. Since 2018, the university has invested over 3 million PLN in the technologically advanced equipment and software for e-Learning. The university's teaching staff participate in numerous training courses on e-learning to gain knowledge and practical skills in its application in the process of teaching. The highly competent staff of the e-Learning Centre of UWSB Merito Wroclaw, has developed over 100 e-courses in various academic fields. The content of those courses is characterized by attractive, interactive, user-friendly format, most commonly equipped with self – assessment modules, which enables participation of students who want to study/revise material on their own. The e-Learning team takes pride in using the latest cutting-edge technological tools and solutions. It is worth mentioning that the e-Learning skills of the Leader's team have also been enhanced owing to the past and present cooperation with Norwegian colleagues from HVL during past common projects and staff training exchange schemes.

UWSB Merito Wroclaw project team (key authors of intellectual outputs):

Anna Zasłona - The project coordinator; a graduate in English Studies with over 20 years of experience in didactics - promoting the application of ICT solutions in teaching; at present - a senior specialist at the Centre for International Cooperation at the UWSB Merito in Wroclaw; wide experience in various International academic enterprises: for nearly 15 years Erasmus+ Program Coordinator, her top achievements in the field of internationalization cover: expanding the network of Erasmus+ partnerships up to 27 European universities, enhancing the quality of international standards in education – recognition and EU accreditation: ECTS Label and DS Label; an organizer of 12 international conferences; participation in a number of national and international projects; in the years 2014 – 2016 - coordinator of the Norway Grants project: “Active in Languages – interactive in teaching, modern ICT-based methods of teaching languages”. In the years 2018 – 2020 – coordinator of the Erasmus+, strategic partnership project: “GameIT: Gamestorming for Innovative Teaching” in the partnership with Vasile Alecsandri University of Bacău, Romania; Western Norway University of Applied Sciences, Norway, University of Ljubljana, Slovenia. The project got the highest distinction from the evaluation board.

Anna Orzeł, PhD – a lawyer and an expert in logistics specializing in road transport. Vice-Dean for organizational affairs and development at the Faculty of Finances and Management. PhD in economics and a graduate of law and administration, a holder of the European Senior Logistician ESLog Certificate.; Business trainer and advisor in the field of transport law; particularly interested in the use of new technologies in logistics with emphasis on transport and smart city issues. Participation in numerous projects in the field of sustainable development, transport and logistics.

Katarzyna Kulig-Moskwa, PhD – lecturer - "Wellbeing in organizations", Head of HR management department at the UWSB Merito Wroclaw, specialisation: HR, public relations, CSR and employee development, management consultant, business coach; leader of the Wrocław branch of the Polish HR Business Partner Association; the editor-in-chief of the first book in Poland on well-being in organizations and the author and co-author of other publications on wellbeing and HR in industry e.g. "Leader's well-being instinct" or Ways to

measure the effectiveness of the implementation of the wellbeing program"; the chairman of the jury in the nationwide competition for the best WellPower well-being projects.

Julita Markiewicz-Patkowska, PhD – specilizes in technical sciences, an academic lecturer, practitioner of managing small and medium-sized enterprises. He supports entrepreneurship, creates and manages projects financed by the EU. In recent years, focused programmes promoted by EU, political and economic events and education management in strategic industries in Lower Silesia. The Co-author of a water purification technology patent; the author of numerous scientific publications, some of which were placed on The Philadelphia List, on environment protection, renewable energy, ecology, management and economic aspects of tourism.

Jaroslaw Tomaszewski, PhD – specializes in law and economy of the European Union and global development; experience in teaching course related to European projects, applying for EU funds and global economics; wide international experience: visiting professor at universities in Belgium, Hungary and Czech Republic; represents the university in the International Businet Association, the Business Week network and the Regional Center for International Debate. The author and coordinator of many international projects in the field of environmental studies, business and didactics.

Kamil Musiał, PhD Sc. - an academic teacher at UWSB Merito in Wroclaw; ISTQB certified tester; a Software Integration Engineer at Nokia - first in LTE technology and then 4 years experience in 5G technology. During his professional career, he constantly explores programming, telecommunications, networking and testing issues. He also works as a trainer in various training projects. A fan of innovative solutions, optimization issues and technologies "from the inside".

Justyn Czekański - an eentrepreneur and an academic lecturer, the past 6 years a coach in strategic consulting and innovation industry; oriented to supporting companies in strategic initiatives emerged while working for McKinsey; focuses on innovative projects in the WEB3 area (Blockchain, tokenization, metaverse, AI, AR/VR, etc.); a member of the Coalition for Polish Innovations and the working group on Artificial Intelligence at the Chancellery of the Prime Minister.

Priority thematic area

Inclusive education, which is currently one of the priorities and standards promoted by the European Commission, should be present, inter alia, at universities. To ensure that the educational offer of universities is inclusive, it should be linked to the expectations of society and address issues of current interest to it. It is also necessary to make efforts to ensure that students from different backgrounds have the right conditions for developing their individual potential and acquiring education, which will allow them to enhance their personal development and full inclusion in society. This will improve access to higher education and increase completion rates for people from different backgrounds, with different talents and needs, including disadvantaged and under-represented groups (e.g. people with disabilities, from ethnic or national minorities, low-income families, etc.).To ensure that a university's offer complies with the concept of inclusive education that it is: focused on the personal development of individuals, accessible to all and flexible, organizational and curricular solutions are required. These should go in line with the renewed EU agenda for higher education, where the European Commission has committed (30.5.2017, COM/2017/0247 final), among other things, to promote, develop and test flexible and modular study programmes to facilitate access to higher education.

The implementation of flexible forms of study, e.g. in the form of e-learning, will enable the educational process to be individualized to the needs of students from disadvantaged groups. A preliminary audit conducted before the launch of the project made it possible to identify gaps in WSB's offer in terms of its compliance with the concept of inclusive education. Therefore, in this project, there were developed 10 e-courses on current, socially relevant issues, designed for the purpose of distance learning studies, which can be flexibly used in the curricula of both UWSB Merito in Wroclaw and HVL, in different fields of study and specialties, in a manner convenient for any kind of user (including disadvantaged persons, e.g. with disabilities, other persons with limited, for various reasons, ability to commute to the university an attend regular classes.), which is in line with the idea of inclusive education. The above priority area involves such issues assigned to Component IV as:1. the development of universities to better match current economic and social needs, including sustainable development;2. integration of new technologies in education. Implementation of the project will contribute to a better adjustment of students' educational offer to the current economic

and social needs, because the contents of 10 developed e-learning courses are based on the latest economic, social, IT trends (”Trends Map 2020” infuture.institute and ”NORDIC INSIGHTS” Scandinavian-Polish Chamber of Commerce), i.e. sustainable development, environmentally friendly technologies and solutions, virtual and so-called ”smart” technologies, skillful balancing of personal and professional life. These issues will have to be faced by future graduates both in their professional and private lives, and thanks to the implementation of this project, these topics will be included in the curricula of both universities. E-courses are prepared in the formula of ”self-learning” and are free open assess resources on the website oze.wsb.wroclaw.pl (Open Educational Resources), in an attractive graphic and multimedia form with the use of various modern methods and teaching tools (including short films, tests or quizzes with the possibility of self-checking). As a result of the project, new technological solutions and teaching methods will be included in the course of academic education.

Project goals

Enrichment of the remote education offer for UWSB Merito students through preparation of 10 innovative e-courses in English on the latest economic and social trends in sustainable development in cooperation with HVL. The objectives of the Education Programme have been achieved successfully mainly through 1. development of staff working in the area of formal education (participation of lecturers in training on remote and inclusive education, 2. mobility of university staff (visits to Leader and Partner) and 3. institutional partnerships for improvement of quality and adjustment of educational offer at universities. The project objective corresponds with the objective nr 3 thanks to the outcomes developed in cooperation between WSB and HVL, which are going to improve the quality and relevance of educational offer at the higher education institutions.

The innovative character of the project: a) interdisciplinary topics of courses building greater awareness of students in the field of sustainable development, referring to the latest economic and social trends, which, according to the findings of the preliminary analysis, are insufficiently present in the UWSB Merito curricula; b) a flexible modular formula of curricula to be used in remote education, which may be easily incorporated into the curricula in more other ways

than so far (e.g. a course on environmental protection in the Management course, or a course on ”Wellbeing” in the (e.g. a course on environmental protection in the field of Management, or a course on ”Wellbeing” in the field of Information Technology). Recipients of the planned project outcomes will include UWSB Merito students of Management, Logistics, Finance and Accounting, Information Technology as well as teaching staff, university authorities, interested persons, i.e. OER users and, of course, HVL students and teaching staff.

Reasons for implementing the project

For several years UWSB Merito Wroclaw has been developing its potential in the field of distance learning in line with the concept of inclusive education, however this formula was mainly supplementary to education provided in a traditional manner. The pandemic time has shown the need for more flexible organization of education, including the development of high-quality remote mode of study.

The team dealing with Quality and Methodology of Education, which has been working since October 2020, before entering the project, has made a preliminary analysis of the current educational offer of the university, consulting the situation with lecturers and students, and has formulated the following main conclusions: the e-course base needs to be updated to reflect the latest socio-economic trends and their interface and format should be modernized according to the latest standards; the highest possible quality of e-learning and its inclusive character should be ensured; inclusive education should be built and promoted when creating new educational materials; current curricula are not interdisciplinary enough; there is a demand for bigger number of courses in English, especially in subjects related to the functioning of international companies (IT, sustainable development, management, logistics, etc.).

In response to the above conclusions, thematic areas of 10 e-courses were defined in correspondence with the university’s fields of study i.e. Logistics, Computer Science, Finance and Accounting or Management. Apparently, the e-courses developed in the project may be flexibly used in the university curricula.

Project outcomes

The main objective of the project is to enrich the remote education offer for students of UWSB Merito Wroclaw by preparing, in collaboration with the Western Norway University of Applied Sciences (HVL), 10 innovative e-courses in English on the latest economic and social trends in sustainable development.

Intellectual outputs:

- The analysis of strengths and weaknesses of remote education based on the experience of the WSB Merito University Wroclaw
- 10 e-learning courses – titles and authors below
- The Handbook on good practices

Main dissemination activities:

- Conference online - February 2024
- Webinar - April 2024

Project impact and long-term benefits:

- Implementation of e-courses in the curriculum of UWSB Merito Wroclaw and HVL
- Increasing students' awareness of sustainability issues and providing lecturers with attractive meaningful teaching aid.
- Encouraging lecturers to create teaching materials in English and to further develop remote learning.
- Increasing UWSB Merito's potential in terms of internationalization (e-courses in English) and inclusive education.

10 e- Courses developed in the project

1. Edu-Tech developed by HVL:

Marcin Fojcik, Department of Computer science, Electrical engineering and Mathematical sciences; Jon Øivind Hoem, Department of Arts Education; Lars Kyte, Department of Health and Caring Sciences; Bjarte Pollen, Department of Computer science, Electrical Engineering

and Mathematical sciences; Joar Sande, Department of Computer Science, Electrical Engineering and Mathematical sciences and Anna Łokietko, UWSB Merito Wrocław

2. Fossil Fuel Free developed by HVL:
Valeria Jana Schwanitz and August Hubert Wierling, Department of Environmental Sciences; Dariusz Kwiatkowski, UWSB Merito Wrocław

3. Work and mental developed by Katarzyna Kulig-Moskwa & Joanna Guźniczak, UWSB Merito Wrocław

4. Wellbeing developed by Katarzyna Kulig-Moskwa & Dariusz Kwiatkowski, UWSB Merito Wrocław

5. No Trace developed by Anna Orzeł & Joanna Guźniczak UWSB Merito Wrocław

6. Immersive Experiences Blue Farming developed by Julita Markiewicz-Patkowska & Anna Łokietko, UWSB Merito Wrocław

7. Smarter Living & Working developed by Gloriana Sanabria & Joanna Guźniczak, UWSB Merito Wrocław

8. Blockchain Ecosystem developed by Justyn Czekański & Anna Łokietko, UWSB Merito Wrocław

9. Deep Impact developed by Jarosław Tomaszewski & Joanna Guźniczak, UWSB Merito Wrocław

10. Machine Learning developed by Kamil Musiał & Anna Łokietko, UWSB Merito Wrocław

General characteristics of the developed e-courses

e-Courses' structure and format

E-courses have been prepared in the formula of ‘self-learning’, with the use of attractive graphics, multimedia I.e. short films, tests or quizzes used for self-assessment of the student progress. In the course production there were employed the latest cutting-edge technological solutions applied in modern remote and face-to-face didactics e.g. the application of AI to

render the lecture commentary (technical solutions and tools presented further in the text). Consequently, visually attractive, varied and interactive character of e-courses makes them more appealing to the 21st century students and guarantees their vivid interest in their educational contents.

The authors of the courses from both HVL and UWSB Merito Wroclaw followed similar general guidelines for construction of the courses (provided below), which were defined in close cooperation with the e-learning team of UWSB Merito. The idea was to create a uniform model of the course, which would meet the functionalities and e-course standards of the OZE platform as well as fulfill educational goals. The e-Learning Department specialists were responsible mainly for technical processing and adjustments of the prepared contents to the environment of the Moodle platform and OZE (Open Educational Resources) of UWSB Merito Wrocław.

Guidelines for lecturers preparing contents

The content of the course should be provided in Power Point and consist of:

- Introduction: presenting goals, agenda, planned learning outcomes,
- 4 modules (40-50 slides each) - duration of approximately max. 2 h,
- The total duration of the whole course: max. 8 h.

Each module should include:

- Introduction to the topic of the given module,
- 40-50 slides in total,
- 6 test questions - self – assessment module e.g. multiple choice or true/false, other suggested forms are alco acceptable,
- Duration time: max. 2 h

Other guidelines and covered:

- provide recording with the commentary for each slide (or a written scenario for AI),
- each slide should be described in detail and additional audiovisual materials (graphs or diagrams, films etc.) place in separate folders with detailed instructions,
- the entire course content should be delivered in English.

Primary resources:

- NORDIC INSIGHTS Trends shaping the future of business - a report published by Scandinavian-Polish Chamber of Commerce
- Journal of Laws of the Republic of Poland, item 2218 - Regulation of the Minister of Science and Higher Education of November 14, 2018 on the characteristics of the second degree of university outcomes for qualifications at levels 6-8 of the Polish Qualifications Framework.

Thematic scope of e-courses and target groups

The selection of topics for preparation of e-courses is meaningful for the idea of the project i.e. providing education and promoting the concept of sustainable development. Thematic scope of materials in the area of: Work and mental, Wellbeing; No Trace; Immersive Experiences; Blue Farming; Smarter Living & Working; Blockchain Ecosystem; Deep Impact. EduTech; Machine Learning and Fossil Fuel Free, address top current trends related to sustainable development – mainly, how to create a work-life balance, take care of mental well-being, how and where to look for alternative materials to plastic and switch to a closed loop economy, how to use natural resources wisely, how to apply smart solutions in society, or how to use technological innovations such as AI or VR in education.

The created e-courses are meant to raise environmental awareness among students, change their perception of the world, reconsidering individual approaches to everyday choices and routines as well as showing how individual decisions affect the environment.

All e-courses may be used in remote, or as a completion in face-to-face, education, at various faculties and specializations as part of curricula - 30 hours duration and assigned ECTS credits, or as an element of self-learning. The target group of e-courses are undergraduate and graduate students, including those with lower chances, of both Partner institutions having free unlimited access to the OER (Open Educational Resources) website.

“NORDIC INSIGHTS Trends shaping the future of business” as a source of inspiration

The inspiration for thematic scope of the e-courses was the report “NORDIC INSIGHTS Trends shaping the future of business” - published by Scandinavian-Polish Chamber of Commerce, presenting the most popular innovations currently being developed on the Scandinavian market. Each identified trend has been described and enriched with case studies, indicating the real operation of companies in this area. In addition, the “Infuture institute” conducted a survey (CAWI) among 73 member companies of the Scandinavian-Polish Chamber of Commerce, whose aim was to assess their attitudes towards identified trends. We are all witnessing transformation of the world to an extent never seen before. Contemporary societies face new challenges – the current world population is growing, and more people will move to cities. That phenomenon imposes new solutions regarding construction and agglomerations management. Western societies are in the process of aging, which intensifies the need of implementing innovations supporting daily lives of the elderly. The pace of changes taking place in the digital world results in expanding new analytical tools and innovative use of big data. Parallel to the aging of society, we are bound to face the challenge of labor shortage with the negative effects to be mitigated with Artificial Intelligence (AI). Competitiveness of companies and states will depend on the level of their adaptation to the transformations or even more - on their ability to foresee future changes, engage non-standard thinking, developing a vision and enhance an effective collaboration.

Having considered the above challenges, The Scandinavian-Polish Chamber of Commerce (SPCC) provides you with “Nordic Insights – trends shaping the future of business” report an effort to identify key business trends in Scandinavia in a broader perspective of the global changes influencing cooperation between Scandinavia and Poland. The Scandinavians are the leaders in a variety of key areas of life, they stand out from the other nations and rank highly in respect of innovativeness, competitiveness and digitalization of society. The report presents a breakdown of the trends in three areas: Economy and Technology, Environment and Sustainability and Society & Work. It also describes several interesting solutions implemented by Scandinavian businesses, including the ones having operations in Poland.

Innovation and openness very often define Scandinavian countries. They define not only the ways in which companies and institutions operate. They also became an idea that the

Scandinavians follow in their everyday life. This is manifested in many areas, from attempting to solve global problems, through improving the quality of life and health of residents, building an innovative economy, up to and including an inclusive education. Thus, the Scandinavian countries set the direction of change and development that should become an inspiration for others. Encouragement to draw knowledge and inspiration from the leaders of positive change is also one of the main messages of the „Nordic Insights - trends shaping the future of business" report.

https://www.spcc.pl/en/events/details/22193/11/2018/2018-11-21T09:30:00

The idea of sustainable development

Sustainable development is a global initiative aimed at promoting economic growth, social inclusion, and environmental protection. It is an organizing principle that aims to meet human development goals while also enabling natural systems to provide necessary natural resources and ecosystem services to humans. The concept of sustainable development was first institutionalized with the Rio Process initiated at the 1992 Earth Summit in Rio de Janeiro. The United Nations has identified 17 Sustainable Development Goals (SDGs) that are intended to be achieved by 20301. These goals are a call to action for all countries to work together to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity.

Sustainable development is regarded to have three dimensions: the environment, economy, and society. The idea is that a good balance between the three dimensions should be achieved. Instead of calling them dimensions, other terms commonly used are pillars, domains, aspects, or spheres. The desired result is a society where living conditions and resources meet human needs without undermining the planetary integrity and stability of the natural system. Sustainable development tries to find a balance between economic development, environmental protection, and social well-being. The Brundtland Report in 1987 defined sustainable development as "development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs". The concept of sustainable development nowadays has a focus on economic development, social development, and environmental protection for future generations.

17 Sustainable Development Goals are a comprehensive framework for creating a more sustainable future for all of us. Each of these goals has specific targets and indicators that are designed to measure progress towards achieving them.

No Poverty: Access to basic human needs of health, education, sanitation

Zero Hunger: Providing food and humanitarian relief, establishing sustainable food production

Good Health and Wellbeing: Better, more accessible health systems to increase life-expectancy

Quality Education: Inclusive education to enable upward social mobility and end poverty

Gender Equality: Education regardless of gender, advancement of equality laws, fairer representation of women

Clean Water and Sanitation: Improving access for billions of people who lack these basic facilities

Affordable and Clean Energy: Access to renewable, safe and widely available energy sources for all

Decent Work and Economic Growth: Creating jobs for all to improve living standards, providing sustainable economic growth

Industry, Innovation and Infrastructure: Generating employment and income through innovation

Reduced Inequalities: Reducing income and other inequalities, within and between countries

Sustainable Cities and Communities: Making cities safe, inclusive, resilient and sustainable

Responsible Consumption and Production: Reversing current consumption trends and promoting a more sustainable future

Climate Action: Regulating and reducing emissions and promoting renewable energy

Life Below Water: Conservation, promoting marine diversity and regulating fishing practices

Life on Land: Reversing man-made deforestation and desertification to sustain all life on earth

Peace, Justice and Strong Institutions: Inclusive societies, strong institutions and equal access to justice

Partnerships for the Goals: Revitalize strong global partnerships for sustainable development

Sustainable development is a call to action for all countries to work together to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity. The SDGs are an important framework for creating a more sustainable future for all of us.

https://www.un.org/

https://education.nationalgeographic.org/resource/sustainable-development-goals/https://www.weforum.org/

e-Learning solutions in modern education – innovative approach

E-learning, also known as **electronic learning**, refers to the delivery of educational content and instruction through digital platforms. It has emerged as a powerful tool, especially in the wake of the COVID-19 pandemic. E-learning encompasses a wide range of activities, from online courses and virtual classrooms to interactive multimedia modules. It leverages technology to facilitate learning beyond traditional classroom settings. Universities and higher education institutions adopt e-learning to supplement or replace face-to-face instruction. E-learning approach employs various multimedia technologies, including videos, animations, quizzes, and discussion forums. Learners engage with content asynchronously, at their own pace.

The COVID-19 pandemic forced higher education institutions worldwide to transition rapidly to online learning. Physical campuses became virtual spaces, and students accessed lectures, assignments, and discussions via digital platforms. While the transition posed challenges, it also highlighted the potential benefits. Online learning can enhance engagement by allowing students to interact with content in innovative ways. Moreover, it democratizes education, reaching learners who might otherwise face geographical or financial barriers. Professors faced a steep learning curve when adapting to new teaching technologies. They had to record lectures, create digital resources, organize virtual classrooms, and conduct live sessions. Some embraced the change seamlessly, while others learned by doing. Online learning encourages a student-centered approach. Learners can revisit materials, collaborate asynchronously, and engage in self-paced learning.

In summary, e-learning and online learning offer exciting possibilities for higher education. By embracing technology thoughtfully, universities can create more engaging, accessible, and student-centric learning experiences. To achieve maximum benefits while minimizing the drawbacks, teachers should introduce technology prudently and with a clear purpose. E-learning can significantly enhance the learning process and unlock new possibilities when used correctly. However, educators must remain vigilant and mindful of its impact, ensuring they encourage teaching practices that promote healthy and productive learning habits.

Digital solutions in education – priority of EU

The European Union introduces and establishes list of priorities, that will address the most pressing issues and the main challenges faced by EU in the closest future. In this period, the European Council is primarily concerned on strengthening European values and freedoms and building sustainable, green, and inclusive Europe for future generations. The six priorities for the following years are as following:

- A European Green Deal
- A Europe fit for the digital age
- An economy that works for people
- A stronger Europe in the world
- Promoting our European way of life
- A new push for European democracy

It is fairly evident that all of the activities carried out by the European Union and the European Commission are fully consistent with those priorities. This compatibility extends to the activities carried out under “The concept of sustainable development in the innovative education of students” project. The worldwide pandemic caused by COVID-19 began additional emphasis on the significance of digital education for the necessary digital transformation in Europe. In particular, it pointed out how important it is to take advantage of the educational and learning potential of digital technology and to ensure that everyone has access to opportunities to improve their digital literacy. In the general report of European Union activities for year 2022, the EU included a list of digital rights and principles for the new decade.

Additionally, in September 2020, the European Commission announced a renewed EU policy initiative called a Digital Education Plan. It defines a shared vision for an inclusive high-quality digital education that is easily accessible across Europe. Its primary objective is to encourage the transition of the education systems of EU member countries to adapt to the generation of digital technology. The Digital Education Action Plan sets forth two main strategic priorities: fostering the development of a high-performing digital education ecosystem and enhancing digital skills and competences for the digital transformation. Within those two priorities,

European Comission describes a set of fourteen actions, that are necessary to achieve the desired objectives.

Source: Factsheet - Digital Education Action Plan (2021-2027); https://education.ec.europa.eu/sites/default/files/document-library-docs/deap-factsheet-sept2020_en.pdf

"The concept of sustainable development in the innovative education of students" project contributes to improving digital competences by promoting e-learning and encouraging online education to complement the traditional mode of studies. Online learning can effectively increase the inclusive aspect of education, enabling better access to learning and cooperation for people with disabilities, from remote regions, and those in socio-economic disadvantage. Thanks to technological innovation and flexibility, online learning can accomplish this. It is also important to note that the digital transformation of education is not limited to the use of online education alone. It should also include improving infrastructure and optimizing fundamental processes, such as the digital recruitment of students, in addition to expanding the forms of teaching and learning that are now available.

Step-by-step description of e-courses

EDU-TECH

Developed by Marcin Fojcik, Jon Øivind Hoem, Lars Kyte, Bjarte Pollen, Joar Sande from HVL & Anna Łokietko from UWSB Merito Wrocław.

The course consists of four modules:

1. An introduction and basics information
2. Video and video tools
3. Special media
4. Other elements, challenges, and reflections

Learning outcomes:

- The student should be aware of the possibilities of using spherical (360) photos and videos, Augmented Reality and Virtual Reality for various communicative purposes.
- The student will get an overview of the history of spherical media, from the analog predecessors to today's digital solutions.
- The student will get insight in the different ways of using spherical media, and how they can create their own content.
- The student will have hands on experiences with various digital tools and services.
- The student will have knowledge about the potential future use of spherical media.

The course contains a variety of interactive tasks for students to perform. Those interactive exercises are essential for online courses as they help to ensure student interaction and engagement. They also lead to improvements in academic achievement, reasoning and critical thinking skills and result in increased retention of students.

Each task features a specific program, software or website for the students to use. By using different programs, they can learn how to use different tools and features, which can help them to become more proficient in a variety of areas. This can be particularly useful in their future workplace, where they may need to use a range of different software programs. Using multiple programs and software can also help to increase creativity and push the students to

explore different ways of presenting information and develop new ideas. The following examples illustrate this course's characteristics:

Exercise 2: Make a panorama picture from many still images

Take a picture

The same technique can be used to produce a full sphere. However, this will take many more pictures.

https://ptgui.com/
Here we will use the software

OPEN

You can use your own images.

Make sure that you take these images with a significant overlap, to enable the software to compare and stitch the images. This can be seen in the images found on this link, and these images can also be downloaded for testing: Link

1

A Systematic Review for Online Learning Management System, Study and Review of Learning Management System Software

A Systematic Review for Online Learning Management .pdf
7751 KB

2

Open source learning management systems in e-learning and Moodle

Open source learning management systems in e-learning and Moodle.pdf
303 KB

FOSSIL FUEL FREE

Developed by Valeria Jana Schwanitz, August Hubert Wierling from HVL & Dariusz Kwiatkowski from UWSB Merito Wrocław.

The course consists of four modules:

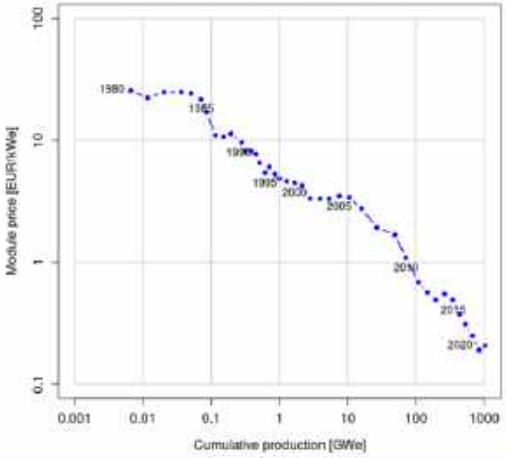
1. Decarbonizing energy systems
2. Smart, not outsmarted citizens
3. Decarbonizing electricity
4. Decarbonizing heat

Learning outcomes:

- The student will understand the role energy services play in our life (global perspective)
- The student will understand the nexus between energy services provision and resource use (environmental damages, social costs)
- The student will understand the principle way forward for a sustainable energy transition

The course is consciously constructed in a relatively simple way, without multiple moving elements and animations. All visuals and text information are presented on the screen, with the lecturer presenting the material in the background. This way of conducting online courses was tested among Norwegian students at HVL, and it was found out, that they prefer a simple arrangement of study material. In order to add some dynamics to the course and make it more interesting and captivating for users, the data is often presented on graphs, charts and diagrams, which were originally created by the course authors. They constitute undeniable value of this course. The following examples illustrate this course's characteristics:

Price reduction for PV systems



Cost developments follow the typical learning curve:

Prices are decreasing with cumulative production as we learn to produce and sale cheaper.

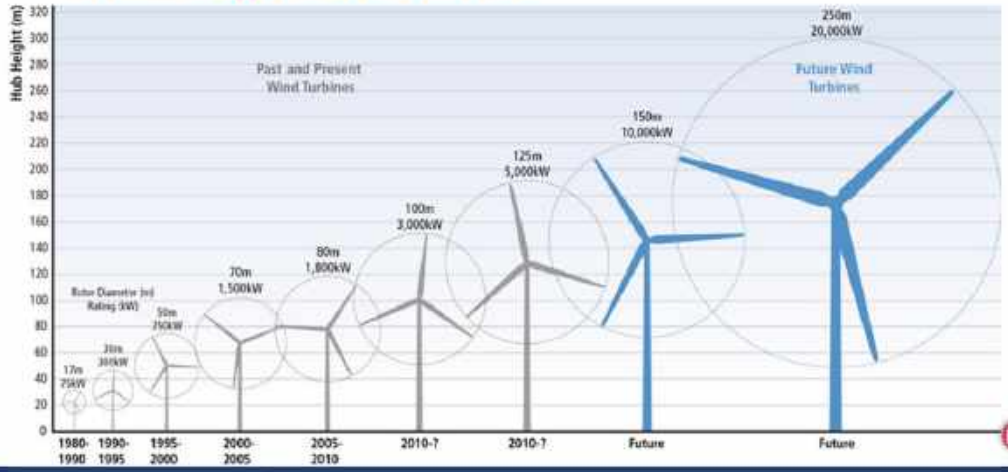
Each time the cumulative production doubled, the price went down by about 19 % over the last 40 years.

Wind yield around the globe

Try it yourself at:

https://globalwindatlas.info/en

Technology development



WORK AND MENTAL

Developed by Katarzyna Kulig-Moskwa & Joanna Guźniczak, UWSB Merito Wrocław.

The course consists of four modules:

1. Introduction to work and mental health
2. Stress and undesirable phenomena at work (burnout, mobbing, discrimination) - recognizing and dealing with them
3. Stress management and resilience building in workplace
4. Creating a menthal health – friendly workplace

In this course, an innovative use of avatars is presented. Avatars play a significant role in enhancing any online learning experience, they provide a human touch. Learners can connect with them in a way similar to how they would address an instructor or mentor in a traditional classroom setting. By watching avatar's face and recognizing some kind of humanoid personality, students feel more engaged and motivated to participate in the course.

Avatars can guide learners through the course content, presenting information, posing questions, and providing tips. They can prompt reflection on the subject matter, encouraging deeper understanding and critical thinking. They can even speak directly to learners, creating

a conversational tone appropriate for the topic. Avatars can help establish trust by fostering connections within the learning community. When face-to-face encounters are unlikely, avatars bridge the gap by creating a sense of presence and familiarity, and therefore they make e-learning courses more personal and friendly. Students may perceive them as approachable guides, enhancing the overall learning experience. They can also serve as role models, demonstrating desired behaviors or skills.

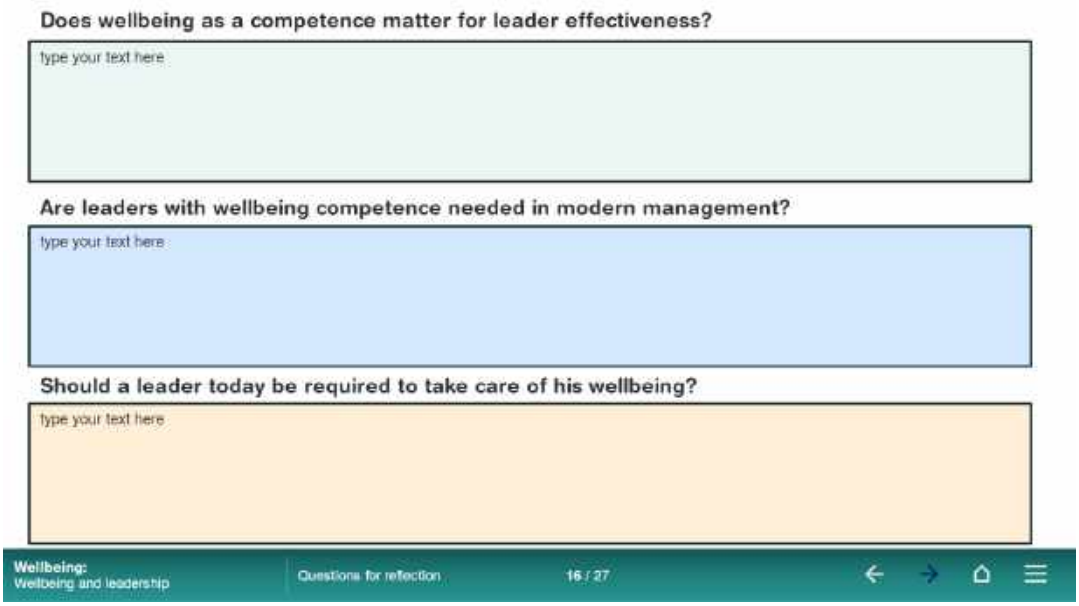
WELLBEING

Developed by Katarzyna Kulig-Moskwa & Dariusz Kwiatkowski, UWSB Merito Wrocław.

The course consists of four modules:

1. The essence and types of wellbeing
2. Wellbeing self - how to take care of yourself
3. Wellbieng organization - the process of building and implementing wellbeing in the organization
4. Wellbeing Leadership

The course features numerous short tests or self-reflection questions. Integrating those elements into online courses enriches the learning experience, promotes self-awareness, and empowers learners to actively shape their educational journey. Short tests and reflection questions encourage active participation. Students eagerly engage in the content, reinforcing their understanding and retaining information more effeciently. Self-assessment helps learners evaluate their strengths and weaknesses, leading to continuous self-improvement. By identifying areas for growth, learners can actively work on enhancing their skills and knowledge.



Self-reflection questions allow learners to examine their thoughts, feelings, actions and motivations. It contributes to their self-concept, which includes traits, abilities, beliefs, values, and roles. Understanding oneself better fosters a stronger sense of identity and personal growth. The act of answering reflection questions or assessing one's knowledge creates a sense of personal investment, motivating learners to stay engaged. It encourages students to analyze their actions and decisions. Reflection questions can be later shared in discussion forums, fostering peer interaction. Students can learn from each other's perspectives and experience.

NO TRACE

Developed by Anna Orzeł & Joanna Guźniczak UWSB Merito Wrocław.

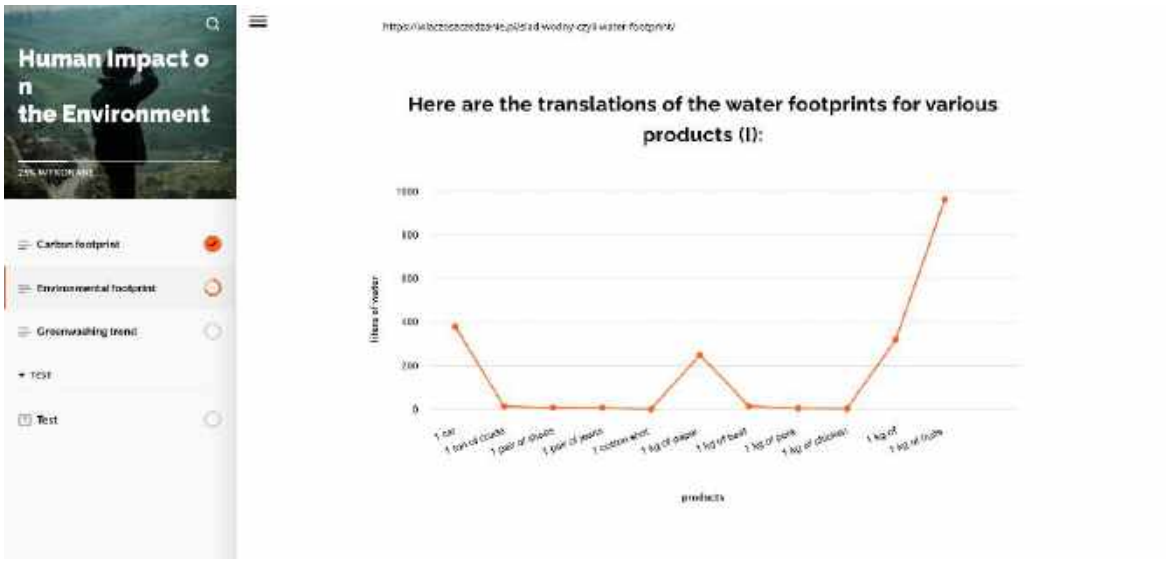
The course consists of four modules:

1. Introduction to Plastic Waste and Its Impact
2. Sustainable Practices to Reduce Plastic Waste
3. Carbon footprint and its importance for the economy
4. Implementation of Sustainable Practices

Learning outcomes:

- The student will understand the problem of plastic waste and its impact on the environment
- The student will learn about sustainable practices to reduce plastic waste
- The student will be able to implement sustainable practices in their daily lives and workplaces

Similarly to other courses, this course includes many interactive and clickable elements, such as sliders, maps and graphs. Interaction i.e. dealing with various elements allows students to get involved in learning, understand the material better and consequently increase their competences in the field. The following examples illustrate this course's characteristics:



The course content is divided further into smaller sections and stages. By starting with foundational concepts and gradually introducing more complex material, students can build a solid understanding of the whole material. When content is broken down into smaller portions, students are able to process and retain information more effectively, which in result ensures their learning outcomes.

IMMERSIVE EXPERIENCES BLUE FARMING

Developed by Julita Markiewicz-Patkowska & Anna Łokietko, UWSB Merito Wrocław.

The course consists of four modules:

1. Concerns the concept of Blue Economy
2. Concerns the idea of blue farming – food production (aquaculture - obtaining food from water environments and plant cultivation based on water media).
3. Concerns the idea of blue farming - renewable energy generation.
4. Concerns the water resources management, protection of water resources, conservation and ocean sustainability.

Learning outcomes:

- The student will be able to define the concept of the blue economy and identify related terms.
- The student will be able to define Blue Farming and identify related terms.
- The student will be able to recognize the reasons why water is an essential global resource.
- The student will be able to explain what it means to be a blue economy entrepreneur.
- The student will be able to recognize the potential of the ocean economy for entrepreneurs.
- The student will be able to recognize the importance of the ocean for a sustainable future.

The aim of the course is to familiarize students with issues related to broadly understood blue agriculture, with particular emphasis on such areas as the concept of blue economy, the idea of blue agriculture and the proper management of water resources.

The effect of participation in the course will be understanding of the idea of blue farming, based on real, practical examples of solutions and their applications in the world. This comprehensive training program aims to raise awareness of the idea of the blue farming trend, i.e. taking care of the quality of all water and using them as a source of food and renewable

energy. It is also intended to help understand how important wise management of water resources is for sustainable development and the environment.

The course consists of many interactive elements, such as clickable icons, tabs with material explanations and additional videos. Videos offer a flexible and engaging way to learn and understand complex topics by students. Compared to still graphics, text, or audio, videos offer a higher recall and retention to an attentive and captive audience. They attract viewer's attention and increase one's engagement. Best practices for creating effective videos include keeping them short, focused, and engaging, with a clear structure and a strong narrative, and contextualizing them with text outside a video. After watching the vide, students can click on the button "Target" to see a written summary of key takeaways from the video.

SMARTER LIVING & WORKING

Developed by Gloriana Sanabria & Joanna Guźniczak, UWSB Merito Wrocław.

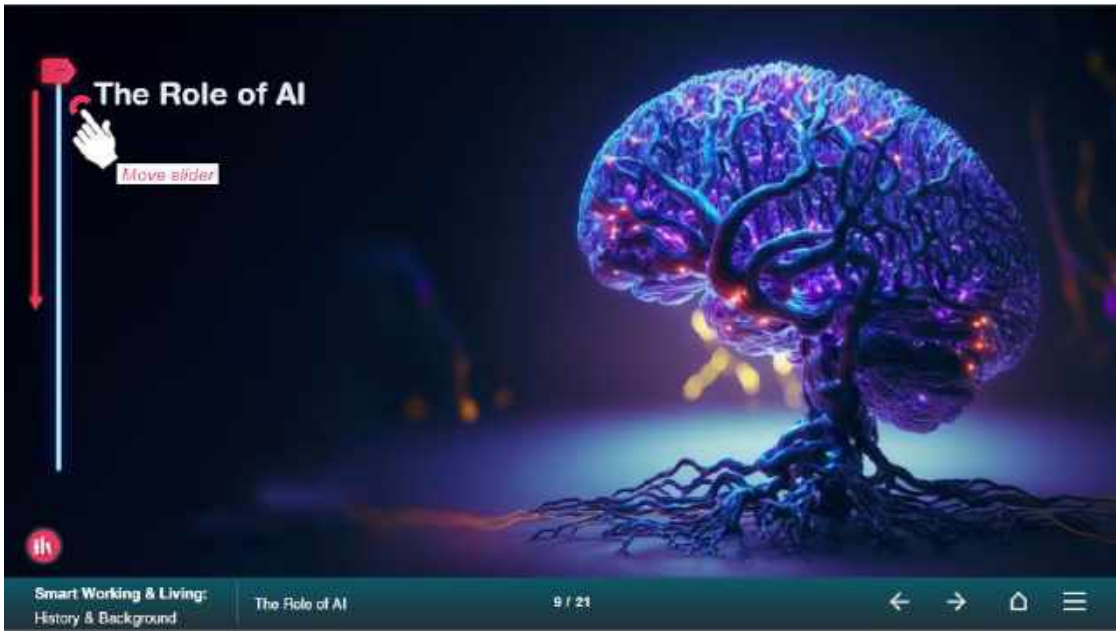
The course consists of four modules:

1. History and brief explanation about smart working and living
2. How to Work Smarter?: Smart Workplace, Smart Communication, Smart Cooperation
3. How to Live Smarter?: Smart Solutions for life and Health Issues
4. How to Become a Smarter Society?: Smart Solutions for Environment and for Our Planet

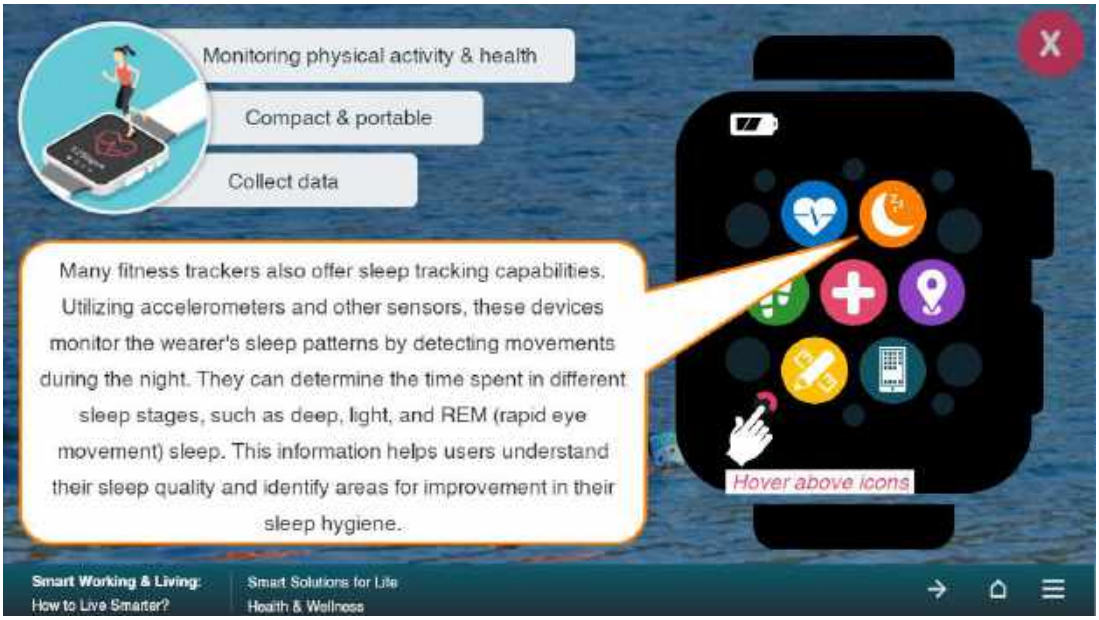
Learning outcomes:

- The student knows and understands selected facts on the topics presented in the module to an advanced level.
- The student is able to explain the relationships between the Internet of Things and Artificial Intelligence and relate them to applications such as Smart lighting or Energy Management.
- The student is able to communicate with the environment using specialized terminology characteristic of the topic of "smart working and living".
- The student is able to take part in a debate - present and evaluate various opinions and positions and discuss them.
- The student undertakes a critical assessment of his knowledge and received content.
- The student recognizes the importance of knowledge in solving cognitive and practical problems related to the Internet of Thoughts.

The course consists of many interactive elements, such as sliders or hovering over icons. Interactivity captures learners' attention. Owing to active participation they better focus on the content, which leads to better memory retention. By interacting with sliders or icons, learners reinforce their understanding of the topic, grasp concepts better and retain information more efficiently.



Sliders enable customization and tailoring the learning experience to individual needs. Hovering over icons can reveal contextual information or provide instant feedback. Those interactive elements allow learners to navigate the course at their own pace. They also facilitate students' self-assessment and enhance their learning retention, which improves the overall effectiveness of the online course.



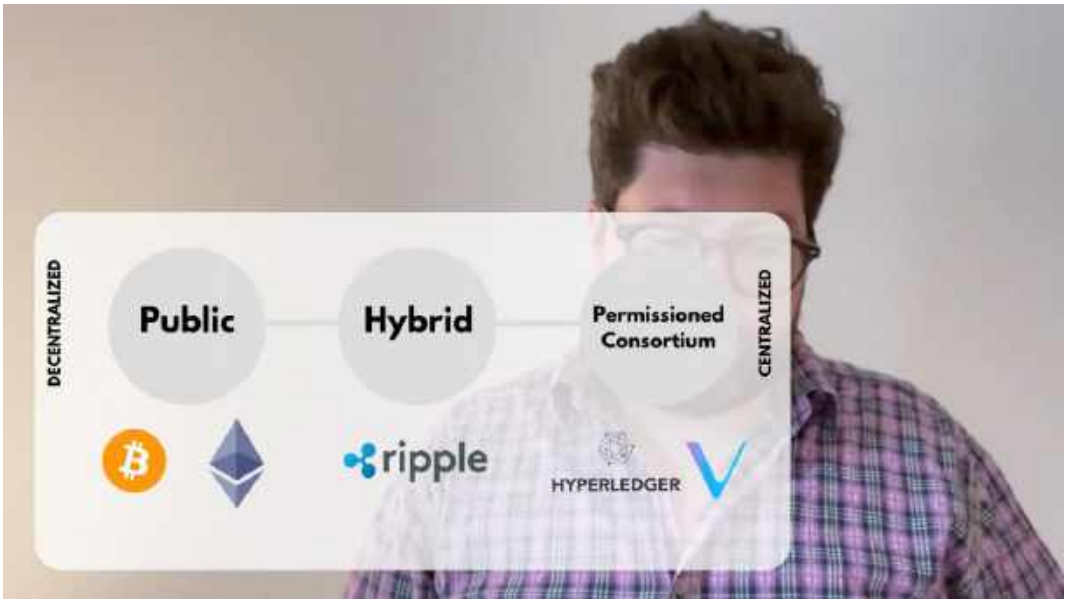
BLOCKCHAIN ECOSYSTEM

Developed by Justyn Czekański & Anna Łokietko, UWSB Merito Wrocław.

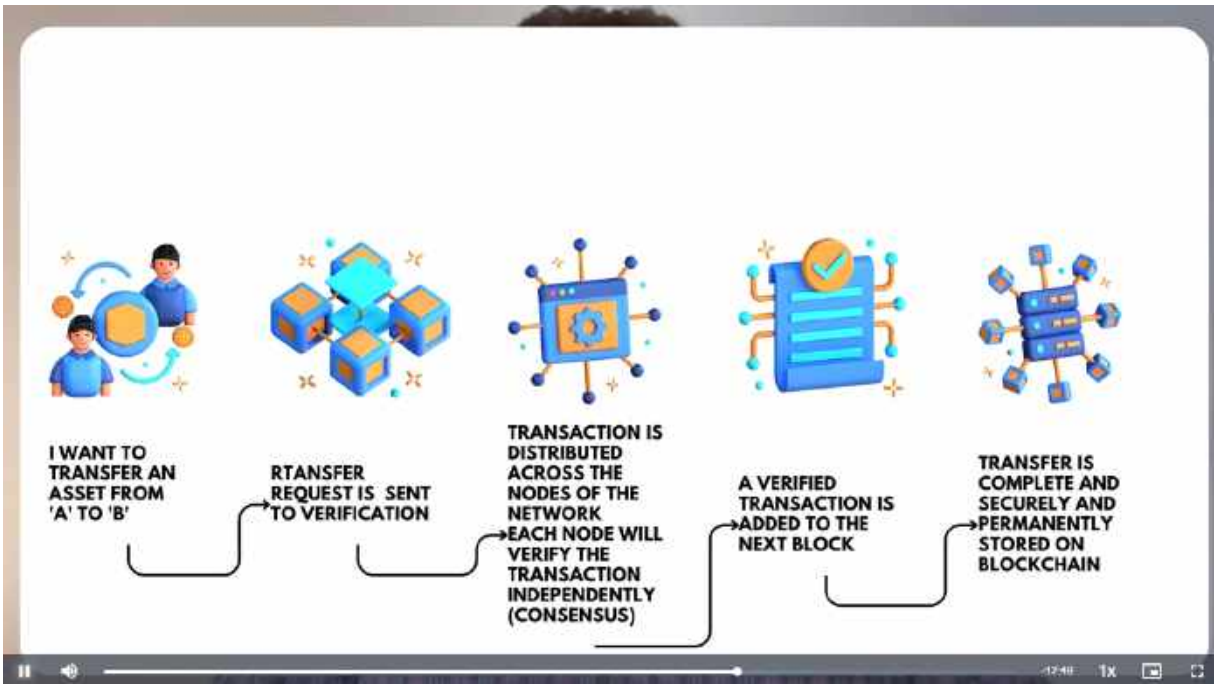
The course consists of four modules:

1. Intro to course and blockchain technology
2. Decentralized finance
3. NFTs
4. DAOs and the Metaverse

In a contrast to other e-courses, this course consists primarily of video materials, with the lecturer describing and explaining the course material. Well-structured videos allow the lecturer to clearly and concisely explain complex topics. Visual demonstrations, animations, and real-world examples enhance students' understanding.



The use of videos is a suitable and efficient tool for students with various learning styles. They combine visual, auditory, and sometimes textual elements, accommodating diverse learners. Videos add life to e-learning making it more enjoyable and engaging. Students are more likely to pay attention and stay focused when content is presented visually in an attractive lively way. Obviously, students can process information more effectively when it's presented in a dynamic format because visual content, such as videos, reduces cognitive overload and maximizes retention.



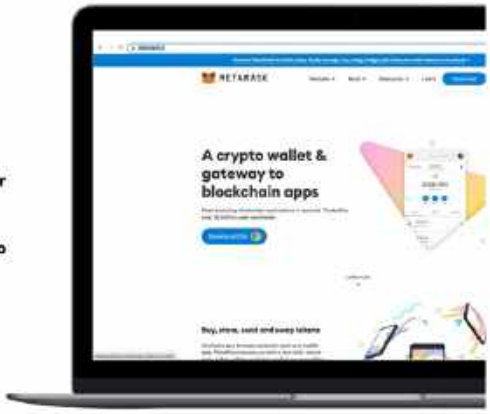
Challenge description

Get yourself an Ethereum wallet

This task won't take longer than 15 minutes. It can be performed in your web browser or you mobile device.

You will set up a non-custodial hot wallet called METAMASK. To do it go to https://metamask.io/ and carefully follow the instructions.

Take notes of the experience, be mindful.
Was anything surprising or difficult in the process?
Write it down in your learning journal!



DEEP IMPACT

Developed by Jarosław Tomaszewski & Joanna Guźniczak, UWSB Merito Wrocław.

The course consists of four modules:

1. Implementation of impacts, using change management methodology
2. Innovation as impacts for economic growth and enterprise development
3. Implementation of impacts
4. Big impacts in practice – case studies

This course provides loads of different additional resources and articles. They provide students with extra context, examples, real-world applications related to the course content and they encourage deeper understanding by offering alternative perspectives and additional valuable knowledge. Diverse resources can make learning more engaging and enjoyable. When students are encouraged to review and study various “real-life” recourses, their interest and motivation tend to increase. The following examples illustrate this course’s characteristics:

Including additional recourses i.e. articles, videos, or expert interviews combines course content to a real-world context. Students gain insight into how the material is applied beyond the online course and this allows them to explore the topic beyond the content provided in the course. They can delve into related topics, expand their knowledge, and satisfy their curiosity. What is more, supplemental resources cater to different learning preferences. They can stimulate less motivated students by providing alternative explanations or additional practice.

MACHINE LEARNING

Developed by Kamil Musiał & Anna Łokietko, UWSB Merito Wrocław.

The course consists of four modules:

1. Machine Learning - introduction
2. Technical look and specific algorithms application
3. Chosen (personal) problems solved with machine learning
4. Chosen (worldwide) problems solved with machine learning and the future of machine learning

Learning outcomes:

- The student knows and understands selected facts on the topics presented in the module to an advanced level.
- The student is able to explain the relationships between supervised and unsupervised learning and relate them to practical applications.
- The student is able to communicate with the environment using specialized terminology typical of Machine Learning.
- The student is able to take part in a debate - present and evaluate various opinions and positions and discuss them.
- The student undertakes a critical assessment of his knowledge and received content.
- The student recognizes the importance of knowledge in solving cognitive and practical problems related to Machine Learning.

Similarly to the courses described above, this e-course consists of numerous videos, together with interactive and clickable elements.Real-life examples are shown on the icons, that allow users to discover them one by one. It holds students' attention and improves their material retention. Additionally, videos are used to further explain complex topics and show examples of machine learning in a visual format, making it easier to understand and remember. The following examples illustrate this course's characteristics:

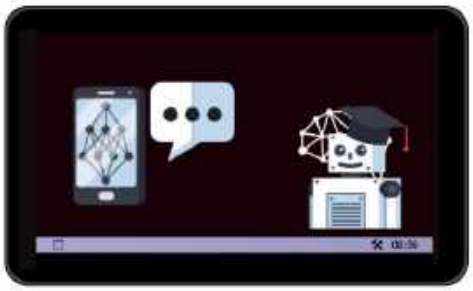
Examples

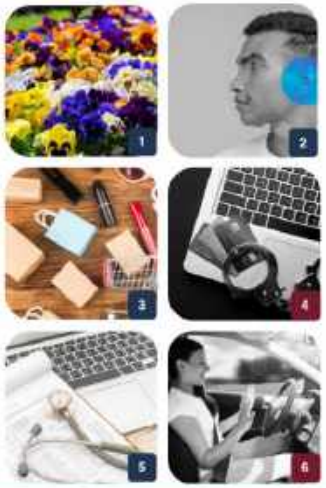
Usage examples

1. Image and speech recognition
2. Natural language processing
3. Recommendation systems
4. Fraud detection
5. Medical diagnosis
6. Autonomous vehicles

Examples

Natural language processing





Future of machine learning

Personalized Education
Machine learning will revolutionize education by creating personalized learning experiences for students. Algorithms will adapt to individual learning styles and paces, delivering custom-tailored educational content. Intelligent tutors and virtual classrooms will provide access to quality education for learners of all ages and backgrounds.

Useful tips for e-course constructors

Creating an engaging and effective e-course can be challenging, but with the right approach, it is possible to create a course that is both informative and enjoyable for the users. Thanks to the experience acquired during the project implementation, the following list of tips for e-course constructors was created:

- **Definition of clear learning objectives:** it is important to define clear learning objectives that align with the course's goals and outcomes. This helps with creating content that is relevant and meaningful.
- **Use of multimedia elements:** Incorporating multimedia elements such as videos, images, and interactive activities helps to keep students engaged and enhance their learning experience.
- **Accessible design:** e-course should be accessible to all students, including those with disabilities. This includes providing captions for videos and ensuring that the course is compatible with assistive technologies.
- **Mutual collaboration:** encouraging collaboration among e-course authors can help them learn from each other, share knowledge and good practices, which results in developing cohesive courses.
- **Regular feedback:** Providing regular feedback to both e-course authors and users is crucial. The feedback for the authors is collected in the testing phase, which allows them to understand the users' expectations more and adjust the courses to better fit the students' needs. Feedback for students can be provided through short tests, quizzes, and discussion forums to encourage interaction among students.

Designing visually attractive and engaging material is a long process requiring creativity and skills. Frequently the biggest challenge is the appropriate selection of graphics, animations, visualization of content and coming up with the entire concept of presenting and digitizing the material. Ensuring the visual attractiveness of the course, so that it does not look like simple slides, is the most complex and time-consuming process. Animations and videos make it much easier to understand the material, and the consistent design and intuitive user interface make using the platform pleasant. Features such as quizzes, drag and drop, open questions, and

clicking on elements on the screen allow students to better absorb knowledge. Division into smaller parts makes it easier to learn the material, and an additional narrator increases the attractiveness of the course. The ability to use the table of contents and modules to control the pace of learning is important in a personalized approach to learning. Other various solutions were used by e-course creators to achieve the interactivity effect and increase the attractiveness of the course:

- Elements that appear at different times, according to what the narrator says
- Visually changing shapes
- Inserting videos and animations
- Inserting elements such as a slider, drag-and-drop or icons that the user should click
- Inserting text
- Inserting sound effects and a narrator
- Text appears from left to right (imitates writing)
- Grouping of thematic threads
- Some elements that appear only after a certain action taken by the user
- Navigation blocks, or setting navigation within slides and between slides
- Creating tests and quizzes with visual and sound effects

Programs, software and tools used to create the e-courses

PowerPoint

Microsoft PowerPoint is a presentation software developed by Microsoft that allows users to create visually appealing and engaging presentations. It is part of the Microsoft Office Suite and offers various features and tools to create multimedia-rich presentations. PowerPoint allows users to combine text, graphics, multimedia elements, and animations to convey information effectively. Some of the most popular features of PowerPoint include animations, designs, the ability to add images and videos, and editing those images and videos. PowerPoint is a powerful and simple-to-use presentation graphics software tool for creating professional-looking electronic slide shows. It is widely used in schools and workplaces to give visually

appealing presentations of information, leading to enhanced engagement. PowerPoint is fully integrated with other tools of the Microsoft Office suite, allowing users to import content created with Excel or Word into PowerPoint, as well as other media such as pictures, audio, and video clips.

Apple Final Cut Pro

Apple Final Cut Pro is a professional video editing software developed by Apple Inc. It is designed for macOS and is widely used by professional video editors. The software has a user-friendly interface that allows users to drag and drop clips into the timeline. Some of its most popular and useful functions include object tracker, cinematic mode and duplicate detection.

Apple Motion

Apple Motion is a powerful motion graphics tool developed by Apple that allows users to create and animate complex images, cinematic titles, fluid transitions, and realistic effects in real time. It is a part of the Final Cut Pro suite and offers various features and tools to create multimedia-rich presentations. Some of the most popular features of Apple Motion include the ability to create 3D animations, particle effects, and motion graphics. Apple Motion is widely used in the film and television industry to create stunning visual effects and animations. It also offers a range of templates and presets that can help users create professional-looking animations quickly and easily. Apple Motion is a powerful tool that can help create stunning visual effects and animations for various projects.

Adobe Illustrator

Adobe Illustrator, a powerful vector graphics editing software by Adobe Inc. The software is widely used by artists and graphic designers to create vector-based illustrations, icons, typography, logos, and other artwork. Some of its most popular and useful features include Freehand drawing, Advanced color options, Layers, Grid feature, Cloud libraries, and Geometric shapes. With tools like the Pen Tool and Pathfinder panel, users achieve precision in drawing and shaping. Typography features offer diverse font options, styles, and effects, with support for text customization. Advanced color management, gradients, and RGB/CMYK modes enhance color control. Layers facilitate organized editing, crucial for artwork and illustrations. The Brush tools and Pathfinder panel contribute to artistic strokes and intricate graphics. The software's effects and filters, including shadows and distortions, elevate artwork. Responsive design is supported with features like the Puppet Warp tool.

Articulate Storyline

Articulate Storyline is a rapid authoring tool that is used to create interactive e-learning courses. It is designed to be user-friendly and allows developers to create engaging online courses containing characters, which help learners understand the content easily. Some of the most popular and useful functions of Articulate Storyline include customizable templates, interactive elements, screen recording, responsive design, and JavaScript support. Storyline provides a range of customizable templates that can be used to create courses quickly and easily. Developers can create interactive elements such as quizzes, games, and simulations, which can help to keep learners engaged and motivated. Screen recording is another useful feature that allows developers to record their screens and add voiceovers, which can be useful for creating software tutorials and other types of training materials. Storyline courses are designed to be responsive, meaning that they will automatically adapt to the screens of

multiple devices, such as laptops, tablets, and smartphones. Storyline also supports JavaScript, which can be used to create custom interactions and animations.

Animaker

Animaker is a cloud-based DIY video animation software that allows users to create animated videos using pre-built characters and templates. It provides a lot of features such as a video creation suite, HTML5 engine, character builder, and a world's largest video asset library. Animaker's video creation suite includes features such as GIF and short video making, live video editing, and subtitle your videos. The character builder feature allows users to create custom characters with over 15 facial features and 10 accessory slots. The software's video asset library includes over 100 million assets such as animated characters, properties, BGs, icons, images, videos, and more. It also provides professionally crafted templates that can be customized and published in under 10 minutes. Animaker's Smart Move feature allows animators to animate complex animations easily, it also provides a feature-rich video-editing suite that includes live video editing and 4K video quality. Animaker has over 100 music tracks and thousands of sound effects in its audio library, which are royalty-free and ready to use. It is a great tool for creating explainer videos with its hundreds of predefined templates.

Doodly

Doodly is a whiteboard animation software that uses the drag-and-drop technique to create animated doodle videos quickly. The platform can create several types of videos, including marketing videos, product promotions, and social media videos. It has a huge library of images and music tracks that gets updated regularly. Some of the most popular and useful functions of Doodly include drag-and-drop interface and offline mode. The software provides a wide

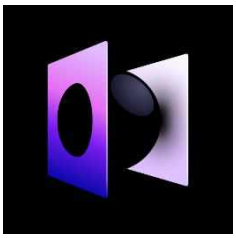
range of custom-drawn images in its library that one can select from to sketch animated doodle videos. Users can also import and use their own media.

Revoicer

Revoicer is a cutting-edge text-to-speech app that allows users to convert text into audio files in real-time. It provides a platform where creators can choose a human voice or AI voice over from different voices available. Revoicer is perfect for creating podcasts, YouTube videos, explainer videos, eLearning courses, audiobooks, and social media content.

Canva

Canva is a free graphic design platform that allows users to create a wide range of designs such as invitations, business cards, flyers, lesson plans, Zoom backgrounds, and more using professionally designed templates. It has a drag-and-drop interface that makes customizing thousands of templates simple and easy. Canva has more than 50,000 templates to choose from, including Zoom backgrounds, posters, presentations, flyers, cards, infographics, business cards, Instagram posts, resumes, invitations, book covers, menus, letterheads, newsletters, photo collages, tickets, bookmarks, invoices, recipe cards, and more. Some of the best features of Canva include its user-friendly interface, wide range of templates, customizable designs, collaboration tools, and mobile app.



LeiaPix

LeiaPix is a 3D animation software that allows users to create 3D animations from 2D images using AI technology. It has a user-friendly interface and offers step-by-step tutorials to help users learn how to use the software. LeiaPix has several features that make it a popular choice for creating 3D animations, including the ability to share 3D content from LeiaPlayer or use LeiaCam to create new 3D memories. The software also allows users to view their creations on VR headsets, import depth maps from LeiaPix to Blender, and view animated images within the software.

DaVinci Resolve

DaVinci Resolve is a video editing software that is used for color grading, color correction, visual effects, and audio post-production. It is developed by Blackmagic Design and is available for macOS, Windows, and Linux. DaVinci Resolve was originally developed by da Vinci Systems until 2009, when it was acquired by Blackmagic Design. DaVinci Resolve is known for its powerful color grading tools that allow users to adjust the color and tone of their videos with precision. Additionally, it has a suite of audio editing tools that allow users to edit, mix, and master audio tracks. The software allows users to collaborate on projects in real-time, making it easy to work with others.

Audacity

Audacity is a free and open-source digital audio editor and recording application software, available for Windows, macOS, Linux, and other Unix-like operating systems. It is the most popular download at FossHub, with over 114.2 million downloads since March 2015. Audacity can be used for post-processing of all types of audio, including effects such as normalization, trimming, and fading in and out. It can record multiple tracks at once, provided the sound card supports it. The software also provides a wide range of effects, generators, analyzers, and tools that can be used to manipulate audio files.

Paint.net

Paint.net is a free raster graphics editor software for Microsoft Windows, developed originally on .NET Framework. It offers a customizable interface and editable layers, which allow creators to perform multi-level image editing. Paint.net provides support for layers, enabling users to edit specific areas of an image. Additionally it offers a wide range of effects such as blurring, sharpening, red-eye removal, distortion, noise, and embossing.

Affinity Designer

Affinity Designer is a vector graphics editor software that is available for Windows, macOS, and iPadOS. It is a powerful tool for creating digital illustrations, concept art, logos, web mock-ups, and more. Affinity Designer provides a wide range of vector pen and shape-drawing tools, dynamic symbols, stroke stabilization, text style management, and vector/pixel export options.

It also offers a variety of raster brush textures that can be added to illustrations, single pixel editing on icons, masking, adding grain to crisp vectors, enclosing and clipping pixel layers. Additionally, Affinity Designer provides a wide range of effects such as blurring, sharpening, red-eye removal, distortion, noise, and embossing. It also has adjustable fade that enables the user to control the shape of the fade to be applied by adjusting various parameters.

Testing and evaluation of selected e-courses by students

The final stage of all e-courses development was the assessment stage i.e. testing two selected, the earliest prepared e-courses by their target group – students. The participants of evaluation of "Wellbeing" and "Immersive Experience. Blue farming" were 101 students representing various fields of study: finances and management, engineering specializations as well as English language studies. The outcomes of evaluation constitute a valuable material to make improvements and corrections in the presently developed e-courses. They will also be vital guidelines in creating e-resources for higher education institutions in a further perspective.

Evaluation of the "Wellbeing" course

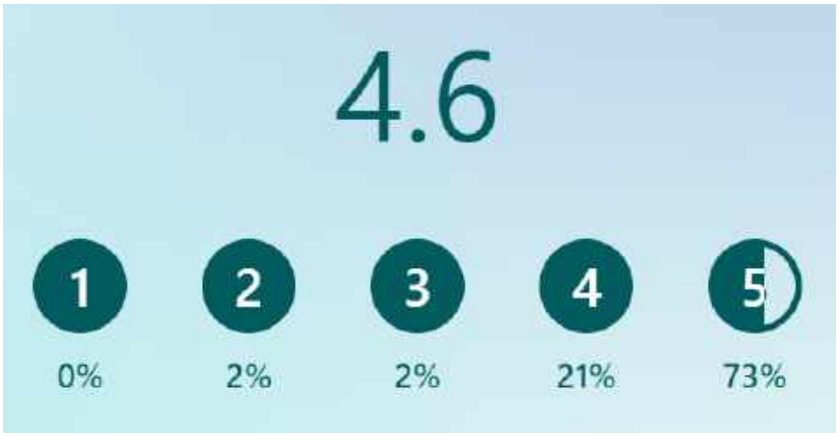
There were 42 participants of testing this course, who after viewing and revising the online material submitted the evaluation online form in MS Forms. Altogether there were 9 questions: 5 closed and 4 open ones, and the gathered answers are as follows:

1) *How do you rate the quality and attractiveness of the course? What is your overall impression? (1 - unattractive, 5 - very attractive)*

2) *How do you assess the substantive value and innovation of the content provided? (1 - very low, 5 - very high)*

3) *How do you evaluate the interactivity and audiovisual form of the presentation of course materials? (1 - very low, 5 - very high)*

4) *How do you rate the quality of navigation and user-friendliness of the course interface? (1 - very unfriendly, 5 - very friendly)*



5) *What were the biggest benefits of participating in the course? Have you learned something new or useful?*

The students evaluating the course have given the following answers:

- The course helps you understand your own needs, values and goals, which in turn contributes to overall awareness of yourself and others.
- It tells you how important it is to maintain balance to maintain good health
- The course included personalized content, the ability to choose the path to listen to the content, and gives me the opportunity to actively participate in the training, which allows me to feel more engaged and find topics that particularly interested me.
- A pleasant form of the course that facilitates learning the material
- I learned a lot of new things that I didn't pay attention to before
- How important mental health is
- Lots of information about mental health
- I learned new vocabulary in English
- A lot of interesting and useful information, one of the best courses
- I was able to learn new things that I hadn't heard before - new experience
- This is how I learned something new and useful because wellbeing is quite an important topic these days.
- For example, I learned how to deal with mobbing
- I learned what wellbeing really is; new knowledge
- I learned to take better care of myself, also at work
- curiosities, learning new concepts from the cultures of other countries
- Everything was audible
- I learned about the mental state during the pandemic

6) *What did you like most about the course? What aspects of the interactive form and substantive content?*

The students evaluating the course have given the following answers:

- A large amount of substantive knowledge, transparency of presentation

- Explaining the problem of lack of rest
- Overall course interactivity, clarity
- Requires clicking to get information – nice!
- Exercise using VR glasses
- You could click on the photos and listen to the text
- interactivity, attractive form - cool
- I really liked the form of the course, its technical and substantive content
- I like team exercises
- I really liked the clear way of presenting it and the good selection of images, Clear explanations of the definition
- The course offers clear, well-organized and understandable content. The content is interesting and easy to “digest”.
- It's good that there is navigation and you can go back and stop the content.
- Possibility of taking part at a time convenient for me and in an attractive form.
- creative and clear transfer of information
- You can click on the screen and maneuver yourself
- I like the included movies

7) *What should be changed or improved in the online course? Please give us your suggestions.*

The students evaluating the course have given the following answers:

- Everything's fine for me
- I think that the course format is the most accessible to me
- I would add some dialogue between two people
- Everything is in perfect order
- It would be nice to choose the language in which we want to take the course.
- I lack a language to choose from, unfortunately not everyone knows English enough to cope with all the words.
- Nothing :)
- I don't know

- Improved mobile version
- I didn't notice any errors
- All is great - nothing needs to be improved
- The quiz in module 2 was stuck on question 5

8) *How do you assess the effectiveness of online teaching based on the tested material?*

The students evaluating the course have given the following answers:

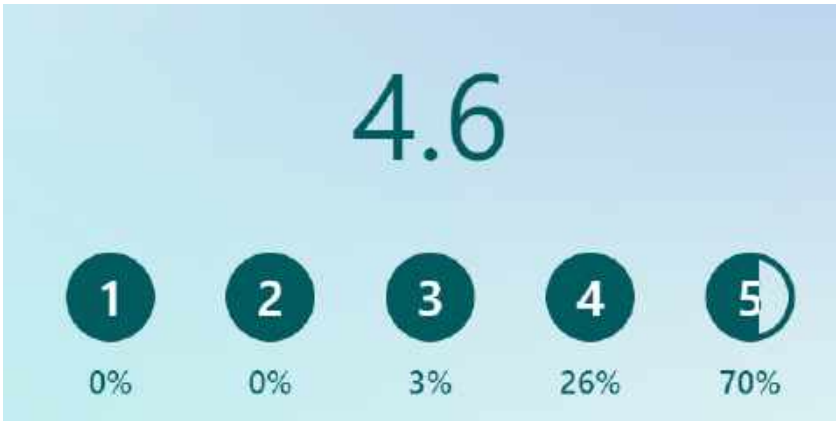
- Very good, it's a good idea
- Online learning can be an effective educational tool, offering a wide selection of educational materials such as videos, presentations, tests and exercises that can help enrich the learning process and facilitate the acquisition of knowledge.
- It was easier to acquire knowledge in the native language.
- Very good, I'm satisfied
- Quite effective
- Online teaching will never be perfect
- easy and pleasant, conducive to remembering
- Excellent, cool
- not very effective

9) *Would you use this form of education again or recommend it to others? (1 - definitely not, 5 - definitely yes)*

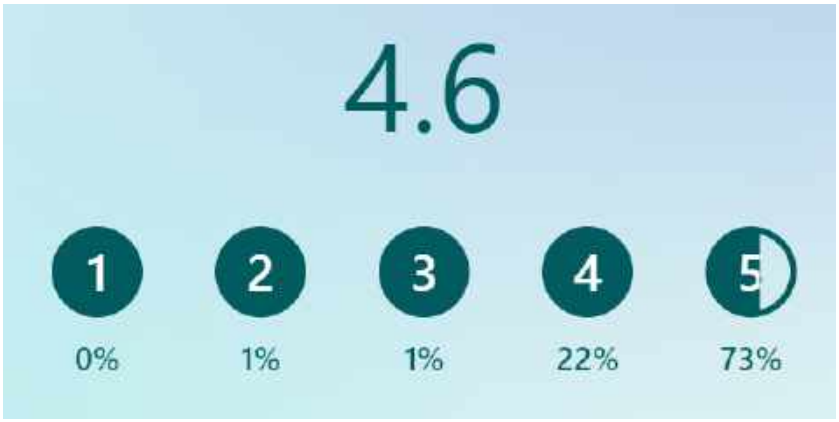
Evaluation of the “Immersive Experience. Blue farming” course

There were 59 participants of testing this course, who after viewing and revising the online material submitted the evaluation online form in MS Forms. Altogether there were 9 questions: 5 closed and 4 open ones, and the gathered answers are as follows:

1) *How do you rate the quality and attractiveness of the course? What is your overall impression? (1 - unattractive, 5 - very attractive)*



2) *How do you assess the substantive value and innovation of the content provided? (1 - very low, 5 - very high)*



3) *How do you evaluate the interactivity and audiovisual form of the presentation of course materials? (1 - very low, 5 - very high)*

4) *How do you rate the quality of navigation and user-friendliness of the course interface? (1 - very unfriendly, 5 - very friendly)*

5) *What were the biggest benefits of participating in the course? Have you learned something new or useful?*

The students evaluating the course have given the following answers:

- yes, extremely useful, new, interesting topic - Deepening awareness of environmental protection
- I like animations, Yes everything was very useful
- Interesting content. I learned about the Blue Economy in an accessible way
- Development of thinking, new, interesting information
- yes, I learned some interesting things. lots of new concepts
- Developing skills, new acquired knowledge

- I learned new, interesting concepts that I didn't know about
- Thanks to the graphics, it was easy to remember the content
- I learned a lot about the environment and its protection
- Lots of interesting facts that I had no idea about
- I only looked at the testing course, but I think that the person who will use it will gain something from it
- First of all, I learned new words in English. Additionally, it was interesting to learn about the Blue Economy.
- An interesting course, easy to use and allowing you to go deeper into the subject
- I expanded their knowledge in the discussed field,
- The thematic scope is too wide
- The course taught me many additional issues regarding Blue Farming
- Increasing knowledge in the field of environmental protection
- The presenter presented materials and issues needed in the work of a production company.
- Yes, I learned a lot about blue farming

6) *What did you like most about the course? What aspects of the interactive form and substantive content?*

The students evaluating the course have given the following answers:

- interactivity, videos, self-testing module, course transparency
- Consistency in tasks, clarity of message, very intuitive
- A form of conveying information, including YouTube videos
- Graphic aspect, interactive tasks, videos, general visualization of content
- Everything was great, the VR classes were the best
- interactivity and audiovisual setting, division into modules
- Visual appearance, Interesting videos, transitions to topics, easily digestible content
- the substantive content was very easy to learn

- New concepts, new issues regarding innovative and sustainable solutions interestingly presented data - in an understandable way
- an achieved power for individual solutions is missing
- You can click on the presentation, various forms of interactive tasks
- Movies, colors, graphics and animations
- A lot of specific content and nice visualizations
- Animations, interesting form, vivid colors, interestingly arranged information on the slides
- I really liked moving between different points or slides by interacting or clicking on the placed points. It gives you the feeling of exploring something and discovering something new.
- A lot of useful and interesting information was provided. Visually, the design is also first class and I want to use it
- interesting and accessible substantive part

7) *What should be changed or improved in the online course? Please give us your suggestions.*

The students evaluating the course have given the following answers:

- I liked the course in its presented form
- the course is well prepared, in my opinion it does not require improvement
- no suggestions
- some elements take a long time to appear or you have to click on them to proceed, which is not clearly marked
- I think everything is fine
- To make images and text appear faster
- Nothing needs to be corrected
- to improve view on mobile devices, ability to "click" animations
- There is probably nothing to improve
- More colors could make these presentations more interesting
- I don't think anything needs to be changed, everything is fine in it

- The course interface and navigation should be slightly improved. Sometimes you cannot move to the next slide or perform another action.
- Divide the course into areas and provide more up-to-date data
- does not require improvement
- The course is conducted to the highest standards
- I have no opinion, everything was cool
- I liked the course, I have no comments.

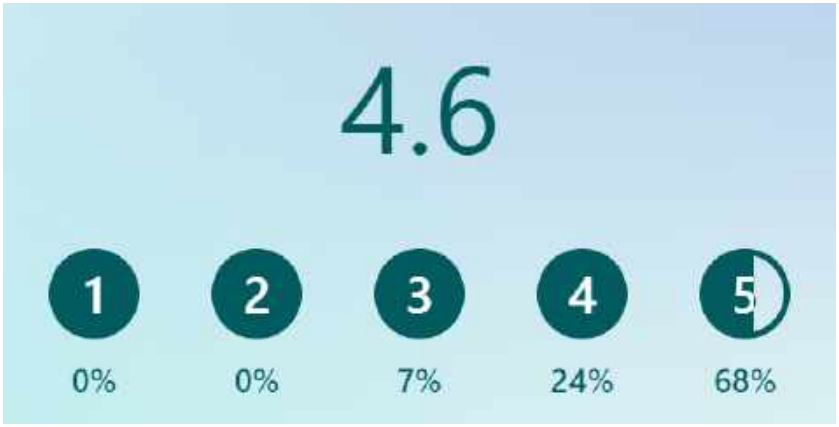
8) *How do you assess the effectiveness of online teaching based on the tested material?*

The students evaluating the course have given the following answers:

- Very good, this way you can learn more effectively than with traditional materials or presentations
- Effective 10/10
- High efficiency, I rate it very good
- All right, cool
- I liked it very much, very good efficiency
- I think this is very effective
- It makes learning easier by presenting knowledge in an interesting way
- Looking at what the course looks like, its design makes learning easier, there are a lot of clear slogans, there is not a lot of boring content to read, only simple key words, and such things have a positive impact on learning
- A nice option for online classes, much better than a regular lecture
- I think that the effectiveness of online teaching based on this material would be high. Not only is the form of the material interesting and interesting, but also transparent and easy to understand.
- Efficiency is good, but working with a lecturer in one room is still the best solution and is not as distracting as looking at the monitor
- It is very good, but due to the necessary travel of many students, lectures could be conducted online - attendance would certainly be greater
- moderately effective

- The online form works very well
- anyone who wants it will get a lot from it
- Is good. Learning using real videos about a given area plus clear substantive explanations

9) *Would you use this form of education again or recommend it to others? (1 - definitely not, 5 - definitely yes)*



Conclusions from testing e-courses

Both tested e-courses have received high scores in each evaluated category – the average grade is 4,7 for the total of "5" being a top grade. The respondents are generally satisfied with the participation in e-courses describing them in open questions as: efficient, friendly, easily navigated and accessible as well as attractive due to their graphical design, high audiovisual quality and interactive content. Students particularly enjoyed the application of videos, they liked idea of a self-testing module and stressed courses' transparency, consistency in tasks and clarity of message. As to the content of both courses, the students claim that they Among listed shortcomings there are comments related to some problems with navigation, especially if you follow a course from a smartphone. It seems that respondents have different learning styles and abilities. While some prefer traditional face-to-face education in a classroom, others do not mind an e-Learning form, however, this group is divided into enthusiasts of very dynamic online contents with lots of clicking and movable elements and those who prefer more static material. Some learners find visual and written material easier to absorb and in case of others audio commentary by the narrator is more appealing and efficient. To meet

different needs and expectations of learners, e-courses developed in the project are purposely not similar – they feature diversified form from more static content for those who feel overstimulated to more dynamic material for students who prefer this way of providing knowledge.

Appreciating international impact of the project – sharing expertise and good practices

Partnership in this education project has undeniable value. This was great opportunity for both institutions to share experience and expertise in the field of environmental studies - sustainable development and innovative forms of didactics supported by ICT. Owing to close cooperation characterized by professionalism, openness and friendliness, both project teams managed to develop intellectual outputs and achieve expected project goals. Cooperation between Norwegian HVL and Polish WSB Merito University in Wroclaw has got a longer history: from Erasmus+ students and staff mobility schemes, projects under Norway Grants and Erasmus+ Strategic Partnership cooperation project carried out with universities in Romania and Slovenia (completed in 2019) and finally this particular Education Program project.

The HVL team made a considerable contribution to the project due to its institutional potential and experience in education and research in social sciences, IT, engineering in relation to environmental sciences. The highly professional project team willingly shared their expertise in those fields, which is reflected in the developed e-courses: Edu Tech and Fossil Fuel Free. Considering the thematic scope of the project – various aspects of sustainable development, the Partner's assets and specialization are complementary to that of the Leader (e.g. logistics, management, environmental and economic sciences). The UWSB Merito in Wroclaw, with substantial technological and organizational capacity regarding e-learning, was made responsible for the technical aspects of the courses' preparation and final adjustment to the functionalities of the OZE platform (free open access resources) and the institutional Moodle platform. The HVL lecturers, apart from developing two e-courses, participated in other important tasks - testing selected e-courses among students and staff, providing materials and support in preparation of the *Handbook of good practices* and presenting intellectual outputs during the planned in the project dissemination events: international online conference

(February 2024), Webinar (April 2024), as well as on other occasions in the form of workshops for HVL and UWSB Merito students and staff, conferences and meetings, on local and international level, dedicated to the topic of sustainable development and/or e-Learning solutions in academic education and beyond.

The participation in the project had benefits both for the Polish and the Norwegian project partners. It resulted in raising academic standards of both institutions by sharing knowledge in environmental science and in the field of innovative cutting edge ICT solutions in education. This way both universities enhanced the quality of teaching, making it updated and appealing to contemporary students, and enriched their development perspectives in didactics. The authors of e-courses believe that all 10 e-courses, owing to their attractiveness and accessibility, will became popular and efficient educational aids in universities throughout Europe. Unlimited transfer of knowledge and promotion of the intellectual output spread among other educational institutions in Europe are substantial asset of the project. Both HVL and UWSB Merito in Wroclaw plan to further extend the scope of cooperation. The bonds of partnership and friendship are important stepping stones on the pathway to all sorts of future cooperation initiatives.

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