EUROPEAN UNIVERSITIES
Erasmus+

EU4Dual

Co-funded by the European Union

EU4DUAL ANNUAL CONFERENCE 2026

ABSTRACT BOOKLET

EU4Dual Conference Organisation Committee

22-23/04/2026

AULA / Bildungscampus 6 / Heilbronn

Dual Innovation for a Healthier Tomorrow

22-23/04/2026 www.eu4dual.education.com

ESTIA INSTITUTE OF TECHNOLOGY · FH JOANNEUM University of Applied Sciences · NJE John von Neumann University · SAVONIA University of Applied Sciences · PAR University of Applied Sciences Velenčiūtė · MCAST · Politechnika Koszalińska · Mondragon Unibertsitatea · DHBW Duale Hochschule Baden-Württemberg

EU4Dual Annual Conference 2026

Conference Proceedings

Table of Contents

Oral Presentations

Healthy Living

Author Christopher Cassar

Affiliation *Malta College of Art, Science and Technology (MCAST)*

Key Words *Spinal health; sedentary lifestyle; preventive health literacy; musculoskeletal prevention; functional screening; segmental motion assessment*

Preventing Musculoskeletal Disorders in Sedentary Europe: A Segmental Screening and Education Framework for Spinal Health Literacy

Background/Context

Musculoskeletal disorders (MSDs) are the most common work-related health problem in Europe, affecting millions of workers (European Commission, 2007). Sedentary lifestyles, repetitive movement, working in the cold or excessive heat are some of the most common causes associated with musculoskeletal complaints and reduced function in Europe, with back pain affecting most European workers. While imaging and posture analysis capture structural features, they overlook early functional changes at individual spinal segments, contributing to delayed awareness and escalating health burdens.

Objective/Purpose This contribution presents an innovative prevention-oriented framework enhancing spinal health literacy through segmental functional screening before chronic symptoms develop. Unlike conventional symptom-driven approaches using global postural assessment, this framework evaluates individual vertebral relationships, comparing each vertebra with adjacent segments. This analyses compensatory patterns and load distribution dysfunctions preceding pain.

Methods/Approach Grounded in biomechanical principles, the framework combines manual segmental screening with educational interventions. Each vertebra is assessed relative to adjacent segments, identifying restrictions before structural pathology develops—analogous to dental examinations detecting early decay. Drawing on preventive dental health models, implementation occurs through workplace wellness programmes and educational settings, with group education creating population awareness and referral pathways for professional assessment. While movement practices support prevention, certain functional restrictions require professional intervention, as muscles cannot restore optimal segmental relationships in all directions.

Results/Findings This evidence-based model addresses critical gaps in current prevention programmes lacking capacity to identify individual segmental dysfunctions. Early pilot observations from educational settings indicate improved participant understanding of segmental spinal function, increased preventive engagement, and earlier professional consultation versus symptom-driven pathways. The framework enables targeted identification of individuals requiring professional care while building broader health literacy.

Conclusion/Implications By strengthening spinal health literacy through segmental screening, this framework supports earlier professional engagement, potentially reducing chronic pain progression and healthcare utilisation. Scalability mirrors dental health models: group education builds population awareness while individuals with functional changes access qualified professionals. This non-pharmacological approach aligns with European priorities for preventive health and sustainable healthcare, addressing musculoskeletal disorder burden in sedentary populations.

An Adaptive Emotion Recognition AI System for Affective Communication in Population with Motor Disabilities

David Antonio Gómez Jáuregui1, Cynthia Lamothe1, Clémence Mainpin2, Maram Djebbi3, Kirmene Marzouki3

1Univ. Bordeaux, ESTIA-Institute of Technology, EstiaR, F-64210 Bidart, France
2Fablab L'Établi, 18 Rue de Moscou, 40140 Soustons, France
3Higher Institute of Computer Sciences, University of Tunis El Manar, Tunis, Tunisia

Individuals with atypical motor abilities face barriers in expressing emotions, as nonverbal cues often deviate from normative patterns, leading to misinterpretation and social isolation [1]. While emotion recognition AI offers solutions, existing models lack adaptability to unique individual profiles [2]. This project aims to design adaptive person-centered emotion recognition system for individuals with motor disabilities. Our methodology combines: (1) multimodal analysis of nonverbal, psychological, and physiological data, and (2) adaptive AI models capable of learning each individual's unique "emotional expressive language." A preliminary study [3] involved three participants with distinct motor profiles, each expressing six emotions in familiar environments (18 videos total). Results demonstrate the feasibility of developing personalized AI that adapts to individual expressive patterns. Building on these findings, we will explore model automatic adaptation through two complementary approaches leveraging multimodal data. First, adaptation via transfer learning will enable rapid adjustment to new users through few-shot learning. Second, interactive adaptation will integrate human feedback loops via interactive reinforcement or machine learning. The model will be integrated into an assistance prototype, enabling caregivers to adapt and fine-tune their interventions according to residents' affective states. This project is aligned with the "Healthy Living" conference track, given the objective to foster social inclusion and enhance emotional well-being.

Key Words *Adaptive AI, Emotion Recognition, Motor Disability, Assistive Technologies*

References:

[1] World Health Organization (2023). Handicap. https://www.who.int/fr/news-room/fact-sheets/detail/disability-and-health

[2] Owen, S., & Maratos, F. A. (2016). Recognition of subtle and universal facial expressions in a community-based sample of adults classified with intellectual disability. Journal of Intellectual Disability Research, 60(4), 344–354

[3] Djebbi, M., Marzouki, K., & Gómez Jáuregui, D. A. (2025). Toward inclusive emotion recognition: Distinctive facial expression patterns in motor disabilities. In 13th International Conference on Affective Computing and Intelligent Interaction Workshops and Demos (ACIIW). Canberra, Australia.

STEP: Developing Trauma-Informed Teaching in European Higher Education

Korhonen Teija[1], Pehkonen Pirjo[1], Aho Jukka[1], Steger Florian[2], Al-Ghurbani Sumaia[2], Lahdo Robert[2], Stuhlpfarrer Elena[3], Hötzl Sabine[3], Turk Marko[4], Tadić Iva[4], Skyba Kateryna[5]

[1] *Savonia University of Applied Sciences, Finland*
[2] *Duale Hochschule Baden-Württemberg, Germany*
[3] *FH JOANNEUM Gesellschaft, Austria*
[4] *Institute for Migration Research, Croatia*
[5] *Khmelnytskyi National University, Ukraine*

Background European higher education institutions increasingly educate students with trauma-related experiences resulting from war, forced displacement, and other adverse life events (1,2). Educators' pedagogical competence is crucial for supporting learning, inclusion, and psychological safety (1,3). Although trauma-informed teaching can enhance student engagement and academic success (1,3), educators' competence in this area remains fragmented and underdeveloped, and research evidence in higher education is limited (1,2).

Purpose The STEP Erasmus+ project (2025–2027) aims to generate research-based knowledge on trauma-informed teaching and to strengthen higher education educators' competence through the development and piloting of a trauma-informed train-the-trainer programme, supported by an open-access pedagogical guidebook.

Methods The project applies a multi-method research and development approach and is implemented in Finland, Croatia, Germany, Austria, and Ukraine. A literature review is conducted, followed by an international expert survey. Based on these findings, a trauma-informed curriculum is developed, operationalised into a train-the-trainer programme, and piloted in participating higher education institutions. The pilot is evaluated in terms of feasibility and applicability across contexts.

Results The literature review identifies key principles, pedagogical frameworks, and competence requirements for trauma-informed teaching. The expert survey highlights educators' development needs in recognising trauma-related responses, fostering psychological safety, and adapting teaching practices. The pilot demonstrates the feasibility and cross-context applicability of the train-the-trainer programme, while the guidebook translates research-based knowledge into practical pedagogical guidance.

Implications: The train-the-trainer programme and open-access guidebook provide a scalable, evidence-based approach to strengthening educators' pedagogical competence and promoting inclusion in higher education. At the EU policy level, the findings support priorities related to inclusion, mental health, lifelong learning, and resilience. For higher education institutions, the project offers concrete tools to embed trauma-informed teaching into staff development, quality assurance, and institutional strategies.

Key Words *Trauma-informed teaching, higher education, psychological safety*

References:

1.Anderson, R. K., Landy, B., & Sanchez, V. (2023). Trauma-informed pedagogy in higher education: Considerations for the future of research and practice. Journal of Trauma Studies in Education, 2(2), 125–140. http://doi.org/10.32674/jis.v2i2.5012

2. Gao, H., Chen, P.-F., & Yao, L. (2023). Trauma-informed practices in higher education: A comprehensive literature review (2015–2023). International Journal of Higher Education, 12(6), 149–162. https://doi:10.5430/ijhe.v12n6p149

3. Carello, J., & Butler, L. D. (2015). Practicing what we teach: Trauma-informed educational practice. Journal of Teaching in Social Work, 35(3), 262–278. https://doi.org/10.1080/08841233.2015.1030059

A Participatory Decision- Support Model for Active and Healthy Ageing in Rural Territories

Eunice Santos1,2,3; Lara Guedes de Pinho2,4 & Helena Arco2,5,6

1 Institute for Research and Advanced Training, University of Évora, Évora, Portugal
2 Comprehensive Health Research Centre, CHRC, LA-REAL, University of Évora, Évora, Portugal
3 Unidade Local de Saúde do Baixo Alentejo, Beja, Portugal
4 Polytechnic Institute of Viana do Castelo, Viana do Castelo, Portugal
5 Polytechnic Institute of Portalegre, Portalegre, Portugal
6 CARE – Research Center on Health and Social Sciences
Corresponding author. Email: helenarco@ipportalegre.pt

Abstract text

Background Population ageing and the increasing burden of chronic disease challenge the sustainability of health systems, particularly in rural and low-density territories. Although midlife is a decisive period for shaping later-life health trajectories, most Active and Healthy Ageing (AHA) policies remain focused on older adults, underutilizing the preventive potential of this life stage. Rural regions face additional constraints: geographic dispersion, limited services availability and fragmented care, highlighting the need for participatory, evidence-informed approaches to identify feasible and context-sensitive interventions. Objective: To identify and prioritize interventions that promote AHA among middle-aged adults living in a rural context. Methods: A participatory qualitative study was conducted in two phases. Phase 1 synthesized quantitative and qualitative evidence from two studies in Baixo Alentejo, Southern Portugal. Quantitative findings revealed associations between sex, employment status and perceived income and physical, mental and social well-being. Qualitative data highlighted expectations regarding autonomy, family and community ties, digital technologies supporting independence and social interaction, and the central role of nurses in health education and follow-up. Phase 2 involved a face-to-face Nominal Group Technique session with 20 intersectoral stakeholders, followed by feasibility appraisal using the APEASE framework. Results: Forty proposals were generated and consolidated into 31 unique interventions. Five priorities emerged: (1) periodic nursing consultations with multidimensional assessment; (2) multidisciplinary primary care consultations; (3) labour time-flexibility measures enabling health-promoting behavior'; (4) digital communication technologies to improve access to health and safety services; and (5) professionally mediated peer-support groups. The highest-ranked interventions clustered within the health pillar and achieved the strongest APEASE scores. Conclusion: Primary care plays a central role in operationalizing AHA priorities in rural settings. Nurse-led and multidisciplinary care, labour flexibility, digital connectivity and peer support constitute feasible, context-appropriate strategies with strong potential to enhance functional capacity, social participation and the sustainability of ageing policies in low-density territories.

Key Words *Active and Healthy Ageing; Rural Health; Midlife Prevention; Primary Care; Participatory Methods*

Assessment of organizational religiosity as a predictor of cognitive decline in older adults: an exploratory transcultural study

Higor Lucas Borges Pereira[1], Guilherme Magalhães Carrilho[1], João de Deus Cabral Junior[2], Vanda Maria Ferreira Simões[2], Bruno Luciano Carneiro Alves de Oliveira[3], Jhule Silva Passinho4, , Cândida Helena Lopes Alves[4], Raul Cordeiro[4], Gilberto Sousa Alves[1]

[1] Translational Psychiatry Research Group, Federal University of Maranhão (UFMA), São Luís, MA, Brazil.
[2] Postgraduate Program in Health Sciences, Federal University of Maranhão (UFMA), São Luís, MA, Brazil.
[3] Department of Public Health, Federal University of Maranhão (UFMA), São Luís, MA, Brazil.
[4] CARE – Research Center on Health and Social Sciences, Portalegre Polytechnic University, Portalegre, Portugal.

Background Organizational religiosity affiliation (ORA) involves regular participation in collective religious activities, which require preserved functional cognitive abilities.
Objective Considering that early cognitive deficits may compromise engagement, this study hypothesized that older adults with lower organizational religiosity would present poorer cognitive performance, even in the absence of established functional impairment.
Methods This cross-sectional community-based study was conducted in eleven quilombola communities in the municipality of Bequimão, Maranhão, Brazil. Participants were recruited through community-based sampling, and the final sample consisted of 222 quilombola older adults (≥60 years). Older adults with significant communication difficulties or severe or degenerative preexisting diseases with marked cognitive or mental impairment were excluded. ORA was assessed using the Duke University Religion Index (DUREL). Cognitive performance was measured using the Mini-Mental State Examination (MMSE) and the Addenbrooke's Cognitive Examination-Revised (ACE-R), and instrumental functionality was assessed using the Pfeffer Functional Activities Questionnaire (PFAQ), all standardized and validated instruments widely used in geriatric research. Comparisons between ORA groups were performed using the Mann-Whitney test. Multiple linear regression models were used to evaluate associations adjusted for age, sex, and education. The study protocol was approved by the Research Ethics Committee of the University Hospital of the Federal University of Maranhão (UFMA) (protocol 2.476.488), and all participants provided written informed consent prior to data collection.
Results The sample was predominantly female, aged between 60 and 69 years, with low educational attainment (Table 1). Older adults with higher ORA showed better scores in MMSE domains related to orientation, command, reading, and writing (Table 2), associations that remained significant after linear regression analysis (Table 3). No significant associations were observed between ORA and ACE-R domains or total score (Table 4). Similarly, functional performance assessed by the PFAQ did not differ between groups (Table 5).
Conclusion The findings suggest that engagement in organized religious activities may reflect preserved cognitive abilities in older adults. Reduced participation in religious practices may represent an early behavioral indicator of cognitive vulnerability, preceding measurable global cognitive or functional decline. These results highlight the potential relevance of social participation as a marker of cognitive health in aging populations. Longitudinal studies are needed to clarify the direction of this association.

Keywords *Social Determinants of Health; Religion; Cognition Disorders; Aged; Ethnic Groups*

Table 1. Sociodemographic profile of the sample

Variáveis	N=222	%

Sex		
Male	104	46.8
Female	118	53.2
Age Group (Years)		
60 a 69	103	46.4
70 a 79	75	33.8
≥80	44	19.8
Escolaridade		
Never attended school	81	36.5
Up to literacy only	66	29.7
Former primary school	64	28.8
From elementary to higher education	11	5.0

Table 2. Comparison of MMSE domains according to organizational religiosity activity (ORA)

MMSE domain	Low ORA (n = 110)	High ORA (n = 112)	Z	p-value	r*
Total Orientation	8.6 ± 1.96	9.02 ± 1.58	-2.07	0.038	0.14
Command	2.76 ± 0.729	2.64 ± 0.721	-2.33	0.020	0.16
Writing	0.3 ± 0.46	0.455 ± 0.5	-2.39	0.017	0.17
Reading	0.227 ± 0.421	0.384 ± 0.489	-2.52	0.012	0.18
Immediate Memory	2.91 ± 0.48	2.89 ± 0.452	-0.88	0.378	0.06
Calculation	1.5 ± 1.62	1.54 ± 1.8	-1.14	0.253	0.08
Delayed Recall	1.82 ± 1.11	2.02 ± 1.01	-0.97	0.331	0.07
Naming	1.58 ± 0.783	1.79 ± 0.56	-0.41	0.681	0.03
Repetition	0.873 ± 0.335	0.884 ± 0.322	-0.22	0.826	0.02
Copying	4.46 ± 0.915	4.63 ± 0.684	-0.35	0.727	0.02
Total MMSE score	20.7 ± 5.23	21.8 ± 4.47	-1.46	0.144	0.10

* r = effect size. Values of r ≈ 0.1 indicate a small effect, ≈ 0.3 a moderate effect, and ≥ 0.5 a large effect.

Table 3. Association between organizational religiosity and MMSE domains after adjustment for sociodemographic variables

Domínio do MEEM	β (Low vs. High OR)	95% CI	p-value
Total Orientation	−0,28	−0,54 a −0,02	0,036

Command	−0,17	−0,31 a −0,03	0,018
Reading	−0,15	−0,27 a −0,02	0,021
Writing	−0,18	−0,33 a −0,04	0,013

Linear regression models adjusted for age (years), sex, and educational level (years of schooling).

Table 4. Comparison of ACE-R domains according to organizational religiosity activity (ORA)

ACE-R domain	Low ORA (n = 110)	High ORA (n = 112)	Z	p-value	r*
Attention and Orientation	13.1 ± 3.33	13.5 ± 3.03	-1.21	0.226	0.08
Memory	9.55 ± 4.74	10.7 ± 4.26	-1.09	0.276	0.07
Verbal Fluency	4.3 ± 2.7	4.44 ± 2.75	-1.32	0.186	0.09
Language	13.2 ± 6.16	14.6 ± 5.61	-1.44	0.149	0.10
Visuospatial Function	6.91 ± 3.57	7.79 ± 3.47	-1.69	0.092	0.12
Total ACE-R score	26.2 ± 11.6	29.2 ± 11.8	-1.55	0.121	0.11

* r = effect size. Values of r ≈ 0.10 indicate a small effect, ≈ 0.30 a moderate effect, and ≥ 0.50 a large effect.

Table 5. Comparison of total PFAQ score according to organizational religiosity ac
tivity (ORA)

PFAQ	Low ORA (n = 110)	High ORA (n = 112)	Z	p-value	r*
Total	5.52 ± 9.08	3.01 ± 6.46	-1.01	0.311	0.07

* r = effect size. Values of r ≈ 0.10 indicate a small effect, ≈ 0.30 a moderate effect, and ≥ 0.50 a large effect.

Healthy Living as a Societal Grand Challenge: Results from an EU4Dual Survey

Authors Friedrichs Kathrin1, Staubmann Wolfgang2, Ebinger Margrit1, Pechstädt Katrin2, Grotz Sonja5, Carabott James3, Minna Karakainnen6, Mayer-Bonde Conny1

Affiliations:

1 Baden-Württemberg Cooperative State University, Stuttgart & Heilbronn, Germany
2 FH JOANNEUM University of Applied Sciences, Graz & Bad Gleichenberg, Austria
3 Malta College of Arts Science & Technology, Malta
4 Mondragon Unibertsitateko Goi Eskola Politeknikoa, Mondragon, Spain
5 PAR University of Applied Sciences, Rijeka, Croatia
6 Savonia University of Applied Sciences, Kuopio, Finland
7 John von Neumann University, Kecskemét, Hungary
8 Koszalin University of Technology

Introduction: Within EU4Dual, one of the three thematic focus areas addresses the societal Grand Challenge "Healthy Living," which aims to improve quality of life, extend healthy life expectancy, and enhance well-being. Healthy Living is multidimensional shaped by physical, mental, social, and environmental factors and requires cross-sector collaboration among education, policy, healthcare, industry, and society. Within EU4Dual, students, healthcare experts, and industry partners from diverse backgrounds engage in "Healthy Living." This survey captures their perspectives and experiences to support the development of future-oriented solutions for a healthier society.

Methods An anonymous, voluntary online survey was conducted within the EU4Dual partner network. Two questionnaires were developed: one targeting students at partner universities and one targeting professionals in health and social care. Data from 264 respondents (161 students, 103 professionals) were analyzed. The survey included single- and multiple-choice questions, Likert-scale items, prioritization tasks, and open-ended questions. Quantitative data were analyzed using descriptive statistics, while qualitative responses were examined through content analysis.

Results Mental health, prevention of chronic diseases, and fair access to healthcare were considered most important, while the rating of their current implementation in health systems lagged behind. Health promotion and disease prevention emerged as the top priority areas for the future across stakeholder groups, including students. Perceived risks for healthy living in the future were physical inactivity and obesity, mental health disorders, and inequalities in healthcare access. Politics and education were identified as key sectors with untapped potential to improve health outcomes, highlighting the importance of structural and preventive approaches.

Conclusion Findings highlight a need for strengthening preventive approaches, mental health, and health literacy—supported by political and educational action—for advancing Healthy Living in Europe. These Findings will be implemented in the Grand Challenge Roadmap and will guide the development of the Joint Dual Master Program.

Key Words *Healthy Living, Disease Prevention, Mental Health, Education and Policy*

15 Years of Social Impact: Dual Learning through Work Placements in Social Care Management at MCAST – Malta

Author:
Ms Antonella Brincat
Senior Lecturer and Student Support Services Coordinator
Institute of Community Services
MCAST – Malta
2) Healthy Living

Background / Context

Over the past 15 years, the BA (Hons) in Social Care Management at the Malta College of Arts, Science and Technology (MCAST) has played a significant role in developing skilled professionals for Malta's social care sector. Since the graduation of its first cohort in 2012, the programme has responded to evolving social needs by combining academic learning with strong practice-based learning. With over 200 graduates to date, the programme has contributed meaningfully to workforce development, leadership capacity, and service quality across diverse social care settings.

Objective / Purpose

The aim is to reflect on the long-term impact of the Social Care Management degree programme by highlighting the value of work placements and the programme's contribution to personal, professional, and sectoral development. It seeks to demonstrate how sustained collaboration between education providers and social care organisations fosters effective practice and employability.

Methods / Approach / Case

The degree programme is delivered over three years and integrates theoretical study with a substantial work placement component. Placement coordination involves collaboration with a wide range of social care organisations, offering students hands-on experience in real-world settings. This reflective account draws on longitudinal graduate data and feedback from former students collected over multiple cohorts.

Results / Findings

Graduates consistently report strong gains in professional competence, confidence, ethical awareness, and practical skills. Work placements are highlighted as particularly impactful, enabling students to apply theory, develop professional identity, and transition smoothly into employment. Many alumni progress into leadership, management, regulatory, and specialist roles, with some securing employment within one of their placement organisations. Feedback also indicates significant personal growth, including resilience, empathy, teamwork, and critical thinking.

Conclusion / Implications

The Social Care Management programme demonstrates the lasting value of practice-oriented higher education in the social care sector. Its sustained success highlights the importance of supportive learning environments, strong institutional collaboration, and experiential learning. The model offers an example for strengthening professional preparation and social impact within community-based education.

Key Words *Placement, Practice, Development, Social care, Social impact*

Dual Innovation for a Healthier Tomorrow: Student-Led Projects for Adaptation and Mitigation in Health Care Institutions

Margrit Ebinger & Christin Loeffler, oral presentation

Prof. Dr. med. Margrit Ebinger, DHBW Stuttgart, margrit.ebinger@dhbw-stuttgart.de

Dr. med. Christin Loeffler, SLK-Kliniken Heilbronn

Background / Context:

Climate change poses a global threat and has direct and indirect effects on infectious diseases, non-communicable diseases and mental health (Hertig et al., 2023). Furthermore, the healthcare sector in Germany, accounting for 5.2% of greenhouse gas emissions, is itself a contributor to climate change and is therefore responsible for contributing to climate protection (Pichler et al, 2019 and Pichler, 2022).

Future health risks will depend not only on the hazards brought about by a changing climate, but also on the ability of health systems to anticipate, prepare for, and effectively manage the associated risks (Ebi & Hess, 2020). Health institutions - including hospitals - are increasingly affected by climate change, facing rising climate-related health risks and the necessity of sustainable transformation. Interdisciplinary and practice-oriented collaboration is vital to address these complex challenges and accelerated action is needed to ensure a healthy future for all (Romanello et al., 2021).

Objective / Purpose:

The aim was to instruct dual students of Applied Health and Nursing Sciences, and students of Health Care Management, to address climate resilience and sustainability in their healthcare institutions. Students therefore designed projects for various target groups focusing on mitigation (reducing greenhouse gas emissions) and adaptation (adjusting to climate change), and formulated evidence-based recommendations in collaboration with their health care institutions.

Methods / Approach / Case:

The development of projects was embedded in the Public Health lecture for Nursing and Health Care Management students at DHBW. The curriculum included an intensive introduction to climate change and its impacts on health, followed by collaborative project development with health institutions and health insurers. Students were introduced to the theoretical framework of Planetary Health, searched intensively scientific literature and engaged with stakeholders to design practical solutions for adaptation or mitigation. They developed evidence-based recommendations tailored to their selected target group, drawing on the guidelines for “Creating Evidence-Based Health Information” and on principles of effective climate communication using the handbook “Talking About Climate” (Schrader, 2022) or the WHO Tool Kit (WHO, 2024). The results were presented either as a scientific poster or as a written assignment, including information materials adapted to the respective target group.

Results / Findings:

Students selected different topics related to climate change-induced illnesses such as climate anxiety, mental health and heat protection, as well as sustainability, energy conservation, waste management and mobility. The adaptation projects resulted for example in the creation of detailed heat protection protocols for vulnerable groups, educational campaigns about climate-related diseases, or supported programs addressing the psychological effects of extreme weather events. Mitigation projects included among others measures to reduce the use of disposable gloves in hospitals, initiatives for climate-friendly staff mobility, and sustainability guidelines for health

insurers. All projects were subsequently published in a final volume (Ebinger & Loeffler, 2025) following their presentation and discussion of barriers and facilitation factors in their institutions.

Conclusion / Implications:

Student-driven projects in health care institutions illustrate the importance of targeted adaptation and mitigation strategies for climate-resilient, sustainable health care. These interdisciplinary initiatives have the potential to generate actionable change, lower emissions, and enhance preparedness for climate-related health risks, even if implementation in practice is challenging in some cases. Incorporating such approaches throughout the health care sector is essential for future climate resilience, even if the individual projects are relatively small in scale.

References:

1. Ebi KL, Hess JJ. (2020): Health Risks Due To Climate Change: Inequity in Causes and Consequences. Health Aff (Millwood). 2020 Dec;39(12):2056-2062. doi: 10.1377/hlthaff.2020.01125. PMID: 33284705.
2. Ebinger M, Loeffler C (Hrsg., 2025): Klimawandel und Nachhaltigkeit in Gesundheitseinrichtungen - Evidenzbasierte Empfehlungen zu den Themen Mitigation und Adaption, Wissenschaftliche Reihe Modul Public Health 2025, DHBW Stuttgart.
3. Hertig E et al. (2023): Klimawandel und Public Health in Deutschland – Eine Einführung in den Sachstandsbericht Klimawandel und Gesundheit 2023, 8 (S3), Journal of Health Monitoring, DOI 10.25646/11391.
4. Luehnen J, Albrecht M, Mühlhauser I, Steckelberg A. (2017): Leitlinie evidenzbasierte Gesundheitsinformation. http://www.leitlinie gesundheitsinformation.de/ (10.3.2026)
5. Pichler PP, Jaccard IS, Weisz U und Weisz H. (2019): International Comparison of Health Care Carbon Footprints. Environmental Research Letters 14 (6):064004. https://doi.org/10.1088/1748-9326/ab19e1
6. Pichler PP (2022): Emissionen des Gesundheitssektors – Status quo und Handlungsbedarf. - In: Graalmann, J., Hirschhausen, E., Blum, K. (Eds.), Jetzt oder nie: Nachhaltigkeit im Gesundheitswesen, Berlin: MWV Medizinisch Wissenschaftliche Verlagsgesellschaft, 39-45.
7. Romanello M et al. (2021): The 2021 report of the Lancet Countdown on health and climate change: code red for a healthy future, The Lancet, Volume 398, Issue 10311, 1619 – 1662.
8. Schrader C (2022): Über Klima sprechen. Das Handbuch, klimafakten.de (11.3.2026)
9. World Health Organization (2024): Communicating on climate change and health: toolkit for health professionals. Geneva, Licence: CC BY-NC-SA 3.0 IGO.

Key Words *Climate Change, Health, Adaptation, Mitigation, Sustainability*

Interdisciplinary Urban Open Classrooms: a new paradigm for mental health literacy and pedagogical innovation

Raul Cordeiro1,2, Bruno Morgado1,2, Pedro Amaro1,2, Luís Vintém1, Magda Cordas1, Pedro Moreira1

1Portalegre Polytechnic University, Portalegre, Portugal

2CARE – Research Center on Health and social sciences

Background / Context Traditional psychopathology education often relies on biomedical models and classroom-confined theory, which can struggle to convey the lived phenomenology of mental suffering. In low-density territories like Portalegre, there is a vital need to bridge the gap between academic clinical knowledge and the community, transforming the surrounding environment into a resource for health literacy.

Objective / Purpose This project aims to implement a "living laboratory" that bridges Nursing and Animation Design. The goal is to illustrate complex psychological concepts—such as loneliness, despair, and the "aesthetics of thought"—by grounding them in the urban heritage and literary history of the city.

Methods / Approach / Case The "Open Classroom" methodology follows a three-phase execution:

The Urban Circuit: A walking tour through four "stations" where concepts are linked to specific local sites and reference authors like writers, painters, poets or other artists.

Interdisciplinary Synergy: Nursing students provide the clinical framework while Animation Design students conduct graphical research to develop 2D/3D animations and mixed-reality supports.

Technological Integration: Abstract psychological states are translated into interactive visual media using techniques like motion capture to enhance sensory learning.

Results / Findings Key outcomes include a significant evolution in students' critical thinking, moving from passive theory to an "active learning" interpretation of the human environment. The project results in a durable, interactive digital pedagogical guide that serves as an internal teaching tool and an external vehicle for community mental health literacy.

Conclusion / Implications By redefining the "campus" as an open space for citizenship, this model demonstrates that "improbable links" between health and art can maximize social impact. It offers a scalable framework for higher education institutions to leverage local geography for innovative, community-engaged education.

Keywords *Open classroom, Pedagogical innovation, Interdisciplinarity, Psychopatholy, Animation design*

User Perspectives on Personalised Nutrition in Health Apps: Results of an Online Survey

Sabrina Antor1,2, Anna Strüven3,4,5, Kathrin Gemesi2, Georges Weis3,4,5, Katja Lotz1, Hans Hauner2,6, Stefan Brunner3,4,5, Christina Holzapfel2,7

1 Baden-Wuerttemberg Cooperative State University, Department of Health - Personalized Nutrition, Heilbronn, Germany.

2 Institute for Clinical Nutritional Medicine, School of Medicine & Health, Technical University of Munich, Munich, Germany.

3 Department of Medicine I, LMU University Hospital, LMU Munich, Munich, Germany.

4 German Centre for Cardiovascular Research (DZHK), partner site: Munich Heart Alliance, Munich, Germany.

5 Center for Sports Medicine, LMU University Hospital, LMU Munich, Munich, Germany.

6 Senior Professorship of the Else-Kroener-Fresenius-Foundation, Technical University of Munich, Munich, Germany.

7 Department of Nutritional, Food and Consumer Sciences, Fulda University of Applied Sciences, Fulda, Germany.

Keywords *Mobile apps, precision nutrition, target grou*

Abstract:

Background Advances in digital health technologies have accelerated the move away from one-size-fits-all dietary guidance towards more individualised nutrition support. In this context, health apps increasingly generate personalised recommendations based on personal data. Yet, little is known about how potential users vary in their willingness to share data, their expectations of app features, and the expected benefits of personalised nutrition recommendations. This lack of insight limits the user-centred development of effective digital nutrition tools.

Objective To investigate associations between individual characteristics and users' attitudes towards personalised dietary recommendations in health apps.

Methods A standardised questionnaire was administered to assess participants' characteristics, including socioeconomic background, anthropometric indicators, and attitudes towards personalised nutrition recommendations in health apps. Behavioural Intention (BI) was measured using the Technology Acceptance Model 3 (TAM3). Data analysis was conducted using RStudio.

Findings The survey was completed by 1,070 participants (42.4 ± 15.3 years; Body-Mass-Index (BMI) 25.6 ± 6.0 kg/m²; 75% female). An exploratory cluster analysis using age, BMI, and BI identified three user groups. The clusters differed in expected benefits, willingness to share personal parameters, aspects of personalised nutrition recommendations, and the rated importance of app features (all $p \leq 0.01$), with small to moderate effect sizes ($\eta^2 = 0.006 – 0.10$).

Conclusions The results suggest that age, BMI, and BI are related to variations in users' attitudes towards personalised dietary recommendations in health apps, although their overall explanatory value was limited. Additionally, considerable heterogeneity in responses was observed within clusters of participants with similar characteristics. These findings suggest the potential relevance of flexible, modular app designs that enable users to adjust features to their individual preferences and expectations.

From digital prevention of type 2 diabetes to community action: designing and piloting intersectoral community outreach sessions

Silva, L.1,2, D'Orey, M.M.3, Carlos, D.4,8, Félix, I.B.2, Camolas, J.2,3,5, Pimenta, N.6,7,8, Godinho, C.2, Marques, C.9, Guerreiro, M.P.2

1 CARE - Research Center on Health and Social Sciences, Polytechnic Institute of Portalegre

2 Egas Moniz Center for Interdisciplinary Research, Egas Moniz School of Health & Science, Caparica, Almada, Portugal

3 ULSSM - Unidade Local de Saúde, Santa Maria, Lisboa, Portugal

4 Faculdade de Motricidade Humana, Universidade de Lisboa, Portugal

5 Faculdade de Medicina da Universidade de Lisboa, Lisboa, Portugal

6 Sport Sciences School of Rio Maior – Santarém Polytechnic University, Portugal

7 Centro Interdisciplinar de Estudo da Performance Humana (CIPER), Faculdade de Motricidade Humana, Universidade de Lisboa, Portugal

8 SPRINT – Sport Physical activity and health Research and INnovation cenTer, Santarém Polytechnic University, Portugal

9 Egas Moniz School of Health & Science, Caparica, Almada, Portugal

Background Type 2 diabetes (T2D) is a major non-communicable disease in Europe, associated with modifiable lifestyle determinants, namely unhealthy dietary patterns and insufficient physical activity. In-person T2D prevention interventions require substantial resources and have proven difficult to implement at scale, partly due to low uptake and poor retention. The VA|PREVENTION project (https://www.vaprevention.org) aims to develop a novel person-centred digital diabetes prevention intervention and to evaluate its (cost)-effectiveness and implementation. Evidence-based educational content on Mediterranean diet and physical activity was co-designed with users and health professionals, tested for comprehensibility, integrated into the web app, and made available as an open-access practical handbook for the wider public, as part of an intersectoral partnership.

Objective To describe the design and preliminary findings of community outreach sessions using the VA|PREVENTION handbook in the two municipalities.

Methods Based on the VA|PREVENTION handbook, the project team developed a slide deck to support interactive sessions on physical activity, dietary choices and sedentary behaviour, alongside a questionnaire to assess knowledge on these topics immediately before and after the session(s). The pilot session involved 30 participants (24 women, 6 men; aged 64–83) from a senior university. Sessions were delivered by an exercise physiologist and a nutritionist from the project team. Pre–post knowledge scores were compared using descriptive statistics.

Results Correct responses on physical activity increased from 20% to 30%, while knowledge of dietary choices improved from 30% to 53%. The largest gains were observed for items on olive oil, legumes, alcoholic beverages and nuts.

Conclusion These findings support rolling out the community outreach sessions as currently designed. Further sessions will assess short-term knowledge gains and key process metrics (reach, participation, satisfaction), and capture common misconceptions to iteratively refine session materials and feed back into the R&D of educational web app content.

Key Words *Type 2 diabetes, community interventions, health knowledge transfer, dietary patterns, physical activity.*

Acknowledgement: This work was funded by FCT – Fundação para a Ciencia e a Tecnologia, I.P., by means of national funds (grant ref. 2022.02969.PTDC - hMps://doi.org/10.54499/2022.02969.PTDC).

EU4Duale Annual Conference 2026

Integrating Wearable Technology and AI for Precision Nutrition in Menopause Management

Chenhui Wang1, Kathrin Friedrichs1, Dorothea Portius1,2, Katja Lotz1 1Corporate State University Baden-Württemberg, Heilbronn
2Institute for Agriculture and Nutritional Sciences, Martin-Luther-University Halle-Wittenberg

Introduction

Menopause is a highly individualized transition that affects physical, psychological, and metabolic health. Despite the substantial variability in symptom presentation and its impact on quality of life (QoL), current nutritional recommendations for menopausal women remain generic. Emerging evidence suggests that personalized nutrition may play a crucial role in alleviating menopause-related symptoms.

Objective

This study aims to explore the integration of smart wearable devices in developing personalized nutrition strategies to optimize menopause management. By continuously tracking physiological parameters, this approach seeks to provide real-time, data-driven dietary recommendations tailored to individual needs.

Methods

This exploratory study has enrolled 200 women aged 45–60. Participants are instructed to wear a fitness tracker to monitor biometric parameters, including heart rate variability, sleep patterns, and activity levels. Dietary intake is assessed through digital dietary records, and standardized QoL and menopause symptom questionnaires (e.g., Menopause Rating Scale, UQOL) are administered. AI-driven data analysis will identify correlations among symptoms, dietary habits, and physiological markers to develop personalized nutritional recommendations.

Results

The study is expected to generate data on the relationships between dietary patterns, physiological markers, and menopause-related symptoms. By analyzing these interactions, the study will identify key nutritional factors influencing symptom severity and overall well-being.

Conclusions

Leveraging digital health technologies and AI-powered analytics, this study aims to establish an innovative, individualized approach to menopause management. The findings will serve as a foundation for precision nutrition strategies, potentially improving symptom relief and long-term health outcomes. This research highlights the role of wearables and personalized dietary interventions in addressing a critical gap in women's healthcare.

Keywords *menopause, personalized nutrition, smart wearables, digital health, quality of life*

Michaela Nuebling, Professor, Faculty of Business, Hotel- and Restaurantmanagement, Baden-Württemberg Cooperative State University (DHBW), Ravensburg

Thomas Dobbelstein, Honorary Professor, Faculty of Management Sciences, Durban University of Technology & Professor, Faculty of Business, Baden-Württemberg Cooperative State University (DHBW), Ravensburg

Think - Prepare - Share: How Food Literacy Based Interventions Help to Promote Healthy Eating Behavior of Students

Food-related behavior affects physical and mental health. Rising intake of ultra-processed foods (UPF) contributes to obesity and chronic diseases. Selecting and preparing healthy food and understanding its impact on health and wellbeing is known as food literacy. Promoting health and preventing chronic diseases requires early interventions that address everyday behaviors. Thus far no study in Germany has explored young adults' food literacy. Therefore, this study investigates food literacy and everyday eating behavior of undergraduate students at DHBW Ravensburg. Based on these findings, two innovative, hands-on cooking workshops were developed in collaboration with a dual partner (nutrition clinic).

Using quantitative research design, data from 905 undergraduate students were analyzed. Food literacy was assessed with the validated Self-Perceived Food Literacy (SPFL) scale. Statistical analyses included exploratory factor analysis, group comparisons, and regression analyses. Workshop development addressed selected learning objectives of the food literacy framework, while focusing on the preparation of healthy, vegan and vegetarian food.

Results indicate that more than half of the students exhibit low levels of SPFL. Higher levels of food literacy are significantly associated with healthier eating behaviors, particularly lower consumption of UPF. In contrast, students with low food literacy report substantially more barriers to healthy eating, e.g. lack of motivation and insufficient cooking skills - factors closely linked to increased long-term risks of chronic diseases. Post-workshop-participation, undergraduates feel more secure in preparing meals from fresh ingredients.

The practical relevance lies in promoting students' food literacy through innovative approaches for health promotion and chronic disease prevention. It highlights food literacy as a key leverage point and demonstrates how empirical findings can be transferred into practice-oriented interventions. Given the increasing consumption of UPF and its association with chronic diseases, understanding and assisting young adults in developing healthy eating behaviors is important and warrants further research and support.

Keywords *Food Literacy, Healthy Eating Behavior, Food-Literacy-Related Workshop Design, Intervention Development*

Leading for Wellbeing: The Role of Willpower

Leadership in contemporary organisations is exercised within increasingly complex and demanding socio-economic contexts characterised by accelerated change, ethical pressure, and sustained performance expectations. In such environments, leadership effectiveness cannot be separated from wellbeing. Leaders who lack self-regulatory capacity are more vulnerable to burnout, ethical erosion, impaired judgement, and diminished ability to sustain healthy organisational cultures. This study explores willpower as a critical yet under-examined dimension of leadership development, with particular relevance to healthy living at individual, organisational, and societal levels.

The study is grounded in the assumption that willpower, understood as the capacity to initiate, sustain, and regulate goal-directed action in the presence of internal and external challenges, is central to ethical leadership, resilience, and sustainable professional practice. The primary aim of the research is to examine how willpower is understood, developed, and enacted by leaders across different organisational and cultural contexts, and to assess its role in supporting healthy leadership and long-term organisational wellbeing.

The research adopts a qualitative, practice-based design. Data are generated through semi-structured interviews with leaders from educational and non-educational sectors across multiple national contexts. The analysis is informed by leadership theories (transformational, distributed, and identity-based leadership) and psychological frameworks related to self-regulation, psychological capital, and resilience.

Findings indicate that willpower is not a static individual attribute, but a developable capacity embedded within a broader developmental process shaped by personal qualities, organisational culture, leadership expectations, and reflective practice. In this context, strong self-regulatory capacity functions as a critical and vital leadership resource, underpinning healthier decision-making, ethical coherence, sustainable and effective stress management, and the capacity to lead change without generating personal burnout or organisational fatigue.

The study contributes to the EU4DUAL focus on healthy living by demonstrating the need for leadership development programmes to explicitly integrate psychological sustainability alongside technical competence. Embedding willpower development within applied leadership education can support healthier leaders, healthier workplaces, and more sustainable institutions.

AI-Supported Parametric Modeling of Dental Prostheses for Biomechanical Analysis

1. Background / Context:

Patient-specific dental prostheses require highly accurate geometric models to ensure proper biomechanical performance and long-term clinical reliability. Current digital workflows based on CT imaging and CAD reconstruction allow detailed finite element analysis of dental restorations; however, the manual creation of high-quality geometric models remains time-consuming and highly dependent on expert knowledge. This limits scalability and slows down the development of personalized treatment solutions.

2. Objective / Purpose:

The objective of this study is to investigate how artificial intelligence can be integrated into an existing parametric modeling framework to automate the reconstruction of mandibular and dental geometries for the mechanical design and analysis of dental prostheses.

3. Methods / Approach:

Previous work established a high-precision NURBS-based parametric model of the mandible and teeth reconstructed from CT data and validated through finite element simulations of bridge-type dental prostheses. Building on this foundation, the present study explores machine learning and deep learning approaches for automatic segmentation of anatomical structures, identification of characteristic geometric reference points, and AI-assisted surface reconstruction. The proposed workflow combines data-driven AI methods with rule-based parametric CAD modeling to generate patient-specific geometries suitable for finite element meshing and mechanical analysis.

4. Results / Findings:

The integration of artificial intelligence into the geometric modeling process is expected to significantly reduce manual modeling time while maintaining the accuracy required for biomechanical simulations. The hybrid AI–parametric approach enables the rapid generation of anatomically consistent models across different patients and anatomical variations.

5. Conclusion / Implications:

The proposed methodology contributes to the development of an automated design pipeline from medical imaging to biomechanical analysis. This supports more efficient development of personalized dental prostheses and promotes improved clinical outcomes by enabling faster and more reliable mechanical evaluation, aligning with the goals of Healthy Living through enhanced patient-specific healthcare solutions.

Key Words *Dental prostheses, Artificial intelligence, Parametric modeling, Finite element analysis, Patient-specific design*

The Silicon-Carbon Paradox: Balancing the Environmental Footprint of AI-Driven CRISPR Innovations

Sven Maricic1-3, Damjana Mihaljevic1, Ivan Tacko1

1Juraj Dobrila University of Pula, Faculty of Engineering, Pula, Croatia
2University of Applied Sciences PAR, Rijeka, Croatia
3University of Rijeka, Faculty of Medicine, Centre for Biomodeling and Innovations in Medicine

Keywords *Sustainability, CRISPR-Cas9, AI, E-waste, Bioethics, Green IT*

Abstract

Digital transformation has significantly expanded global connectivity, but this progress has also intensified environmental concerns. Increasing amounts of electronic waste and the rising energy consumption of large AI computing infrastructures highlight the growing ecological footprint of modern information technologies. This work focuses on the relationship between energy-demanding artificial intelligence systems and their application in CRISPR-based gene editing within medical and agricultural domains. The analysis combines perspectives from information technology, environmental studies, and biotechnology, considering both the environmental impact of digital infrastructure and the practical potential of AI-supported DNA editing. Although CRISPR techniques have demonstrated strong potential in treating genetic disorders and improving agricultural efficiency, their dependence on high-performance computing introduces sustainability challenges that cannot be overlooked. Ethical aspects of gene editing are also considered, particularly the distinction between somatic and germline interventions, as well as concerns related to unequal access to advanced biotechnologies. The results indicate that technological progress in bioengineering may lose its broader societal value if supported by environmentally inefficient digital systems. The study emphasizes the need for integrating sustainable IT practices and clear regulatory approaches in order to balance innovation, ethical responsibility, and environmental impact in future digital–biological systems.

“So, I feel safe “ - Personal values of patients with advanced lung cancer

10. **Background** Current guidelines advocate for the alignment of treatment and care objectives with the individual values and preferences of patients diagnosed with advanced cancer. Nevertheless, the consistent implementation of this patient-centered approach remains suboptimal within hospital settings. To investigate the underlying personal values of individuals with metastatic lung cancer and the modalities through which these are conveyed to physicians, a mixed-methods study was undertaken.

11. **Objective** The aim of this study was to examine the personal values of patients with metastatic lung cancer

12. **Methods** The study encompassed quantitative data from 66 patients with metastatic lung cancer, collected using the Human Values Scale. A comparative analysis was performed with the German cohort from the 9th European Social Survey. Additionally, semi-structured in-depth interviews (n = 17) were conducted and analyzed using qualitative content analysis.

13. **Results** Quantitative analysis indicated that patients assigned greater importance to the value dimensions of self-transcendence (universalism, benevolence; $p = 0.02$) and openness to change (self-direction, stimulation; $p = 0.03$), with an observed increase in self-direction among those with more advanced disease stages. Conversely, values associated with conservation (conformity, tradition, security; $p = 0.04$) and self-enhancement (power, achievement; $p = 0.02$) were considered less significant. Notwithstanding these expressed preferences, qualitative findings demonstrated that personal values and existential concerns were predominantly neglected during clinical interactions. Patients frequently acquiesced to physicians’ treatment recommendations without critical engagement, highlighting a discrepancy in the consideration of patient values and preferences within clinical decision-making.

14. **Conclusion** These findings underscore the necessity for physicians to adopt a proactive approach in eliciting and integrating patient values, thereby facilitating patient empowerment in the decision-making process. The insights gained may contribute to the development of value assessment instruments and targeted interventions aimed at enhancing shared decision-making and promoting care that aligns with individual patient goals.

Key Words *Personal values, Lung cancer, Advanced cancer, Shared decision-making, Advance care planning*

Future of Work

Best Practice Business Outreach: How EU4Dual contributes to regional competitiveness in the Kapfenberg region

Regional competitiveness increasingly depends on the availability of skilled talent, strong university–industry collaboration, and the alignment of education and research with regional development strategies. Dual studies universities play a key role in addressing skills needs while supporting innovation and socio-economic growth at regional level.

This poster presents the EU4Dual Alliance's approach to best practice business outreach and its contribution to regional competitiveness, using the Kapfenberg Industry Region as an illustrative case.

EU4Dual aims to strengthen regional ecosystems by increasing student numbers through dual studies and facilitating the smooth integration of graduates into the labour market. Kapfenberg boasts numerous internationally renowned companies such as voestalpine BÖHLER, Pankl Racing Systems or Lactosan. Building on this strong industrial basis, the region has developed into a vibrant hub for research, development and education, bringing together future-oriented and internationally operating companies with the European talents of tomorrow. With the goal of increasing the competitiveness of the companies and the region alike, EU4Dual partners with the city of Kapfenberg and locally based but internationally operating companies.

To boost our cooperation efforts, we initiated a format called "Creating tomorrow's talents: Together we train the brightest minds" where we engage industry partners through Regional Industry Fora, Industrial Internship Placements, development of an Industry Experts Pool, Employment Fora, Joint Development of Microcredential Programs, Awareness-raising Activities as well as high level Business Round Tables. Indicators are structured along participation, education–industry alignment, and regional impact dimensions. The indicator framework and preliminary results will be presented at the conference.

These efforts will ensure that industry stakeholders actively contribute to the Alliance's activities and demonstrate positive impacts on regional competitiveness, including improved employability, talent retention, strengthened innovation capacity, and the attraction of international students to the region. By aligning education, research, and governance with regional needs, EU4Dual contributes to sustainable socio-economic development of workplaces and offers a transferable model for strengthening regional innovation ecosystems across Europe.

(300 words)

Authors Lydia Tropper (FH JOANNEUM), Thomas Schaffer-Leitner (Municipality of Kapfenberg)

Keywords *EU4Dual, regional competitiveness, business outreach, industry cooperation*

Leveraging Quality Assurance for Innovation and Resilience in Small Higher Education Institutions: Addressing Industry Needs

Authors Curmi, R1; Rizzo, A2 and Montalto, M3

Affiliations *1: Malta College of Arts, Science and Technology*
2: Malta College of Arts, Science and Technology
3: Malta College of Arts, Science and Technology

Abstract

Background:

Higher Education Institutions (HEIs) are currently navigating a paradigm shift where traditional educational models need to adapt to the evolving demands of a dynamic work context, to ensure institutional resilience while operating under significant resource constraints. There is often a friction between quality assurance (QA) and innovation, viewing the former as a bureaucratic 'ticking-the-box' exercise that potentially hinders creative progress. This research addresses the gap in understanding how QA can be transitioned from a compliance-heavy burden into a strategic change agent that provides for a more competitive and sustainable work context.

Objective:

The study aims to investigate the factors that allow small HEIs to integrate quality frameworks with innovative practices. It seeks to create a substantive theory to answer how these institutions can foster QA and innovation that ensures recognized, valuable certifications while remaining viable and agile enough to respond to labour market shifts.

Methods:

This study adopts a grounded theory approach that includes methods triangulation. The study focuses on the higher education sector of the small island state of Malta, utilizing a comprehensive category schema developed from twenty-one in-depth interviews with institutional leaders and regulatory experts. Data was triangulated against regulatory standards, programme data and institutional accounts to identify patterns in leadership dynamics and structural influences.

Results:

Findings indicate that 'soft' QA practices—such as leadership commitment, organizational culture, and employee motivation—are more effective drivers of innovation than 'hard' technical tools. Properly implemented QA was found to enhance institutional attractiveness and performance by ensuring that innovative programs are grounded in academic integrity and industry relevance. Conversely, the high cost of digital infrastructure remains a primary barrier to future-readiness for micro-institutions.

Conclusion For HEIs to serve as catalysts for a resilient workplace, the research in question suggests that they need to migrate from a quality control mindset to a holistic quality culture. Small HEIs often serve niche industry sectors, trying to align to ESG standards whilst being able to innovate without compromising educational quality.

Key Words *Quality Assurance, Innovation, Higher Education, Organizational Culture, Small Institutions.*

References

Al-Imarah, A.A., Shields, R., Kamm, R., 2021. Is quality assurance compatible with technological innovation? Case studies of massive open online courses (MOOCs) in United Kingdom higher education. Quality in Higher Education 27, 4–19. https://doi.org/10.1080/13538322.2021.1830474

Antunes, M., Texeira Quirós, J., Justino, M.D.R., 2018. Role of Management Control Systems in Quality, Innovation and Organizational Performance in Portugal SMES Companies. International Journal of Innovation and Technology Management 15, 1850014. https://doi.org/10.1142/S0219877018500141

Antunes, M.G., Quirós, J.T., Justino, M. do R.F., 2017. The relationship between innovation and total quality management and the innovation effects on organizational performance. International Journal of Quality & Reliability Management 34, 1474–1492. https://doi.org/10.1108/IJQRM-02-2016-0025

Birks, M., Mills, J., 2015. Grounded Theory - A Practical Guide, Second. ed. Sage Publications, London.

Charmaz, K., 2006. Constructing Grounded Theory, First Edition. ed. Sage Publications, London.

Corbin, J., Strauss, A., 2008. Basics of Qualitative Research, Third Edition. ed. Sage Publications, Thousand Oaks, California.

Creswell, J.W., Creswell, J.D., 2022. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 6th edition. ed. Sage Publications, Inc, Los Angeles.

CYQAA, 2015. The Cyprus Agency of Quality Assurance and Accreditation in Higher Education (CYQAA) [WWW Document]. URL https://www.dipae.ac.cy/index.php/en/cyqaa-en/about-us-en (accessed 5.15.23).

EHEA, 2023. European Higher Education Area and Bologna Process [WWW Document]. HISTORY - A common Vision. URL https://www.ehea.info/page-ministerial-conference-bologna-1999 (accessed 5.6.23).

European Commission, 2015. The revised guide to SME Definition. European Commission, Belgium.

Eurostat, 2023. Small and medium-sized enterprises (SMEs) - Structural business statistics - Eurostat [WWW Document]. Small and medium-sized enterprises (SMEs). URL https://ec.europa.eu/eurostat/web/structural-business-statistics/information-on-data/small-and-medium-sized-enterprises (accessed 5.6.23).

Government of Malta, 2023. Exemptions from Tuition Fees at State Educational Institutions [WWW Document]. Exemptions from Tuition Fees at State Educational Institutions. URL https://www.servizz.gov.mt:443/en/Pages/Education_-Science-and-Technology/Education-Services/Higher-_-Tertiary-Education/WEB542/default.aspx (accessed 8.16.23).

Idris, I., 2019. Exploring organizational culture, quality assurance, and performance in higher education. MEC-J (Management and Economics Journal) 3, 166–181.

JobsPlus, 2023a. Jobsplus [WWW Document]. Training Courses. URL https://jobsplus.gov.mt/courses/ (accessed 8.16.23).

JobsPlus, 2023b. Jobsplus [WWW Document]. Training Pays Scheme. URL https://jobsplus.gov.mt/schemes-jobseekers/training-pays-scheme (accessed 8.16.23).

Kettunen, J., 2008. A conceptual framework to help evaluate the quality of institutional performance. Quality Assurance in Education 16, 322–332. https://doi.org/10.1108/09684880810906472

Leiber, T., 2018. Impact evaluation of quality management in higher education: a contribution to sustainable quality development in knowledge societies. European Journal of Higher Education 8, 1–14. https://doi.org/10.1080/21568235.2018.1474775

Levers, M.-J.D., 2013. Philosophical Paradigms, Grounded Theory, and Perspectives on Emergence. SAGE Open 3, 2158244013517243. https://doi.org/10.1177/2158244013517243

Mello Silva, M.F. de, Vargas, E.R. de, 2021. Quality assurance systems: enemies or allies of innovation in higher education institutions? QAE ahead-of-print. https://doi.org/10.1108/QAE-09-2020-0116

MFHEA, 2023. External Quality Assurance [WWW Document]. External Quality Assurance. URL https://mfhea.mt/external-quality-assurance/ (accessed 5.6.23).

MFHEA, 2022. Programme Audit Report - AUM.

MFHEA, 2020. The Malta Qualifications Database [WWW Document]. Malta Further & Higher Education Authority. URL https://mfhea.mt/the-malta-qualifications-database/ (accessed 5.15.23).

MFHEA, 2005. Malta Further and Higher Education Authority [WWW Document]. Malta Further & Higher Education Authority. URL https://mfhea.mt/timeline/ (accessed 5.6.23).

Mourato, J., Patrício, M.T., 2019. Evaluation and control process in higher education institutions: a comparative analysis. QAE 27, 269–284. https://doi.org/10.1108/QAE-02-2019-0019

Newton, J., 2010. A Tale of Two 'Qualitys': Reflections on the Quality Revolution in Higher Education. Quality in Higher Education 16, 51–53. https://doi.org/10.1080/13538321003679499

Owlia, M.S., Aspinwall, E.M., 1997. TQM in higher education - a review. International Journal of Quality & Reliability Management 14, 527–543. https://doi.org/10.1108/02656719710170747

Psomas, E., Antony, J., 2017. Total quality management elements and results in higher education institutions: The Greek case. Quality Assurance in Education 25, 206–223. https://doi.org/10.1108/QAE-08-2015-0033

QEF, 2010. Quality Board for Icelandic Higher Education [WWW Document]. URL https://qef.is/ (accessed 5.15.23).

QQI, 2015. Quality and Qualifications Ireland unveils new award brand identity [WWW Document]. Quality and Qualifications Ireland. URL https://www.qqi.ie/news/Quality-and-Qualifications-Ireland-unveils-new-award-brand-identity (accessed 5.15.23).

Riccomini, F.E., Cirani, C.B.S., Carvalho, C.C. de, Storopoli, J.E., 2021. Educational innovation: trends for higher education in Brazil. International Journal of Educational Management 35, 564–578. https://doi.org/10.1108/IJEM-07-2019-0245

Roffe, I.M., 1998. Conceptual problems of continuous quality improvement and innovation in higher education. Quality Assurance in Education 6, 74–82. https://doi.org/10.1108/09684889810205723

Schneckenberg, D., 2009. Understanding the real barriers to technology-enhanced innovation in higher education. Educational Research 51, 411–424.

Sciarelli, M., Gheith, M.H., Tani, M., 2020a. The relationship between quality management practices, organizational innovation, and technical innovation in higher education. QAE 28, 137–150. https://doi.org/10.1108/QAE-10-2019-0102

Sciarelli, M., Gheith, M.H., Tani, M., 2020b. The relationship between soft and hard quality management practices, innovation and organizational performance in higher education. The TQM Journal 32, 1349–1372. https://doi.org/10.1108/TQM-01-2020-0014

Seyfried, M., Pohlenz, P., 2018. Assessing quality assurance in higher education: quality managers' perceptions of effectiveness. European Journal of Higher Education 8, 258–271. https://doi.org/10.1080/21568235.2018.1474777

Singh, M., 2010. Quality Assurance in Higher Education: Which Pasts to Build on, What Futures to Contemplate? Quality in Higher Education 16, 189–194. https://doi.org/10.1080/13538322.2010.485735

Strauss, A., Corbin, J., 1998. Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory, Second edition. ed. SAGE Publications, Inc, Thousand Oaks.

van Veggel, N., Howlett, P., 2018. Course leadership in small specialist UK higher education – a review. International Journal of Educational Management 32, 1174–1183. https://doi.org/10.1108/IJEM-09-2017-0250

Venkatraman, S., 2007. A framework for implementing TQM in higher education programs. Quality Assurance in Education 15, 92–112. https://doi.org/10.1108/09684880710723052

World Economic Forum, 2020. Is this what higher education will look like in 5 years? [WWW Document]. World Economic Forum. URL https://www.weforum.org/agenda/2020/11/higher-education-online-change-cost-covid-19/ (accessed 8.24.23).

Zgaga, P., 2019. The Bologna Process in a global setting: twenty years later. Innovation: The European Journal of Social Sciences 32, 450–464. https://doi.org/10.1080/13511610.2019.1674130

Zhu, C., 2015. Organisational culture and technology-enhanced innovation in higher education. Technology, Pedagogy and Education 24, 65–79. https://doi.org/10.1080/1475939X.2013.822414

SME Readiness for Industry 5.0: Maturity Insights and Actionable Implementation Pathways in Germany– A Cooperative Research Study

Prof. Dr. Katja Stamer DHBW Stuttgart/Horb, Germany ORCID: 0000-0003-3610-9721
k.stamer@hb.dhbw-stuttgart.de

Eléonore Scholten, Business Engineering student DHBW Stuttgart/Horb, Germany w23053@hb.dhbw-stuttgart.de

Key words *Industry 5.0; SME Maturity Assessment, Implementation roadmap*

Background SMEs face a dual transformation: Industry 4.0 remains only partly realised, while Industry 5.0 introduces additional requirements for human-centric, sustainable, and resilient production systems. Given limited resources and strategic capacity, SMEs struggle to address both agendas simultaneously. Despite rising interest, empirical evidence on Industry 5.0 readiness in SMEs remains scarce, resulting in a notable decision gap for managers [1].

Objective This study empirically examines SME readiness and maturity for Industry 5.0 by assessing conceptual understanding, technological prerequisites, and organisational preparedness [2]. It addresses the research question: What is the current maturity level of SMEs regarding their understanding, technological readiness, and organisational capacities for Industry 5.0, and which barriers hinder widespread implementation? Further, the study provides recommendations structured along a roadmap for guiding SME transitions [3] [4]

Methods/Approach Building on a literature review comparing conceptualisations of Industry 5.0 [5] and synthesising existing empirical studies on the implementation status in SMEs, the research employs a mixed-methods design. It comprises (1) a quantitative employee survey (n = 61) applying a maturity model across the three Industry 5.0 pillars—human-centricity, sustainability, and resilience; (2) semi-structured interviews (n=25) with executives/representatives from German SMEs to capture strategic and organisational perspectives.

Results Findings indicate moderate Industry 5.0 readiness of German SMEs: sustainability is partly established, while human-centricity and resilience are weakly anchored. Barriers include fragmented IT infrastructures, interoperability issues, skills shortages, limited organisational learning, and current economic challenges Employees call for improved training and modernised digital systems; managers stress that digitalisation must enhance—not replace—human work, and note that resilience planning remains incomplete.

Conclusion Although technological foundations exist, SMEs require substantial capability development in human-centric and resilience dimensions. Recommended actions include targeted skill-building, embedding sustainability and resilience in everyday operations, bridging remaining Industry 4.0 gaps through digital roadmaps, and adopting enabling technologies such as cobots, digital twins, AI, and IoT within ethical and governance frameworks.

References:

[1] Rejeb A; Rejeb A; Zrelli I; Süle E (2025) Industry 5.0 as seen through its academic literature: an investigation using co-word analysis https://doi.org/10.1007/s43621-025-01166-0

[2] Hein-Pensel F; Winkler H; Brückner A; Wölke M; Jabs I; Mayan IJ; Kirschenbaum A; Friedrich J; Zinke-Wehlmann C (2023) Maturity Assessment for Industry 5.0: A review of existing maturity models. Journal of Manufacturing Systems 66 https://doi.org/10.1016/j.jmsy.2022.12.009

[3] EU Commission (2024). ERA Industrial Technologies Roadmap on Human-Centric Research and Innovation for the manufacturing sector. Luxembourg: Publications Office of the European Union, 2024. https://research-and-innovation.ec.europa.eu/knowledge-publications-tools-and-data/publications/all-publications/industrial-technologies-roadmap-human-centric-research-and-innovation-manufacturing-sector_en

[4] Piccarozzi M; Silvestri L; Silvestri C; Ruggieri A. (2025) Roadmap to Industry 5.0: Enabling technologies, challenges, and opportunities towards a holistic definition in management studies. Technological Forecasting and Social Change (205) https://doi.org/10.1016/j.techfore.2024.123467

[5] Ghobakhloo M; Iranmanesh M; Tseng ML; Grybauskas A; Stefanini A; Amran A (2023) Behind the definition of Industry 5.0: a systematic review of technologies, principles, components, and values . Journal of Industrial and Production Engineering. https://doi.org/10.1080/21681015.2023.2216701

Aneta Olga Hapka, Koszalin University of Technology

Beyond Firewalls: How Human Factors, Procedures, and Legacy Systems Shape Cybersecurity in the

Abstract

The rapid digitalisation of academic and institutional environments has created new socio-technical vulnerabilities that extend far beyond traditional cybersecurity concerns. This presentation examines how human behaviour, organisational procedures, and legacy technological systems jointly shape security risks in the Future of Work. Drawing on a series of real-world case studies involving compromised accounts, flawed access-control mechanisms, outdated RFID/NFC technologies, and social engineering attacks, the study demonstrates that the most critical weaknesses arise not from technology itself but from its interaction with users.

The analysis highlights how routine practices, misplaced trust, procedural gaps, and cognitive shortcuts enable attackers to bypass security controls, escalate privileges, or impersonate legitimate users. At the same time, the findings show that even low-cost procedural and technical adjustments – combined with targeted awareness-building – can significantly enhance resilience. The project integrates perspectives from electronics, computer science, and human-centred security to propose practical prototypes and interventions that strengthen user defences against both technical and social attacks.

The work aligns with the EU4Dual Future of Work priorities by emphasising human-centric design, ethical technology use, and the role of lifelong learning in building safe, inclusive, and sustainable workplaces. It offers actionable insights for institutions seeking to modernise their security posture while supporting the well-being and competence development of their staff and students.

Key Words *social engineering , human-centred security, access control weaknesses, procedural gaps, lifelong learning in security*

The abstract is aiming the Future of Work track.

Collaboration in a Virtual Environment – Results of the funded FFG-Project "ICON – Immersive Co-Creation Hub"

K. Zamazal – FH Joanneum Graz

Abstract text:

A part of the Austrian FFG funded Initiative COIN (Cooperation & Innovation) the project "ICON – Immersive Co-Creation Hub" researches on the potential of different methodologies for collaboration in virtual space.

An interdisciplinary, networked collaboration laboratory has been established, it connects VR and AR hardware such as data glasses, tablets, and smartphones with multisensory elements like motion tracking, data gloves, pressure-sensing insoles, and application software, making them accessible to different fields of study.

In parallel, a standardized methodology for collaboration is being developed to create a shared socio-technological foundation, which will subsequently be tested in selected applications across various disciplines.

The project has been successfully finished and approved by the FFG end of 2025 after 4 years of intensive research with results that can be experienced for industrially used working and training environments, physio-therapy education, digital twin scaling and collaborative scenarios towards Industry 5.0.

The presentation of findings and results ends with a "Technology Roadmapping" for Immersive Applications as final work package of the Project.

Key Words:

VR/AR, Immersive Technology, Virtual Collaboration, Future Working Environment

Multiphysics Driven Optimisation of Wire Bond Looping for Improved Reliability in Semiconductor Packaging

Stephen Sammut1*, Kevin Formosa2

1 Malta College for Arts Science and Technology

ORCID 0000-0002-4993-4416

2 STMicroelectronics Malta

**Corresponding author email: stephen.sammut@mcast.edu.mt*

Background / Context

Wire bonding remains the dominant interconnect technology in semiconductor packaging, supporting the manufacture of billions of devices annually and a global industry valued in the tens of billions of euros. Despite this maturity, bond loop design is still established through laborious experimental work, exposing manufacturers to risks such as wire sweep, electrical shorting, and heel related failures that affect yield, reliability, and time to market. While prior research has demonstrated three dimensional finite element prediction of loop formation and separate reliability models, these approaches are often applied in isolation, limiting their usefulness for optimising new wire alloys, capillary designs, and increasingly demanding package architectures.

Although loop geometry is typically assessed in terms of manufacturability and static reliability, different wire bond loop shapes can also exhibit markedly different susceptibility to vibration, making their dynamic behaviour an important but often overlooked aspect of package robustness.

Objective / Purpose

This project investigates how a coupled multiphysics modelling workflow can be used to predict and optimise wire bond loop formation while directly reducing stress concentrations associated with reliability risk. The aim is to identify controllable process parameters and capillary trajectories that produce manufacturable, repeatable loop geometries with reduced heel and interface stresses.

A further objective of this work is to develop COMSOL based models to evaluate how different loop shapes respond to vibration, including their resonant frequencies, mode shapes, and vibration amplitudes under dynamic loading.

Methods / Approach / Case

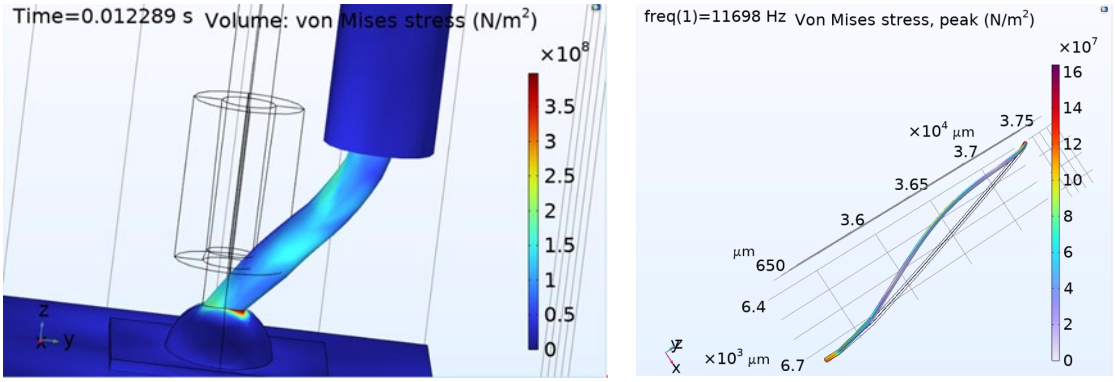
Both two-dimensional and three-dimensional COMSOL Multiphysics models of wire looping are being developed, integrating structural mechanics with rate-dependent, elastoplastic behaviour of copper and gold wires. The framework focuses on stresses induced during capillary motion, capturing the influence of trajectory control, wire feed, deformation history and contact conditions. Parametric sweeps and sensitivity analyses are conducted over key variables including loop height and shape targets, wire diameter and alloy properties, capillary path and geometry, and clamp or tension representations. Candidate process windows are evaluated using geometric metrics such as clearance and loop symmetry, alongside mechanical indicators including peak stress and strain concentrations at critical regions, particularly near the heel and along the free-air loop.

Additional COMSOL structural dynamics models are being developed to compare candidate loop geometries by simulating their vibration response and extracting resonant frequencies, dominant modes of vibration, and displacement amplitudes under representative excitation conditions.

Results / Findings

The models reveal non-linear interactions between process parameters, material behaviour, and loop geometry that significantly influence loop stability and stress localisation. Compared with baseline conditions, optimised parameter sets reduce predicted peak stress concentrations while maintaining clearance and consistent loop profiles.

The vibration modelling shows that loop shape has a strong influence on dynamic response, with certain geometries exhibiting lower resonant frequencies and larger amplitudes that indicate greater susceptibility to vibration induced instability.



a b

Figure 1 – (a)Time resolved von Mises stress field showing mechanically induced stresses in the wire during capillary driven loop formation (b)Frequency response showing stress at peak amplitude on wire loop.

Conclusion / Implications By linking loop formation physics directly to reliability relevant stress metrics, the workflow advances beyond isolated modelling or empirical optimisation. Practically, it provides a transferable framework for optimising wire alloys, capillary design, and loop geometry, shortening development cycles and supporting more reliable electronics.

By incorporating COMSOL based vibration analysis into the workflow, the framework can be used not only to optimise loop formation and stress distribution, but also to identify loop shapes with greater dynamic robustness through their resonant frequencies, vibration modes, and displacement amplitudes.

Key Words *Wire bonding optimisation; Multiphysics modelling; Semiconductor packaging; Process reliability; Digital twin manufacturing.*

Acknowledgements

The authors wish to acknowledge the Research Fellowship Scheme, MCAST and STMicroelectronics for supporting the project. Project “ScienceSemiCon” was financed by the Ministry for Education, Sport, Youth, Research and Innovation.

From Entrepreneurial Learning to the Future of Work: Evidence from EU4Dual practice-based mobility within European innovation and entrepreneurship ecosystems

Authors Matti Laitinen[1], Jérémie Faham[2], Bojan Jovanovski[3], Arnaud Catinot[2]

Affiliations *[1] Savonia UAS, Finland, [2] ESTIA Institute of Technology / ESTIA Entreprendre, France, [3] FH JOANNEUM UAS, Austria, EU4Dual European University Alliance*

15. Background / Context:

Rapid technological change, evolving work patterns, and increasing skills uncertainty are reshaping the Future of Work in Europe. Dual higher education and entrepreneurial learning environments play a central role in developing human-centered competencies such as collaboration, problem-solving, entrepreneurial agency, and the ability to navigate uncertainty, which are essential for innovation-driven and technology-mediated work contexts. However, empirical evidence on how short-term entrepreneurial and innovation mobility experiences translate into concrete outcomes and mindset change remains limited.

16. Objective / Purpose:

This paper examines how practice-oriented entrepreneurial learning and cross-border mobility experiences supported through the EU4Dual network contribute to skills development, entrepreneurial identity formation, and early career trajectories relevant to the Future of Work, including entrepreneurship-based job creation and self-employment pathways.

17. Methods / Approach / Case:

The study applies a qualitative multiple-case approach based on EU4Dual entrepreneurial and innovation mobility programs across partner institutions. The study covers 10 student mobilities conducted since 2023 and involves 10 mentors. Data sources include program documentation, participant reflections, selected participant interviews, staff exchange insights and evidence from regional startup ecosystems and innovation platforms. The analytical framework integrates entrepreneurial learning theory, work-integrated learning models, and European policy orientations on employability and lifelong learning, with analysis focusing on skills development, mindset change, and entrepreneurial outcomes. Potential self-evaluation bias is acknowledged, given that the study examines the network's own programs.

18. Results / Findings:

Results indicate that entrepreneurial mobility generates tangible outputs beyond academic learning objectives, including prototype development, product concepts with intellectual property potential, transnational collaboration-oriented mindsets, transversal skills, early-stage commercialization, access to technological infrastructures, and progression into incubators. Participants demonstrate mindset shifts, transitioning from students to entrepreneurial actors capable of navigating uncertainty, cross-cultural collaboration, and innovation-driven work contexts.

19. Conclusion / Implications:

Entrepreneurial learning mobility has largely remained practice-based. This study provides a scientific analysis based on qualitative interviews with program participants and positions

entrepreneurial learning mobility within the academic literature on entrepreneurship education and mobility-based learning. Entrepreneurial learning mobility emerges as a scalable, human-centered response to Future of Work challenges. By aligning findings with European policy frameworks on skills (Union of Skills), employability (ESCO), innovation-driven growth, and the EU Startup and Scaleup Strategy, this paper outlines pathways for extending these experiments into structured European frameworks for dual education, entrepreneurship, and lifelong learning.

Key Words *Entrepreneurial Learning; Dual Higher Education; Innovation Ecosystems; Entrepreneurial Mobility; Future of Work*

How to Shape Future-Ready Talents through Theory, Practice, and Research – First Success Stories from FH JOANNEUM

DI Dr.-Ing Holger Friehmelt, Mag.a Gerrit Landgrebe-Nesitka, Mag.a Claudia Meister, Stefan Muckenhuber BSc MSc PhD; FH JOANNEUM GmbH, Austria

Background and Motivation

Technological progress is steadily reshaping education and workforce development. Teaching staff and HR professionals at universities of applied sciences face growing challenges in recruiting and developing qualified personnel. While solid technical foundations remain essential, new content and digital learning media are increasingly required. At the same time, technology alone does not solve learning challenges, and human cognitive limits must be considered. Effective education therefore requires a balanced mix of proven teaching methods and innovative approaches. Teachers and students must engage in "new learning and learning new things," while HR must support continuous upskilling and instructional development.

Approach and First Results

Student Example: An EU4DUAL partner university launched its first Arctic Expedition Team course in 2025, combining interdisciplinary classroom instruction with intensive fieldwork. Within this 5-ECTS course, students and faculty jointly planned and organized a Greenland expedition, selecting use cases and technical prototypes from student proposals. Classroom learning in Arctic safety, geophysics, and technology was directly applied during field research at the Sermilik station. Students conducted autonomous sensing, drone operations, and AI-supported observations under real conditions and examples will be shown in the presentation. The close integration of lectures and hands-on teamwork strengthened technical competence, teamwork, and leadership skills for both students and staff.

Staff Example: To empower and motivate teaching staff to address complex research questions and engage effectively with today's students, a new advanced combustion laboratory was established. The aircraft propulsion systems group integrates theory - covering thermodynamics, CFD multiphase flows, and full propulsion systems—with experimental validation on test rigs, including hydrogen fuel systems. PhD candidates and students are directly embedded in ongoing research, linking curricula with cutting-edge sustainability topics. This approach strengthens practical skills, increases research motivation, and supports industry-relevant innovation, while also enabling staff to pursue their own doctoral research and continuously update teaching content. The presentation will contain quantitative and qualitative substantial of this hypothesis.

Conclusion and Outlook Building on these initial successes, the interdisciplinary team plans to further expand hands-on learning and applied research environments. The goal is to strengthen future-oriented skills, improve staff recruitment and development, and better prepare students and educators for the evolving demands of the future workforce.

Key Words *Students Motivation, Staff Empowerment, Applied Sciences, Fieldwork, Arctic Expedition, Research Laboratories*

Educational Foundations of the Future of Work: Examining Success Determinants Among German Unicorn Founders through Higher Education

Dr. Árpád Szőcs, John von Neumann University, Faculty of Economics and Business

In the evolving landscape of the "Future of Work," unicorn startups - privately held technology firms valued at over US$1 billion - act as primary engines for high-value job creation and digital sovereignty. Germany has established itself as the European Union's leader with 33 unicorns by 2026, yet the specific interplay between formal education and such hyper-growth remains underexamined.

This study identifies the success determinants behind Germany's recent startup surge, specifically investigating why 76% of these companies achieved unicorn status after 2021. It explores how higher education backgrounds and regional innovation clusters intersect to facilitate global scaling. The research utilizes a quantitative analysis of 33 German unicorns and their 66 founders. The framework evaluates founders' educational trajectories (domestic vs. international degrees), geographical founding patterns, and the institutional characteristics of the chosen innovation ecosystems. The research employs a quantitative approach where qualitative indicators were transformed into a series of dummy variables, enabling a systematic correlation analysis between founders' educational trajectories and their subsequent entrepreneurial success.

Results indicate a high geographical concentration in Berlin, while Munich ranks second, successfully leveraging its synergy between elite technical universities (e.g., TUM) and large-scale corporate headquarters. Data confirms that founders are highly educated; however, a significant gender gap exists: only 3% (2 out of 66) of founders are women, revealing a critical disparity in high-tech entrepreneurship.

While Germany's "Entrepreneurial University" model effectively fosters technical success, the findings highlight a need for policy interventions to improve gender inclusivity. To ensure a resilient and sustainable future of work, the ecosystem must move beyond academic excellence and prioritize diverse leadership pathways through enhanced community partnerships.

Key Words *startup, unicorn, innovation ecosystem, higher education, future of work*

The Future of Work as a Knowledge and Governance Challenge: Intellectual Capital, Human–AI Collaboration, and Organizational Adaptability

Authors and affiliations
Manfred Bornemann
Intangible Assets Consulting GmbH
bornemann@ia-consulting.at
Kay Alwert
alwert. GmbH &Co. KG
Kay@alwert.com
Maria Kretschmer
Fraunhofer IPK
Maria.kretschmer@ipk.fraunhofer.de
Ronald Orth
Fraunhofer IPK
Ronald.orth@ipk.fraunhofer.de
Holger Kohl
Fraunhofer IPK
Holger.kohl@ipk.fraunhofer.de
Abstract text

Background / Context Digitalization, artificial intelligence, sustainability requirements, and demographic change are transforming work across sectors. Knowledge-intensive work is becoming the dominant mode of value creation. Established management approaches, primarily process- and efficiency-oriented, show structural limits under these conditions. At the same time, AI-based systems alter task allocation, learning trajectories, and accountability in organizations. The future of work therefore raises fundamental questions of knowledge, competence, and governance.

Objective / Purpose This contribution conceptualizes the future of work as a strategic challenge centered on Intellectual Capital. It examines how Human, Structural, and Relational Capital can be aligned to support competence development, human–AI collaboration, and continuous organizational adaptation. The paper asks how organizations can be designed to remain effective, accountable, and resilient under conditions of permanent transformation.

Methods / Approach The paper applies a conceptual and practice-based framework grounded in the Intellectual Capital Statement – Made in Germany, complemented by international standards for Knowledge Management and AI Management (ISO 30401, ISO/IEC 42001). The analysis integrates organizational theory, including dynamic capabilities and ambidexterity, with empirical insights from applied cases in knowledge-intensive organizations. Recent developments toward AI-supported and near-time Intellectual Capital monitoring are included.

Results / Findings The findings indicate that future work performance depends on the interaction of three factors. Human Capital must emphasize learning capability, critical judgment, and responsibility. Structural Capital requires robust processes, data infrastructures, and governance mechanisms for human–AI cooperation. Relational Capital enables network-based value creation and shared learning. AI reshapes work by reducing routine activities and accelerating knowledge flows, with direct implications for competence formation.

Conclusion / Implications Intellectual Capital offers a coherent strategic framework for shaping the future of work. It connects organizational design, leadership, and governance under AI conditions. The framework supports decision-making in knowledge-intensive and highly regulated environments and contributes to current debates on sustainable work systems.

Key Words *Intellectual Capital; Dynamic Capabilities; Human–AI Collaboration; Knowledge-Intensive Work; AI Governance*

A review of Explainable AI-Driven Decision Support for Transparent Budget Allocation in Multi-Campus Higher Education

Frank Samson1,2, Muthoni Masinde1, Sabine Moebs2
1 Duale Hochschule Baden-Württemberg (DHBW), Heidenheim, 2 Central University of Technology (CUT), Free State

Abstract text

The demand for data-driven decision support systems to manage complex budgeting processes across multi-campus environments in higher education institutions is increasing. Compared to non-multi-campus institutions, which have simpler budgeting structures because budget data are presented in fewer, more standardized formats. Regardless of demand, the adoption of advanced artificial intelligence (AI) techniques in the multi-campus budgeting process is constrained by a lack of transparency, weak alignment with governance policies, and heavy reliance on supervised learning. More challenges exist in decentralized budgeting contexts, where heterogeneous financial structures, evolving policies, and stakeholder accountability demands complicate automated decision-making. This study conducted a literature review to map methods, identify gaps, and derive design requirements for explainable AI budgeting systems. Specifically, it addresses the research question: What methods and design requirements are necessary to develop explainable AI for budgeting systems in multicampus higher education institutions? To answer this question, a systematic search of the literature was conducted across various research databases, including Springer, IEEE Explorer, and Google Scholar. The results were synthesized to present prior research on unsupervised learning, anomaly detection, limitations of supervised learning, and explainability techniques in financial analytics and decision support systems. Results found that unsupervised learning and anomaly detection methods effectively identify latent spending patterns, inefficiencies, and financial risks in data-sparse settings and under structural change. However, their limited interpretability restricts their practical adoption in high-stakes institutional settings for equity and fairness in campus allocations, as well as by legal and compliance constraints. Similarly, supervised learning suffers from inconsistent and subjective labelling practices, reducing generalizability and policy relevance. To address these gaps, the study proposes an Explainable AI framework that combines model-agnostic explainability techniques, interpretable-by-design models, and visual analytics as complementary strategies to enhance transparency, trust, and accountability. That supports policy-responsive and auditable resource allocation decisions across campuses while preserving analytical flexibility

The actual use of AI tools by young people, as exemplified by an IT competition

Abstract text

Generative artificial intelligence tools have emerged during the education process of current high school students. In most cases, students were not taught how to use AI tools purposefully, so their contact with such tools often consisted of trial and error, and the results obtained were not verified for correctness. This leads to a situation where students blindly rely on AI tools and expect AI to replace them in their daily work. In this context, the question arises: will students who have not been deliberately taught AI tools be able to use such tools to develop coherent and useful artifacts?

The study was conducted on a sample of 37 high school students who participated in an IT competition based on the hackathon formula. The competition was carried out in four categories: IT, industry, social sciences, and artistic works. The competition required that 70% of the content developed be generated by AI. The research focused on the competition entries, the prompts

developed, and the opinions gathered during the competition. The results indicate that most participants were able to use AI tools as support to facilitate selected tasks (e.g., developing a website prototype). Only some of the participants developed complete and coherent solutions. Observations indicate that not everyone knows how to use AI tools, which points to the need for education on the effective use of AI. In particular, education on how to use AI tools to facilitate work or increase efficiency, while maintaining the quality of such work at the level performed by humans.

Key Words *generative artificial intelligence, hackathon, practical use of AI, youth*

Generative AI Literacy for Emerging Professionals: Tool Selection and Attribution Gaps in Engineering Students

A J Millward-Sadler – FH JOANNEUM

As Generative AI (GenAI) systems become embedded in everyday knowledge work, employers increasingly expect graduates to demonstrate GenAI literacy as a transversal workplace skill. Universities preparing students for the workplace therefore face a dual challenge: to define what GenAI literacy entails and to address observable gaps in emerging professionals' abilities to prompt, evaluate, select tools, attribute use and make integrity-oriented decisions.

Building on earlier work that examined prompting practices and introduced a bifurcated prompting framework embedding post-response evaluation (Millward-Sadler, 2026), this study focuses on two further dimensions of Rapanta et al.'s (2025) GenAI literacy framework: tool selection and attribution. Survey data from bachelor-level engineering students (n=50) and master's level students across two European institutions (n=36) are used to explore how far students can be considered GenAI-literate in ways that are meaningful for future workplace practice.

Preliminary analyses indicate that students across academic levels rely predominantly on a single general-purpose chatbot, with limited awareness or uptake of research-oriented and domain-specific tools. Where wrappers are used, they are mostly language-focused (e.g., DeepL, Grammarly) rather than geared towards research or synthesis of information. Early evidence from thesis declarations further suggests that students struggle to attribute GenAI use transparently and accurately.

This work argues that these patterns signal a GenAI literacy gap that cannot be addressed by exposure alone. It makes the case that it is currently necessary to adopt a systematic approach to GenAI literacy development across each of the four dimensions—prompting, evaluation of output, tool selection and attribution and integrity-oriented decision making—if students are to participate effectively with academic integrity in their studies and then transfer this as a transversal skill to GenAI-mediated workplaces.

Keywords *GenAI literacy, emerging professionals, future of work*

Bridging Health Promotion and Educational Workplaces: A Voice Health Intervention for Preschool Teachers

Background / Context Healthy living at work includes safeguarding the physical resources professionals rely on to perform their roles sustainably. In education, the voice is a primary work tool, yet vocal health remains underrepresented in occupational health and workplace health promotion strategies. Teachers are known to experience increased vocal load and related health risks (Nusseck et al., 2020). Preschool teachers are particularly vulnerable due to prolonged speaking in noisy, high-demand environments. Preventive voice education programs have been proposed as feasible measures to mitigate occupational vocal strain (Vermeulen et al., 2022; Lin et al., 2023).

Objective / Purpose This study examined whether a brief, workplace-based voice education program can improve vocal well-being among preschool teachers and explored its relevance as an interdisciplinary intervention linking health promotion, occupational health, and educational practice.

Methods / Approach / Case A total of 76 preschool teachers from Tuzla in Bosnia and Herzegovina participated and were assigned to two conditions based on personal work schedules. The intervention group (n = 31) received a four-hour face-to-face voice training session combined with written educational materials, while the comparison group (n = 45) received written materials only. The training addressed healthy voice use, vocal load awareness, and practical strategies for everyday teaching situations, drawing on principles of functional voice work (Huestegge & Polz, 2015). Outcomes were assessed at baseline and three months post-intervention using the Vocal Fatigue Index (VFI) and blinded perceptual voice quality ratings (GRBAS). Data were analyzed using nonparametric procedures.

Results / Findings Both groups reported improvements in vocal well-being over time. However, participants who attended the interactive training demonstrated broader and more consistent improvements than those receiving written information alone. Blinded perceptual evaluations supported these findings, indicating the added value of direct training.

Conclusion / Implications Brief, workplace-based voice education can support vocal well-being in voice-intensive professions and represents a feasible component of workplace health promotion. Integrating vocal health into healthy living strategies in educational workplaces may contribute to sustainable working conditions and long-term workforce well-being. The findings highlight the importance of interdisciplinary collaboration between health professionals, voice specialists, and educational institutions (Ibrahimagić et al., 2025).

Keywords *Vocal Health; Preventive Voice Training; Teachers; Noisy Workplace*

AI-DRIVEN DUAL INNOVATION FOR HEALTHIER WORKPLACES: INTEGRATING FINANCIAL AND MANAGERIAL INNOVATION THROUGH ARTIFICIAL INTELLIGENCE

Mercy Minoo Kavele1, Dorota Jelonek2, Csaba Balint Illes1

1John von Neumann University Doctoral School of Management and Business Administration, Budapest, Hungary

2Department of Management Information Systems, Czestochowa University of Technology, Częstochowa, Poland.

Abstract

Background The increasing focus on healthier workplaces has intensified organizational reliance on artificial intelligence (AI) to support employee wellbeing amid rising healthcare costs and workforce stress. While AI-driven financial innovation and AI-enabled managerial innovation are increasingly adopted across European organizations, prior research has largely examined these domains independently. This fragmented perspective limits understanding of how integrated AI-enabled capabilities contribute to sustainable workplace health outcomes.

Objective This study aims to empirically examine how AI-driven financial and managerial innovations interact to promote healthier workplaces. It addresses the research question: How does the integration of AI-enabled financial and managerial innovation influence workplace wellbeing outcomes?

Methods The study adopts a quantitative research design using a cross-country dataset covering 20 European countries. The dataset integrates indicators of AI adoption, digital intensity, managerial practices, and workplace wellbeing. Multiple regression analysis is employed to test the relationships between AI adoption, financial innovation, managerial innovation, and workplace wellbeing. A mediation model is applied to assess the indirect effects of AI through dual innovation mechanisms.

Results The findings indicate that AI adoption has a significant positive effect on both financial innovation ($\beta = 0.52$, $p < 0.001$) and managerial innovation ($\beta = 0.44$, $p < 0.001$). Financial innovation demonstrates a moderate positive effect on workplace wellbeing ($\beta = 0.29$, $p < 0.01$), while managerial innovation exhibits a stronger impact ($\beta = 0.41$, $p < 0.001$). The direct effect of AI adoption on workplace wellbeing is weak, suggesting that its influence is indirect. Mediation analysis confirms that financial and managerial innovation jointly mediate the relationship between AI adoption and workplace wellbeing.

Conclusion This study advances the dual innovation literature by providing empirical evidence that AI contributes to healthier workplaces through integrated financial and managerial innovation processes. The results highlight the critical role of managerial innovation in translating AI-enabled financial capabilities into well-being outcomes. The findings offer practical implications for organizations and dual education systems by emphasizing the need for integrated skill development in AI, financial decision-making, and management practices. The study provides a foundation for future empirical research on AI-driven workplace transformation in European contexts.

Keywords *AI-Driven Innovation, Dual Innovation, Employee wellbeing, Financial Innovation, Managerial Innovation*

Ethical AI-Driven Innovations and Readiness Skills for Healthier Workplaces – MSMEs Case Studies. (Forging the AI- Social Compact).

Sharlom Muita1, & Anna Dunay2
Doctoral School of Management and Business Administration
John Von Neumann University

Abstract

This paper seeks to explore how artificial intelligence, automation, and human-machine collaboration can enhance safety, well-being, and productivity in evolving work environments. The future of work extends beyond the integration of technology; it hinges on aligning technological progress with human potential, equity, and sustainability. Work in the future will be a partnership between people, agents, and robots—all powered by Artificial Intelligence. The objective of the study will explore how AI technologies are impacting on mental, physical and psychological aspects of the employee environment and proposes a conceptual ethical governance framework for their integration into organizations to ensure responsibility and transparency while seeking to reinforcing organizational regulatory compliance and socio-economic security with AI-Powered Policy Tools. Design/methodology/approach: The study will adopt a systematic literature review of institutional reports and illustrative corporate case studies. A qualitative case study methodology will be deployed to help analyze AI transformational toolkits currently adopted by multinational corporations to enhance safety, wellbeing and productivity in the evolving work environment and seek to replicate the same for MSMEs. Using survey questionnaires, the study will analyze how AI – innovation Ethical Governance Model is linked to employee safety, well-being, and productivity. Findings: The paper is expected to contribute to management and business development literature by highlighting employee well-being as a strategic organizational resource and by offering practical implications for managers seeking to enhance productivity and employee well-being through ethical governance, readiness skills, awareness, and conformity assessment framework that are critical levers for sustainable alignment to labor market needs.

Keywords *Artificial Intelligence, Ethical AI framework, AI related disclosures, AI human collaboration, Healthy Workplace, AI readiness Skills*

TRIComp Future Skills as Dispositions for Agency and Wellbeing in the

Authors Ulf-Daniel Ehlers1 & Aleydis Kleine-Allekotte2

1 Baden-Wurttemberg Cooperative State University, Germany; ulf-daniel.ehlers@dhbw-karlsruhe.de

2 Baden-Wurttemberg Cooperative State University, Germany; Aleydis.kleineallekotte@dhbw-karlsruhe.de

Keywords *Future Skills; TRIComp; Future of Work; Work-integrated Learning; Well-being*

The future of work is increasingly shaped by rapid digitalisation, ecological change, and AI-driven restructuring of professional roles (Herrero et al., 2025). These developments challenge traditional, skill-only training methods because workers need to navigate uncertainty, complexity, and ongoing transitions. As a result, competence development must go beyond technical skills and understanding, focusing on Future Skills as qualities for self-organization, agency, and responsible action in dynamic environments.

This contribution introduces the TRIComp competence model (Transformation-Research-Innovation Competence) as a theoretically grounded framework for Future Skills designed to foster individual and collective well-being in evolving work contexts. It is based on a Europe-wide online survey, structured interviews with experts in education and industry, as well as a systematic analysis of existing frameworks such as GreenComp and DigiComp.

TRIComp combines competence-based learning theory with action-oriented perspectives on agency and self-organisation. It integrates four empirically consolidated competence domains, such as Innovation, Green Transformation, Digital Transformation, and Management (see Lukito et al.,2022; Appio et al., 2021; Cobbinah et al., 2025), as interdependent capacities that enable adaptive performance in complex work environments. The model is embedded in a modular Seamless Transition Approach linking Higher Vocational Education and Training (HVET) with Higher Education through competence-oriented curricula and work-integrated learning designs.

The framework provides a structured taxonomy for developing transversal capabilities such as adaptability, initiative, interdisciplinary collaboration, and resilience. It positions Future Skills not as static outcomes but as developmental resources supporting employability, meaningful work participation, and psychosocial well-being.

TRIComp offers a scalable educational response to the future of work by connecting competence development, learner agency, and healthier professional identities. It highlights how dual innovation architectures can generate social impact through sustainable and well-being-oriented workforce transformation.

References

Appio, F. P., Frattini, F., Petruzzelli, A. M., & Neirotti, P. (2021). Digital transformation and innovation management: A synthesis of existing research and an agenda for future studies. Journal of Product Innovation Management, 38(1), 4-20.

Cobbinah, J., Osei, A., & Amoah, J. O. (2025). Innovating for a greener future: do digital transformation and innovation capacity drive enterprise green total factor productivity in the knowledge economy?. Journal of the Knowledge Economy, 1-39.

Herrero Rámila, C., Castaño Muñoz, J., Romero Rodríguez, S., & Moreno Morilla, C. (2025). Key Drivers of Inclusive Digital Transformation of European Vocational Education and Training Systems. Apprenticeships in England–Initial or Continuing VET, 263.

Lukito, D., Suharnomo, S., & Perdhana, M. S. (2022). Transformation management capabilities for digital transformation initiatives: a construct conceptualization in alignment with the dynamic capabilities framework. Journal of Organizational Management Studies, 1, 1-22.

Green Economy

Drivers and Barriers for Integrating Biodiversity-Friendly Regional Food Products into German Supermarkets

Submission for EU4Dual Annual Conference – Heilbronn 2026

Authors Prof. Dr. Alexander Hennig, Prof. Dr. Marc-Daniel Moessinger, Carina Siefert, Prof. Dr. Christian Vranckx, Baden-Württemberg Cooperative State University (DHBW) Mannheim, Germany

Abstract: Oral Presentation

Biodiversity loss remains a major challenge for agri-food systems, and existing policy instruments have so far failed to halt its progression. Complementary market-based approaches that involve actors along the entire food value chain are therefore increasingly discussed. In this context, regional food systems and supermarket retail represent potential leverage points for integrating biodiversity conservation into everyday consumption practices. This study explores the potential of market-based approaches by examining drivers and barriers for integrating regional and biodiversity-friendly food products into German supermarkets, addressing a research gap at the intersection of biodiversity conservation, regional value chains, and food retail.

The analysis is based on 13 semi-structured interviews with farmers, producer associations, and representatives from discount and full-range retail companies, the study applies a qualitative coding approach distinguishing internal and external factors, clustered into thematic groups.

Key barriers include marketing and communication challenges, the absence of uniform standards for biodiversity-friendly production, strong consumer price sensitivity and efficiency-oriented, centralized procurement structures. Important drivers are personal commitment and values of individual actors, entrepreneurial autonomy of independent retailers, differentiation and image benefits and strong cooperative relationships along the value chain. The findings suggest that independent retailers can act as key entry points for biodiversity-friendly products. Political support and the development of clear standards are essential to enhance the broader market integration of regional and biodiversity-friendly food products in Germany.

The findings contribute practice-oriented insights for scaling biodiversity-friendly regional food systems and align with EU4Dual's focus on applied research and knowledge co-creation for sustainable transformation. The work is part of the research project BiodivRegio, funded by the state of Baden-Württemberg and the EU.

Keywords *biodiversity-friendly food, regional food value chain, supermarket retail, sustainable value chains, drivers and barriers*

Healthy Tourism, Healthy Futures: Understanding Sustainability Motivations in Malta's Hotel Sector

Maria Jourdan, Senior Lecturer, MCAST, Malta

Background / Context:

Small island states are among the most vulnerable to the health and welfare impacts of climate change, particularly through rising temperatures, water scarcity, coastal degradation, and pressures on essential services. In Malta, where tourism is a significant economic pillar, the hospitality sector both contributes to and is affected by these climate-related stressors. Hotels consume substantial amounts of energy and water and generate considerable waste, making environmental sustainability central to protecting ecological integrity, community wellbeing, and long-term public health. Yet the factors that shape sustainability-related decisions within this sector remain insufficiently understood.

Objective / Purpose:

This study examines the motivations that influence decision-makers in Malta's hotel industry to adopt environmentally sustainable initiatives, with a focus on how climate-related risks and concerns for health and welfare inform managerial choices.

Methods / Approach:

A qualitative multi-case study was conducted using semi-structured interviews with hotel managers and sustainability leads across different hotel categories in Malta. The analysis was guided by theoretical frameworks such as systems thinking, stakeholder theory, and institutional theory to identify patterns in how organisations respond to environmental, social, and health-related pressures.

Results / Findings:

Initial findings indicate that decision-makers increasingly associate environmental sustainability with improved community wellbeing, healthier working environments, reduced exposure to climate-related risks, and enhanced resilience of tourism-dependent livelihoods. Regulatory pressures and market expectations also reinforce these perceptions.

Conclusion / Implications:

The study highlights that sustainability adoption in Maltese hotels extends beyond environmental responsibility: it is closely tied to safeguarding public health, ensuring community welfare, and strengthening resilience to climate change. Understanding these motivations can inform targeted policies and industry support mechanisms that promote healthier, climate-resilient tourism systems.

Key Words *Malta Hotels; Decision-making; Small Island States; Hospitality Industry; Environmental Sustainability.*

Evolution of Sustainable Tourism in Asia (2015–2025): A Bibliometric Journey from Theory to Green Policy

Pham Thi Hau

John von Neumann University, Doctoral School of Management and Business Administration, Infopark sétány 1., Budapest, Hungary
E-mail: pham.hau@hallgato.nje.hu

Abstract

In the context of globalization, sustainable tourism has become an essential pillar for achieving the United Nations Sustainable Development Goals. Asia, with its rapid urbanization and rich but threatened biodiversity, plays a critical role in global tourism growth. This study provides a comprehensive bibliometric analysis of sustainable tourism in Asia during the crucial decade of 2015–2025, a period marked by the Paris Agreement and the COVID-19 pandemic. Using the PRISMA process, 372 documents from Scopus and Web of Science were analyzed via VOSviewer and R-Bibliometrix. Results show an impressive annual growth rate of 26.51%, with China and Malaysia leading the knowledge network. Thematic analysis identified a significant structural shift: research has matured from foundational conservation theories to the implementation of green policies, with a focus on low-carbon economies, renewable energy, and climate resilience. However, keyword density analysis revealed significant knowledge gaps, particularly in cross-border ecosystem governance. This study concludes that the coming decade must prioritize

sustainable digitalization and transboundary management mechanisms. These findings provide a strategic roadmap for policymakers and academics to achieve net-zero emissions by mid-century.

Key Words *Sustainable tourism, Asia, bibliometric analysis, Green policy*

Sustainable Finance in Practice: What Drives ESG Fund Performance in Poland?

Authors and affiliations: Agnieszka Moskal, Koszalin University of Technology, Faculty of Economic Sciences

Abstract:

The rapid development of sustainable finance in Europe has been driven by growing investor interest in environmental, social, and governance (ESG) factors and by increasingly stringent regulatory frameworks. A key milestone in this process was the implementation of the Sustainable Finance Disclosure Regulation (SFDR), which significantly improved transparency, reduced the risk of greenwashing, and strengthened the credibility of ESG-labelled financial products. At the same time, advances in financial technologies, particularly machine learning (ML), have transformed investment analysis by enabling more accurate assessment of complex and non-linear relationships. Despite these developments, empirical evidence on the determinants of ESG fund performance in emerging European markets, such as Poland, remains limited. The main objective of this study is to identify and evaluate the key determinants influencing the performance of ESG investment funds in comparison with conventional equity funds in the Polish market. The study covered the period from 2020 to 2025. The analysis employs the Extreme Gradient Boosting (XGBoost) algorithm, which is recognized for its strong predictive performance and suitability for financial data analysis. Fund performance is examined in relation to selected explanatory variables, with particular emphasis on fund-specific characteristics such as fund size and fund age. The expected results suggest that XGBoost is an effective tool for identifying different performance drivers of ESG and traditional equity funds. In particular, fund size and fund age are anticipated to emerge as the most significant determinants, while the relevance of other factors may differ between ESG and non-ESG funds. The study contributes to the green economy and sustainable finance literature by demonstrating the practical usefulness of machine learning methods in evaluating ESG investments. The findings may support investors, fund managers, and policymakers in making more informed decisions and in promoting the further development of sustainable investment markets.

Key Words *ESG Funds; XGBoost; Machine Learning; Fund Performance Determinants; Sustainable Finance*

From Policy to Practice: Training Technicians and Decision-Makers to Implement the European Green Deal in Low-Density Regions

Abstract text

Despite strong alignment with the European Green Deal and related climate frameworks, low-density regions continue to face significant difficulties in implementing Sustainable Energy and Climate Action Plans (SECAPs/PAESCs). These challenges are less related to policy design and more to limited technical capacity, fragmented governance structures, and insufficient decision-making skills among local technicians and policymakers. This gap highlights the need for advanced, practice-oriented educational models capable of translating strategic climate objectives into operational actions.

This paper aims to propose and assess an advanced educational framework designed to equip technicians and decision-makers with the competencies required to operationalize climate and energy policies in low-density territories, with particular emphasis on Green Economy principles.

The study adopts an applied educational approach grounded in professional training experiences and real-world SECAP implementation processes. It integrates digital learning platforms, GIS-based territorial diagnostics, and decision-support tools within a structured training model focused on policy interpretation, prioritization of measures, and investment planning. The framework addresses pivotal domains including NZEB building renovation, renewable energy communities, sustainable mobility, water efficiency, ecosystem-based adaptation, and energy poverty mitigation.

Preliminary outcomes indicate that combining digital technologies with territorially grounded learning significantly enhances participants' analytical and decision-making capacities. Trainees demonstrated improved ability to prioritize actions, align funding mechanisms with policy objectives, and adapt climate strategies to local constraints and endogenous resources.

The proposed framework reframes low-density regions as living laboratories for advanced climate governance education. It offers a scalable model that strengthens institutional capacity, supports Green Economy transitions, and improves the effectiveness of climate policy implementation in peripheral territories.

Key Words *Green economy; Climate governance training; SECAP implementation; Digital education; Low-density regions*

Krzysztof Dziadek (Koszalin University of Technology, Poland)

Does the Green Asset Ratio Reflect Green Financing? An Analysis of Polish Banks.

Abstract text

Objective The objective of the study is to analyse the scope, consistency, and quality of disclosures by Polish banks regarding the Green Asset Ratio (GAR), with particular emphasis on their usefulness in assessing the banking sector's actual engagement in financing green investments. The GAR has become a mandatory disclosure element for banks in the EU under the EU Taxonomy and sustainability reporting standards. In theory, it is intended to measure the share of assets aligned with EU environmental criteria; however, its practical usefulness and relevance for evaluating banks' involvement in financing green investments remain a subject of debate. At the same time, the implementation of GAR requires significant operational effort from financial institutions, while taxonomy criteria lead to greater caution in disclosing green exposures.

Methods The study is based on a qualitative content analysis of published taxonomy and ESG reports of the largest Polish banks, combined with a comparison to international practices described in industry literature and analyses conducted by research institutions. The analysis focuses on calculation structures, narrative disclosures, and the scope of data used in the computation of the GAR.

Results The findings indicate substantial heterogeneity in GAR disclosures across banks. Low GAR values predominate, resulting, inter alia, from limited data availability on the corporate client side and numerous regulatory exclusions. Disclosures are often highly technical in nature and are not linked to banks' product offerings or their strategies for financing the green transition.

Conclusions and implications:

The results suggest that the current design and reporting practices of the GAR limit its usefulness as a measure of real support for green investments. This points to the need for further development of disclosure standards and additional research into the links between taxonomy-based indicators and banks' credit decision-making processes.

Key Words *GAR, banks, ESG, EU, Taxonomy*

Czy Green Asset Ratio mierzy zielone finansowanie? Analiza ujawnień banków działających w Polsce

Cel: Celem badania jest analiza zakresu, spójności oraz jakości ujawnień polskich banków dotyczących Green Asset Ratio (GAR), ze szczególnym uwzględnieniem ich przydatności do oceny rzeczywistego zaangażowania sektora bankowego w finansowanie zielonych inwestycji. Wskaźnik GAR stał się obowiązkowym elementem ujawnień banków w UE w ramach Taksonomii UE i standardów raportowania zrównoważonego rozwoju. W teorii ma mierzyć udział aktywów zgodnych z kryteriami środowiskowymi UE, jednak jego praktyczna przydatność oraz znaczenie dla oceny zaangażowania sektora bankowego w finansowanie zielonych inwestycji pozostają przedmiotem dyskusji. Jednocześnie wdrożenie GAR wymaga znacznych nakładów pracy w instytucjach finansowych, a kryteria taksonomiczne przekładają się na większą ostrożność w ujawnianiu zielonych ekspozycji.

Metodyka: Badanie oparto na jakościowej analizie treści publikowanych raportów taksonomicznych i ESG największych polskich banków oraz ich porównaniu z praktyką międzynarodową opisaną w literaturze branżowej i analizach instytucji badawczych. Analizie poddano struktury obliczeń, ujawnianą narrację oraz zakres danych wykorzystywanych przy obliczaniu GAR.

Wyniki: Wyniki wskazują na znaczną heterogeniczność ujawnień GAR pomiędzy bankami. Dominują niskie wartości wskaźnika, co wynika m.in. z ograniczonej dostępności danych po stronie klientów korporacyjnych oraz licznych wyłączeń regulacyjnych. Ujawnienia często mają charakter techniczny i nie są powiązane z ofertą produktową banków ani strategią finansowania transformacji.

Wnioski i implikacje: Uzyskane rezultaty sugerują, że obecna konstrukcja i sposób raportowania GAR ograniczają jego użyteczność jako miary realnego wsparcia zielonych inwestycji. Wskazuje to na potrzebę dalszego rozwoju standardów ujawnień oraz badań nad powiązaniem wskaźników taksonomicznych z decyzjami kredytowymi banków.

Title of Paper: Bridging Generations: Embedding Older People's Sustainability Knowledge in Early Childhood Educators' Training

James Carabott

Malta College of Arts, Science and Technology, Malta

Shirley Ann Gauci

Malta College of Arts, Science and Technology, Malta

Green Economy

Climate Change, Health and Welfare

Oral presentation

Bridging Generations: Embedding Older People's Sustainability Knowledge in Early Childhood Educators' Training

Background / Context

In 2025, the challenges associated with the green economy and its future implications are widely recognised across education, research, and society. Climate change has intensified risks related to health, wellbeing, food security, resource use, and social cohesion, highlighting the need for coordinated and inclusive responses beyond technological and economic solutions. While policy and innovation agendas emphasise green skills and circular economy principles, less attention has been given to the social and educational processes through which sustainability values are transmitted across generations.

Objective / Purpose

The study aimed to trial a structured intergenerational reminiscence programme centred on sustainable practices, with the research question: How can an intergenerational reminiscence programme effectively foster meaningful interactions related to sustainable practices between older adults and young people? Thus, addressing a gap in research linking sustainability challenges with health, welfare and education through socially grounded pedagogical approaches.

Methods / Approach / Case

The study reports on a pilot intergenerational reminiscence programme informed by the values of the EU4Dual European University Alliance. Participants included five older adults, purposively selected from the Active Ageing Unit at St Vincent de Paul, Malta, and six undergraduate students enrolled in an Early Years degree at the Malta College of Arts, Science and Technology. Three facilitated sessions focused on everyday practices associated with sustainable living, resourcefulness and circular use of materials. A mixed methods design was employed: quantitative data were collected using the Rosenberg Self-Esteem Scale to examine changes in older participants' wellbeing, while qualitative data were generated through session documentation and a post-programme focus group with students, analysed within an interpretivist framework.

Results / Findings

Findings indicate positive changes in older participants' self-esteem and the development of intergenerational understanding and cultural literacy among students. Sustainability-related values

and green skills emerged through narratives of past practices, alongside tensions between nostalgic recollections and contemporary ecological realities.

Conclusion / Implications

The study demonstrates that intergenerational learning can support wellbeing and sustainability education by fostering reflective and inclusive pedagogies. It highlights the potential of education-based interventions to strengthen resilience, wellbeing and sustainability mindsets within climate-challenged societies.

Key words *intergenerational learning, sustainability education, wellbeing, early childhood educator training, mixed methods research*

How to save the world

– A dissonance theory based model proposal on the psychology of (non-)responsible consumption –

Prof. Dr. Aiman Chammout, DHBW Mannheim

Climate change, species extinction, land consumption and ocean warming are just some of the global human problems that are the subject of intense debate in politics and society. What all these problems have in common is that they can ultimately be traced back, at least to some extent, to our (consumer) behaviour. This raises the obvious question of how consumers can be motivated to consume responsibly, i.e. taking ecological and/or social aspects into account.

There are essentially two motivational patterns discussed in the literature. On the one hand, it can be argued that consumers are/can be motivated to consume responsibly if this enables them to achieve positive outcomes. This line of argument is supported by studies that focus on personality traits, a sense of responsibility or a feeling of self-efficacy. In addition to such positive motivating forces, however, the literature also discusses motivators that aim to avoid negative feelings. In this context, the construct of "eco-guilt" is receiving a lot of attention; for example in public discussion in Germany, there is frequent talk of "flight shame" ("Flugscham").

The theory of cognitive dissonance (dissonance theory for short) provides a framework that is very well suited to encompass both groups of motivators and consider them in an integrated manner. Dissonance theory, which is firmly established and extremely influential in social psychology, examines how people deal with contradictions in their behaviour. It therefore forms a theoretically substantiated approach to explaining non-responsible consumption, which is also characterised by a contradiction, namely that between choosing a consumption alternative and the (at least potential) knowledge of the social and/or environmental damage caused by this choice.

This conference contribution develops this analytical framework – also based on the results of an exploratory survey – and supplements it with a whole range of other variables that do have / may have a direct or moderating influence (including plasticity of damage, personality traits, diffusion of responsibility, wear-out perception, etc.), so that overall a comprehensive model is created for the analysis of (non-)responsible consumption that also identifies a number of starting points for motivating consumers to consume responsibly.

Key Words *dissonance theory, responsible consumption, consumer psychology, motivational distortion, diffusion of responsibility*

Bridging the Human Implementation Gap: Integrating Behavioural, Social and Governance Dimensions through the HumanFactor Compass

Andrea Schätzle, Verena Schmid, Monika Gonser
Intersectoral School of Governance Baden-Württemberg, DHBW CAS

Abstract:

Background / Context:

Across European regions, sustainability measures that underpin a green economy often underperform in practice, even when technologies and policy frameworks are in place. Evidence from HumanFactor indicates that implementation shortfalls are frequently driven by behavioural dynamics, social norms, and institutional routines that are not systematically considered during planning and coordination. HumanFactor is an Interreg Alpine Space project that examines behavioural, social and governance-related barriers to sustainability implementation and develops practical tools – such as the HumanFactor Compass – to support context-sensitive transformation processes in the Alpine region. The HumanFactor project is implemented by an intersectoral and international partnership including a ministry, NGO, Entrepreneurs and Academia from Austria, France and Germany.

Objective / Purpose:

This contribution aims to show how actors in the Green Economy track can better anticipate and address human and governance-related barriers to implementation by using the digital HumanFactor Compass as a structured decision-support tool.

Methods / Approach / Case:

The presentation draws on the HumanFactor synthesis of behavioural and governance literature and practice-based evidence from Alpine-region sustainability contexts. It explains how the Compass operationalises this evidence by guiding users through key dimensions, including behavioural drivers (e.g., norms and perceived efficacy), stakeholder relations, trust and communication, role clarity, power asymmetries, and institutional constraints.

Results / Findings:

HumanFactor findings consistently indicate three requirements for implementation: (1) behavioural determinants such as perceived norms, responsibility attribution, and collective efficacy influence uptake of technical measures; (2) clear responsibilities, coordination pathways, and inclusive participation shape legitimacy and ownership; (3) technical solutions become effective when embedded in socially grounded processes aligned with local realities.

Conclusion / Implications:

The HumanFactor Compass supports cross-sector partnerships and public actors in diagnosing misalignments early and adapting strategies to context. For Green Economy initiatives, this strengthens implementation capacity by aligning technical solutions with behavioural and governance conditions, improving the feasibility and durability of sustainability measures.

Key Words *human implementation gap; behaviour change; governance; digital decision-support tool; green economy implementation*

Climate resilience and energy poverty: A comparative household-level analysis of Hungary and Jordan

Mohammad M. Jaber
Department of International Economics, Faculty of Economics and Business, John von Neumann University
mohammad.jaber@nje.hu
ORCID: 0000-0001-8808-4170
Eszter Siposné Nándori
Institute of World and Regional Economics, Faculty of Economics, University of Miskolc
eszter.sne.nandori@uni-miskolc.hu
ORCID: 0000-0003-2737-2886
Katalin Lipták
Institute of World and Regional Economics, Faculty of Economics, University of Miskolc
katalin.liptak@uni-miskolc.hu
ORCID: 0000-0001-6714-0858

Abstract

Background The transition to a green economy is increasingly shaped by climate risks and evolving energy systems. However, evidence indicates that green transitions can intensify social inequalities if existing vulnerabilities, such as energy poverty, are not sufficiently addressed. Although climate resilience is a primary goal of green economy strategies, the social and economic determinants of household-level resilience remain inadequately understood, especially in urban and industrial-legacy settings.

Objective This study investigates how energy poverty, financial vulnerability, and climate perceptions interact to shape household climate resilience, with the aim of informing inclusive and risk-sensitive green economy policies.

Materials and methods: Original household survey data (N = 439) from two industrial-legacy urban regions are used to construct composite indices of energy poverty, financial poverty, climate perceptions, and climate resilience. Ordinary least squares regression models assess the determinants of climate resilience, controlling for key socio-demographic characteristics. Diagnostic tests confirm model adequacy and low multicollinearity.

Findings The results show that climate perceptions are positively and significantly associated with household climate resilience, indicating that experiential awareness of climate risks enhances adaptive capacity. In contrast, both financial poverty and energy poverty are negatively associated with resilience, emphasising the limiting effects of material deprivation. Regional context is also significant, highlighting how structural and infrastructural conditions affect adaptive capacity.

Conclusions The findings demonstrate that climate resilience in the green economy extends beyond technological or behavioural factors and is fundamentally rooted in socio-economic conditions. Policies to strengthen resilience should integrate efforts to reduce energy poverty, invest in housing and infrastructure, and provide targeted social support. These results support place-based and inclusive green economy strategies that align climate risk management with social equity objectives.

Keywords *energy poverty; climate resilience; green economy; vulnerability; climate perceptions*

A hybrid adaptive control to achieve synchronized voltage regulation and proportional power sharing across bidirectional converters

The increasing deployment of renewable energy and DC microgrids requires effective coordination of bidirectional DC/DC converters and the development of control strategies to support efficient and sustainable energy systems. Integrating voltage control and power management is essential to ensure stable, reliable, and efficient DC microgrid operation [1,2].

Power quality issues in DC microgrids are closely linked to voltage control, leading to key research challenges. First one, is the coordination DC–DC converters interfacing energy resources, storage, and loads. Without proper coordination, converter interactions can cause voltage deviations, power imbalances, and efficiency losses [3]. Effective control must ensure synchronized operation, power sharing, ripple reduction, and robustness to varying operating conditions. The second challenge is managing the DC bus voltage. Maintaining stable, constant voltage is essential for reliability and load protection [4]. Control must handle variations from renewables, storage, and loads, minimize oscillations, and enable integration of new sources, combining fast local regulation with higher-level coordination to ensure overall voltage stability under dynamic conditions.

Decentralized control, using local strategies like droop control, offers fast responses and plug-and-play simplicity without communication needs [5]. However, relying only on local information can cause suboptimal voltage regulation and difficulties managing interactions among converters, limiting overall performance [6].

This research proposal aims to develop a hybrid adaptive controller, combining fast local control with distributed communication to achieve synchronized voltage regulation and power sharing across bidirectional converters. By leveraging both local decision-making and inter-node coordination, the proposed approach enhances scalability, fault tolerance, and operational stability. Advanced techniques, such as model predictive control, enable oscillation suppression and voltage stability under variable renewable generation, while intelligent estimation and model-based prediction anticipate disturbances and improve real-time performance. The expected outcomes include improved power quality, resilient microgrid operation, and scalable control architectures, with practical implications for the deployment of sustainable, reliable, and intelligent DC microgrids in future energy systems.

Key Words *DC microgrids ; DC/DC converters ; power quality ; voltage control ; hybrid adaptive controller*

[1] Mohammad Sarvi and Homa Zarei Zohdi. A comprehensive overview of dc-dc converters control methods and topologies in dc microgrids. Energy Science & Engineering, 12(5):2017–2036, 2024. https://doi.org/10.1002/ese3.1730.

[2] Tomislav Dragicevic, Xiaonan Lu, Juan C. Vasquez, and Josep M. Guerrero. DC microgrids—Part II: A review of power architectures, applications, and standardization issues. IEEE Transactions on Power Electronics, 31(5):3528–3549, 2016. https://doi.org/10.1109/TPEL.2015.2464277

[3] Saeed H. Hanzaei, Mehdi Korki, and Xian-Ming Zhang. Distributed cooperative voltage mode control for DC-isolated microgrids powered by renewable energy sources. International Journal of Electrical Power & Energy Systems, 152:109175, 2023. https://doi.org/10.1016/j.ijepes.2023.109175

[4] Vitor Fernão Pires, Armando Pires, and Armando Cordeiro. DC microgrids: Benefits, architectures, perspectives and challenges. Energies, 16(3), 2023. https://doi.org/10.3390/en16031217

[5] Xialin Li, Li Guo, Yunwei Li, Chao Hong, Ye Zhang, Zhen Guo, Di Huang, and Chengshan Wang. Flexible interlinking and coordinated power control of multiple dc microgrids clusters. IEEE Transactions on Sustainable Energy, 9(2):904–915, 2018. https://doi.org/10.1109/TSTE.2017.2765681

[6] Md Shafiul Alam, Md Alamgir Hossain, Md Shafiullah, Asif Islam, M.S.H. Choudhury, Md Omer Faruque, and Mohammad A. Abido. Renewable energy integration with dc microgrids: Challenges and opportunities. Electric Power Systems Research, 234:110548, 2024. https://doi.org/10.1016/j.epsr.2024.110548

Building indicators of sustainable energy well-being: a proposition for health and well-being in the context of climate change and modern energy transition to support communities, local governance and industry stakeholders

Author Marta Arantes Godoy. Geographer, Master in Environmental Health, PhD in Global Health and Sustainability and Researcher at the Institute of Advanced Studies at University of São Paulo-USP, Brazil.

Background The transition to clean energy has the potential to promote global health by reducing diseases caused by air pollution from fossil fuels, fostering behavioral and social changes, and generating positive impacts, such as increased quality of life. However, it can also cause adverse effects, such as stress and anxiety, due to the profound socio-technical transformation underway, and exacerbate energy poverty, requiring energy policies with social inclusive approach. Preliminary indicators of sustainable energy well-being were identified during doctoral research. The focus was on citizens and local governance in the face of the decarbonization of economies and the increase in extreme weather events that cause prolonged blackouts and difficulties with indoor thermal comfort. The concepts of energy well-being and aspects of public and collective health were used from the perspective of quality of life and well-being, the Sustainable Development Goals (SDGs) 3, 7 and 13 of the 2015 Paris Agreement and integrated uses and dimensions of equitable access to electricity, aiming at well-being and energy justice.

Objective To identify social determinants of health and well-being in promoting energy-sustainable societies under climate change, energy transition and urban health.

Approach The pre-established indicators, based on technical, environmental, social, economic, and regulatory aspects of energy well-being, are being re-examined and detailed. The identification of parameters and metrics should also make it possible to qualify and quantify degrees of sustainable energy well-being in municipalities, highlighting potential vulnerabilities and achievements.

Results A set of indicators and their metrics to assess sustainable energy well-being will be tested in selected locations. These indicators should contribute to improving the quality of life, assisting communities, local governance, and companies in the sector in improving energy adaptation measures with sustainability. The indicators will contribute to energy and urban planning, climate change adaptation actions, sustainable cities, legislation and regulation of the electricity sector, urban health, and global health.

Conclusion The proposition and testing of specific indicators for energy well-being in the context of sustainable development and urban health fills a significant knowledge gap in the global literature. Indicators of energy well-being are going to be tested and improved through case studies.

Key Words *affordable energy; energy well-being; quality of life; energy in urban health; sustainable energy systems*

Data-Driven Operational Assessment of Battery Aging in Urban Electric Bus Fleets

Dr. Szilassy Péter Ákos, John von Neumann University

Keywords:

electric buses; battery aging; operational data; state-of-health; sustainable mobility

Abstract

(Background / Context) The rapid electrification of urban public transport is a key component of Europe’s transition towards a green economy and sustainable energy systems. While electric

buses significantly reduce local emissions, their long-term operational sustainability is strongly influenced by battery aging. However, empirical evidence based on real-world fleet operation remains limited, particularly for lithium iron phosphate ($LiFePO_4$) battery technology.

(Objective / Purpose) This study aims to identify and quantify operationally observable indicators of battery state-of-health (SoH) degradation in an urban electric bus fleet, using routinely collected operational data instead of laboratory-based measurements.

(Methods / Approach / Case) The analysis is based on a fleet of thirteen BYD K9UB battery-electric buses operating in Győr, Hungary, each equipped with a 343 kWh $LiFePO_4$ battery. The dataset covers approximately 27 months of intensive urban operation, with average daily mileage exceeding 220 km per vehicle. High-resolution fleet management data were analyzed, including charging duration, transferred energy, state-of-charge (SoC) variation, maximum and average charging power, daily mileage, and ambient temperature. Battery degradation was assessed indirectly through changes in charging time, charging power characteristics, and energy-based capacity estimation, while accounting for temperature effects.

(Results / Findings) The results reveal measurable signs of early-stage battery aging within the first two to three years of operation. Although the reduction in effective capacity remains moderate, consistent trends are observed in extended charging times and reduced peak charging power, particularly in the high-SoC charging phase.

(Conclusion / Implications) The findings demonstrate that operational data can provide valuable insights into battery health, supporting sustainable fleet management, optimized charging infrastructure utilization, and informed decision-making for the long-term deployment of electric buses in green urban transport systems.

POTENTIAL AND CHALLENGES OF AI TOOLS IN THE PROCESS OF INDUSTRIAL DECARBONISATION STRATEGY DEVELOPMENT AND EVALUATION

DI Juergen Fluch1; Jennifer Jolly, BSc MSc1; Florian Singer MA2; FH-Prof. Dipl.-Ing. Dr. Uwe Trattnig1, FH-Prof. Priv.-Doz. DI Dr. Christof Sumereder1, FH-Prof. Priv.-Doz. MMag. Dr. Johanna Muckenhuber2

1 Institute Energy, Transport and Environmental Management, FH JOANNEUM Gesellschaft mbH, E-Mail: juergen.fluch@fh-joanneum.at
2 Institute Social Work, FH JOANNEUM Gesellschaft mbH

1 Summary

The transformation of industrial energy systems toward climate neutrality is imperative, yet often constrained by data gaps, system complexity, and economic limitations. Digital technologies, particularly generative Artificial Intelligence (genAI), offer ways to address these challenges. Large Language Models (LLMs) can reconstruct incomplete datasets, analysing system interdependencies, forecasting energy demand, and supporting the integration of renewable energy sources based on clearly defined optimization KPIs. In this study, AI tools were evaluated within a standardised use case covering the key phases of an energy audit. The results indicate that generative AI can support system optimisation and help bridge data gaps. However, its effectiveness is strongly influenced by data quality for model training, prompting strategies, and user expertise. At the same time, industrial system complexity, limited domain-specific training, and challenges related to trust and social acceptance remain significant barriers.

2 Background

The demanded transition of industrial energy systems toward climate neutrality is obvious but challenging. Renewable energy still covers a limited share of global and European primary energy demand, while industry accounts for roughly one quarter of consumption and remains largely fossil based. Effective decarbonisation requires efficiency improvements and renewable integration, but these are often constrained by missing high-resolution data, system complexity, and economic uncertainty. Digital technologies such as AI and data analytics offer new opportunities, though challenges related to feasibility, data governance, and skills persist (K. Aviso, 2025).

3 Objective

This study investigates whether generative Artificial Intelligence (GenAI), particularly Large Language Models (LLMs), can support specific tasks of industrial energy audits and decarbonisation planning by bridging data gaps, improving system understanding, and accelerating decision-making, while also assessing technical and social limitations.

4 Methodology

Several state-of-the-art GenAI tools (ChatGPT, DataRobot, Powerdrill Bloom, Docugami) were applied within a standardised industrial use case. The evaluation followed the main phases of an energy audit across three levels of detail, from rough initial data reconstruction to system optimisation. The approach covered data generation, system interpretation, and evaluation of efficiency and renewable integration measures. User acceptance and social impacts were assessed

through surveys, interviews, and workshops within the project “Sustainable Working AI” funded by Zukunftsfond Steiermark, complemented by a master’s thesis.

5 Results

GenAI shows clear potential to support energy audits by reconstructing incomplete datasets, identifying inefficiencies, analysing interdependencies, forecasting demand, and supporting renewable integration. It also facilitates documentation, scenario analysis, and stakeholder communication. However, performance strongly depends on data quality, prompting skills, and user expertise. Limited domain-specific training, system complexity, and concerns regarding data security and reliability remain major constraints (A. Windmann, 2024). User acceptance varies significantly across organisational levels, with trust and transparency emerging as critical issues.

6 Conclusions

GenAI can meaningfully enhance optimisation processes and reduce information barriers in industrial decarbonisation, but it cannot replace domain expertise and engineering judgment. Technical limitations and social acceptance issues currently restrict large-scale adoption. Future developments should focus on transparent, explainable, and user-centric AI frameworks tailored to industrial energy systems. Only by combining AI capabilities with human expertise and trust-building measures can GenAI evolve into a key enabler of climate-neutral industrial energy systems.

7 References

K. B. Aviso, (2025), Decarbonizing the chemical industry through digital technologies, Digital Chemical Engineering, Volume 16, 2025, 100250, ISSN 2772-5081, https://doi.org/10.1016/j.dche.2025.100250.

A. Windmann, P. Wittenberg, M. Schieseck and O. Niggemann, "Artificial Intelligence in Industry 4.0 (2024): A Review of Integration Challenges for Industrial Systems," 2024 IEEE 22nd International Conference on Industrial Informatics (INDIN), Beijing, China, 2024, pp. 1-8, doi: 10.1109/INDIN58382.2024.10774364

OpenAI. (2023). ChatGPT (Version 1.1.0 – 26/01/26) [Large language model), https://chat.openai.com/chat

Key Words *Industrial decarbonisation, audit, renewables, GenAI, user acceptance*

Application of AI: OpenAI was used to shorten text

Sustainable Production of Titanium Alloy Powders for SLM via Ultrasonic Atomization

Dorota Laskowska, Błażej Bałasz, Łukasz Żurawski
Koszalin University of Technology, Faculty of Mechanical Engineering and Energy, Śniadeckich 2, 75-453 Koszalin, Poland

Abstract text

The development of additive manufacturing technologies, particularly Selective Laser Melting (SLM), imposes increasingly stringent requirements on the quality of metallic powders used as feedstock materials. Titanium alloys Ti-6Al-4V and Ti-6Al-7Nb are widely applied in biomedical engineering, including implantology, due to their high biocompatibility and corrosion resistance. At the same time, within the framework of the green economy, increasing emphasis is placed on material processing technologies that reduce energy consumption, minimize raw material losses, and limit the environmental impact of manufacturing processes.

The aim of this study was to evaluate the potential of ultrasonic atomization as an environmentally sustainable method for producing Ti-6Al-4V and Ti-6Al-7Nb titanium alloy powders intended for SLM applications, with particular emphasis on process efficiency and the properties of the resulting particles.

Atomization processes were carried out using an ultrasound atomizer, with variations in electric current intensity (100–200 A) and ultrasonic amplitude (60–80%), under an argon protective atmosphere. The obtained powders were subjected to sieve analysis, process efficiency assessment, and evaluation of particle size distribution and morphology.

The results demonstrated a significant influence of process parameters on powder characteristics. A reduction in electric current intensity promoted the formation of finer particles, whereas higher ultrasonic amplitudes led to a broader particle size distribution. Selected process strategies enabled the production of powders with predominantly spherical particle morphology, desirable for SLM technology, while reducing material losses.

The research confirms that ultrasonic atomization can be an important component of a sustainable metallic powder production chain, supporting circular economy principles. High process efficiency and control of particle size fractions reduce waste generation and demand for primary raw materials. This approach lowers the environmental footprint across the material life cycle, from powder production to additive manufacturing applications, and supports the development of environmentally responsible material solutions for biomedical engineering.

Key Words *Additive Manufacturing, Titanium Alloy Powders, Sustainable Manufacturing, Circular Economy, Biomedical Engineering*

Process Stability in L-PBF as a Key Factor for Sustainable Additive Manufacturing

Authors Arkadiusz Żuber, Dariusz Lipiński, Filip Szafraniec

Abstract text

Laser Powder Bed Fusion (L-PBF) technology can be effectively employed to support the objectives of the green economy by enabling reductions in material consumption, energy use, and production time through the fabrication of complex geometries within a single process. However, the environment al benefits associated with L-PBF are strongly dependent on process stability, energy efficiency, and the quality of manufactured surfaces. This study focuses on the detection, analysis, and assessment of geometric inaccuracies arising during the formation of single melttracks. The investigations were conducted on specimens produced from Ti-6Al-4V titanium

alloy Rusing multi-scale analysis of geometric features combined with advanced Signac processing and morphological analysis methods to identify indicators of process instability. The results confirm the existence of a strong, non-linear relationship between process parameters and the geometric variability of melt tracks and enable the identification of parameter combinations that limit the formation of surface irregularities. From a sustainability perspective, these conditions promowe more efficient energy utilization, reduced material losses, and a decreased need for energy-intensive post-processing operations.

Key Words: Laser Powder Bed Fusion (L-PBF), Melt track geometry, Process stability, Ti-6Al-4V, Sustainable manufacturing

The role of corporate green bonds in reducing greenhouse gas emissions – evidence from Poland and the Warsaw Stock Exchange

There is a growing interest in financing sustainability investments using bonds (hereafter referred to as green bonds). As the acquired financing needs to be used for ESG projects (per the Warsaw Sustainable Segment definition) there may exist a correlation between the green bond market size and company sustainability metrics e.g. CO2 emissions, per extant literature. This study aims to provide more evidence and explore this issue in further detail using data from selected companies on the Warsaw Stock Exchange (WSE). The study seeks to determine whether the capitalization of the company's green bond market and green bond yields (using data from the WSE Catalyst) are determinants of selected sustainability or green economy metrics, particularly CO2 emissions.

The study uses multivariate regression to model the correlation between issued bond value and control variables and CO2 emissions. These determinant variables include market cap of green bonds, profitability (determined based on both buy-and-hold and month over month returns strategies), cumulative abnormal returns (CAR). Primary data acquired from WSE, stooq.pl (bond market data), prs.ms.gov.pl (financial and non-financial reports - fundamental company information, CO2 emissions). Granger causality will be used to provide further evidence as to whether there exists a causal relationship between the variables. The results are consistent with extant literature, i.e. the proportion of value of extant green bonds to total assets is inversely correlated with CO2 emissions at a statistically significant level. Granger causality inconclusive. The findings suggest that companies which use green bonds as financing for ESG projects generally attain better ESG outcomes than those that either choose different financing sources or forgo sustainability investing altogether. These conclusions could be useful for both the public sector and company directorates, as they may help evaluate methods for achieving ESG goals.

Key Words *Green bonds, ESG, greenhouse gas emissions, sustainability*

Dual Higher Education

Authors Ernst Deuer1 & Julian Fritsch2

Affiliations *Baden-Wuerttemberg Cooperative State University Ravensburg1 & Baden-Wuerttemberg Cooperative State University Karlsruhe2*

The dual study programme at Dual Hochschule Baden-Wuerttemberg from the perspective of various stakeholders: Findings from a Large-scale Survey Study

Background

Cooperative state universities have become an integral part of the German higher education system. Like any other higher education institutions, however, ongoing social, technological, and labour-market changes require that current structures, curricula, and institutional conditions have to be continuously evaluated and potentially adapted.

Objective

The objective of this study was to evaluate (a) the relevance of established characteristics of cooperative state universities and (b) potential areas for their development using a multilateral perspective.

Methods

An online survey was distributed to all stakeholders of the Baden-Wuerttemberg Cooperative State University. Responses were provided from 2,401 students, 184 professors, 1,504 external lecturers, and 1,118 dual partners. Regarding established characteristics, the survey included questions about organizational as well as teaching/practice-related aspects. Regarding areas of development, the questions addressed programme design, practice- and research-orientation, equality of opportunity and study success as well as sustainability/personality development and internationalisation.

Results

The findings reveal that both organizational and teaching/practice-related characteristics were largely regarded as relevant across all stakeholder groups. Among these, alternating theory–practice phases received the highest approval, while intensive study programs were rated least favourably. In terms of future development, stakeholders highlighted several priority areas, including adapting program design to advances in artificial intelligence, strengthening the integration of theory and practice, promoting non-discriminatory access, or fostering life skills. Notably, professors reported the lowest approval levels for these proposed development domains compared to other stakeholder groups.

Conclusion

The findings of this study provide a robust empirical basis for understanding stakeholder perceptions of cooperative state universities in Germany. Overall, the majority of respondents expressed satisfaction with the current system. At the same, the results also highlight the need for targeted adjustments to existing structures in order to respond effectively to ongoing societal and technological changes

Key Words *Evaluation, societal changes, artificial intelligence, theory-practice*

European Degree Label Criteria and

Authors:

Dr. Virpi Laukkanen, Savonia University of Applied Sciences, Finland

Dr. Jon Altuna, Mondragon University, Spain

Background

In March 2024, the European Commission presented a blueprint for the European Degree. This work evolved into a step-by-step roadmap setting out phases toward a possible fully integrated European Degree by 2029. First a joint European Degree Label will be implemented build on the foundations provided by the Bologna process. The label will act as a guarantee of compliance with the highest quality standards and will have a significant European dimension.

Objective and Approach

This paper focuses on how Dual Higher Education (DHE) meets the criteria of European Degree Label (EDL), and how DHE could enhance the EDL's goals especially from the point of view of work life relevance of the studies, and employability of the students.

In this paper we discuss how the EDL criteria align to the Dual Higher Education (DHE) Framework developed by the EU4Dual European University Alliance. This correspondence is based on the guidelines for the implementation of the EDL developed by EU Policy Lab and insights gathered from a European Degree Forum and FOREU4ALL European University Alliances' workshop on the European Degree Label.

Key Outcomes

The EDL criteria focus on transnational cooperation, mobility, and European values. Criteria include e.g. joint program design, embedded mobility, multilingualism, interdisciplinary approaches, labour market relevance, democratic values, and inclusion, aiming for easier recognition and harmonized quality across the European Higher Education Area.

From Dual HE point of view, it is especially interesting that the labour market relevance is now highlighted as one key point of the criteria. DHE has a deep integration of academic learning with workplace practice, supporting the work life relevance and students' employability. However, at the same time this deep connection with workplace learning forms challenges related to some other EDL criteria like e.g. embedded mobility.

We see that DHE has great potential to support the implementation of EDL and enhancing the labour market relevance aspects of joint European Degrees. The experiences in DHE study programmes can help to develop EDL criteria to fit more work life integrated Higher Education programmes and not only the traditional studies implemented in an academic environment.

Key Words *European Degree, European Degree Label, Dual Higher Education, Work Integrated Learning*

Implementation of the new contract in Dual University Education in Spain

J. Galarza, M. Ezkurra and L. Markuerkiaga

Faculty of Engineering, Mondragon University, Spain

Abstract

This paper presents the results of a collaborative initiative between Fundación Bertelsmann in Spain and Mondragon University, with the aim of analysing the implementation process of the new dual contract (CFA in Spanish) and the associated regulations governing Dual Higher Education (DHE) in Spain.

DHE in Spain is governed by three national regulations. Academically, Royal Decree 822/2021 establishes the framework and introduces the Dual Mention. In the field of labour, Royal Decrees 32/2021 and 1065/2025 set the contractual terms via the CFA.

This research analyses the experience of 8 Spanish universities 3 years after the new DHE regulations were approved.

The CFA is an essential legal instrument for the implementation of University Dual Training and a necessary condition for obtaining recognition of the Dual Mention. It is a key tool in improving the employability of students, assists companies in integrating young talent and provides legal and social protection to all parties involved.

However, this research identifies common barriers to effectively implementing the Dual Mention and the CFA. To address this, the following measures are proposed: standardise the terminology used and produce reference models for the required agreements; develop a digital application to allow all parties to coordinate effectively; and simplify the administrative process with clear instructions and official templates.

Companies are unaware of the return on investment of DHE and the benefits of using the CFA. It is deemed necessary to establish financial incentives to encourage company participation. These incentives could include direct grants for this contract and tax deductions that partially offset the costs incurred in student training.

As a result of this research, a support guide has been developed to assist universities in their collaboration with companies, facilitating the implementation of such a key element as the CFA and its proper integration into Dual University Education in Spain.

Key Words *Collaboration, world of work, support, dual contract, regulatory framework.*

ENHANCING OBJECTIVE AND HOLISTIC ASSESSMENT IN DUAL HIGHER EDUCATION: A MULTIDIMENSIONAL RUBRIC APPROACH

Ezkurra, Mikel (0000-0003-1605-2086) 1; Gomendio, Amaia(0000-0002-3517-8306) 1;
Alonso de Mezquía, David(0000-0002-6014-2196) 1; Markuerkiaga, Leire(0000-0002-7588-5910) 1;
Galarza, Josu(0000-0002-3644-3845) 1

1 Mondragon Unibertsitatea, Spain

Keywords:

assessment rubric
student self-assessment
co-assessment
feedback
soft and technical skills

Article history:

Received:

Revised:

Accepted:

Abstract

Assessing student development in dual higher education faces challenges due to inconsistent evaluation practices and overly subjective appraisals. This study proposes a multidimensional rubric designed to standardise assessments while integrating diverse perspectives (student self-evaluation, co-assessment between academic and company tutors, and structured feedback) to ensure holistic and evidence-based evaluations. Initial validation shows improved grading consistency, stronger tutor collaboration, and enhanced student accountability.

Introduction

Dual Higher Education (DHE) is characterised by the combination of two places of learning: the Higher Education Institution (HEI) where the emphasis is on theory, and the workplace where the emphasis is on practice (Turk, 2023). Specific DHE models vary according to countries and their particular situations (Dragan & Hochrinner, 2024; Dupouy & Bakni, 2024a; Dupouy & Bakni, 2024b; Halista-Telus, 2023; Laukkanen et al., 2024; Merlo et al., 2023; Ságі & Fülöp, 2024; Turk, 2023; Viklund & Elgundi, 2024a; Viklund & Elgundi, 2024b) but all face similar challenges, including collaboration and partnerships, balance between theory and practice, and evaluation of acquired skills (Montalto & Agius, 2024; Varga & Ságі, 2024; Varga, 2024).

Objective assessment of student development in DHE poses an ongoing challenge, hampered by inconsistent assessment practices and a tendency towards overly positive grades in workplace-based training (Jackson, 2018). While traditional rubrics provide structure, they are often bureaucratic tools that prioritise compliance instead of truly helping students learn practical skills. Their complexity or lack of detailed criteria often leads to subjective interpretations (Panadero & Jonsson, 2020). Furthermore, the limited feedback mechanisms within existing frameworks fail to promote meaningful student development and alignment between academic and industry expectations.

This study responds to four systemic issues identified in current DHE assessment processes:

20. Lack of uniformity and objectivity: differences in grading criteria between academic and industry panels, exacerbated by generic descriptions in assessment tools (Hand & Clewes, 2000).

21. Grade inflation: a documented tendency towards overly positive assessments in the workplace, partly because the performance metrics lack necessary detail (Jackson, 2018).
22. Operational complexity: elaborate rubrics that prioritise compliance over pedagogical utility, creating administrative loads for tutors (Cockett & Jackson 2018).
23. Feedback gaps: infrequent or unstructured feedback loops that limit opportunities for student reflection and refinement of skills (Carless, 2018).

To address these issues, the Engineering Faculty of Mondragon Unibertsitatea (MU) has reviewed the monitoring process of apprenticeships, and has developed a streamlined, multi-stakeholder rubric based on measurable observations and explicit competency benchmarks. The framework integrates three novel components:

24. Student self-assessment, which promotes metacognitive awareness of skill development.
25. Co-assessment between academic and company tutors, which ensures balanced assessment of theoretical and applied competencies.
26. Structured feedback cycles embedded at critical milestones, which promotes continuous improvement.

The developed framework includes a consistent and progressive evaluation system across all academic levels. This ensures assessments are adapted to the knowledge and skills acquired at each stage. Crucially, this proposal acknowledges the essential role of tutor preparedness, a factor often overlooked in DHE literature (Fialho et al. 2023).

Methodology

The development of a new rubric to address the observed challenges in dual assessment requires a critical analysis of existing evaluation frameworks. This begins with a rigorous examination of current assessment protocols, including their procedures, criteria, and stakeholder engagement mechanisms. To define a new evaluation methodology and tools, evidence-based modifications and the introduction of novel strategies are proposed.

Dual programme of the Engineering Faculty of MU

The dual programme of the Engineering Faculty of MU is implemented in 10 bachelor’s degrees and 10 master’s degrees, and engages 800 students annually across more than 200 companies. The faculty promotes long term apprenticeships, divided into two stages in both the bachelor's and master's degrees, as shown in Figure 1.

The first stage is optional, and takes place in the 2nd and 3rd year of the bachelor’s degree, and in the 1st year of the master’s degree. In this stage students are studying and working part-time. On the other hand, the Degree Final Projects (second stage) are compulsory and are carried out full time.

In both stages, students receive financial remuneration based on the time dedicated to the apprenticeship, which is higher in the master's degree because of the greater level of expertise. Moreover, in the master's degrees remuneration is determined by the legally established minimum wage.

The grade of the dual activities significantly impacts the students' average mark, because of the number of ECTS assigned to this program in the curricula. MU is committed to increasing this credit recognition, which reflects the increasing prioritisation of dual apprenticeships as a critical component of higher education. Figure 1 illustrates the proposed breakdown of credits in the Engineering Faculty. The number of credits assigned to the dual activities is 6 and 9 ECTS in the part-time optional stage in the bachelor's degree, and 12 ECTS in the master's degree. In contrast, up to 60 and 30 ECTS are assigned to full-time degree final projects.

The percentage of students in the dual programme in each year ranges from 30 % to 50 % in the optional stage in the bachelor's degree, and up to 75 % in the master's degree. This percentage rises to 100 % during the compulsory stage, reflecting universal participation as a fundamental requirement.

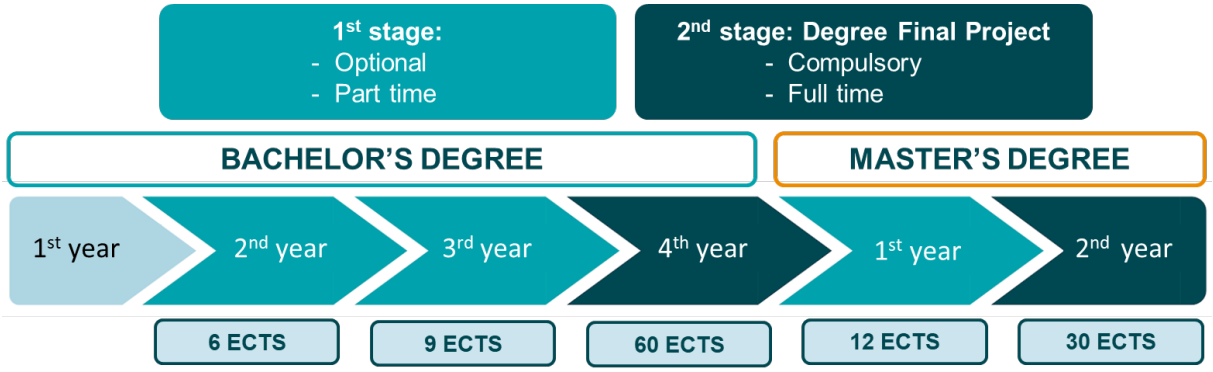


Figure 1. Dual program at the Engineering Faculty of Mondragon Unibertsitatea

Traditional dual monitoring and assessment in the Engineering Faculty of MU

Academic monitoring of the student throughout the apprenticeship is essential to ensure compliance with the training programme, and to collect evidence of integration into the company environment and their performance. The Engineering Faculty has three established milestones to carry out such monitoring:

27. Workplace integration. This takes place in the company during the first month after the apprenticeship starts. The student and tutors are introduced, and the training program is reviewed to check that the scope of the project is well understood. The academic tutor ensures that the student has received the necessary training in occupational health and safety. In addition, the work plan is reviewed to ensure that the work to be done is well aligned with the technical skills developed in the degree programme.
28. *Mid-apprenticeship review. The student prepares a written report and an oral presentation of their achievements to date. The progress of the project is checked to forecast whether the planned objectives will be met within the established timeframe. Academic and company tutors carry out a qualitative assessment and then give feedback to the student, which offers insights for improvement during the remaining project period.*
29. *Final assessment. A panel composed of professionals from academia and companies, commonly including academic and company tutors, evaluates the final report and oral presentation of the project. This panel is responsible for determining the final grade of the dual apprenticeship.*

All dual activities (at both optional and compulsory stages), irrespective of their dedication and duration, are assessed according to five dimensions. It is important to highlight that in addition to

the technical skills of the apprentice, which covers the first dimension, soft skills are also integrated into the assessment. The breakdown of all dimensions is as follows:

30. Technical capacity.
31. Written communication.
32. Oral communication.
33. Work ethic & attitude.
34. Project impact analysis, from the economic, social, and environmental point of view.

In the rubrics used in the faculty, dimensions are evaluated by grading a number of given items, on a scale from 1 to 10, where 10 represents the maximum grade (Figure 2). However, no supporting evidence is indicated to ensure that the rating is objective and consistent. Tutors are asked to record written evidence to justify each mark, but doing so is not very common practice.

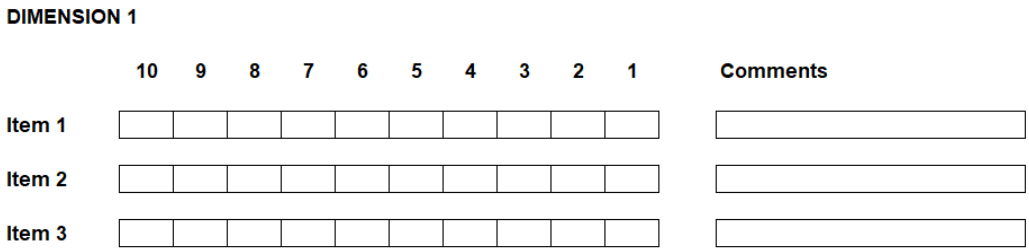


Figure 2. Traditional rubric at the Engineering Faculty of Mondragon Unibertsitatea

The final grade of the dual activity is calculated as the weighted average of the grade assigned to each dimension. This weight is 40 % for the technical skills, and 15 % for each of the other four dimensions. As stated in section 2.1, this grade carries significant weight in the overall assessment, demanding a fair, homogeneous, and evidence-based assessment for all students.

Assessment methodology and rubric proposal

A thorough and critical analysis was carried out of both the current student monitoring process, and the methodology and tools used for the assessment. The main key lines of work defined from this analysis are as follows:

35. Maintain the three milestones defined in the student monitoring process, and guarantee effective communication between the company tutor and the academic tutor. These milestones should prioritise face-to-face meetings or video-calls.
36. Maintain the five dimensions used in the assessment. The academic tutor must guarantee that they are used not only as a final evaluation, but also to give feedback, especially in the mid-apprenticeship review.
37. Review the items used to evaluate each dimension, and identify facts to uniquely assign a grade for each item. This helps to ensure that the mark is based on objective and measurable criteria, rather than individual subjective viewpoints.
38. Identify items that allow tracking a student's progress through successive stages of education, from bachelor's to master's degree.

The most significant change in the proposed rubrics lies in the revision of the items that correspond to each dimension, and the way they are assessed. Table 1 shows the items to evaluate each dimension.

Table 1. Items for grading assessment dimensions

Technical capacity	*Written communication*	*Oral communication*	*Work ethic & attitude*	*Project impact analysis*
Technical competence	Structure & content	Visual aids	Work management	Occupational health & safety analysis
Learning capacity	Format	Oral delivery	Creativity, initiative & motivation	Sustainable Development Goals (SDGs) analysis
	Style & communication	Defence of the project	Responsibility & personal commitment	Economic impact analysis
			Adaptability	

A list of facts was defined to describe what is expected of an apprentice in each item. Refinements were incorporated into the definitions of these facts, to grade students in the ranges 10-9, 8-7, 6-5, or below 5. Therefore, tutors are asked to locate the student at a range for each fact, depending on their performance, which ensures evidence-based grading. The grade for each item is determined by the average of the marks allocated for each fact.

Table 2 and Table 3 present examples of how facts are described to locate students in the grading ranges for the items "Style and communication" ("Written communication" dimension), and "Creativity, initiative, and motivation" ("Work ethic & attitude" dimension).

Table 2. Facts for assessing Style and communication item, in Written communication dimension

	10-9	*8-7*	*6-5*	*<5*
Fact 1	Excellent technical and formal language	Adequate technical and formal language	Appropriate language	Inappropriate language
Fact 2	Clear and precise communication	Clear communication	Somewhat ambiguous communication	Ambiguous and imprecise communication
Fact 3	Ideas well-organised and presented logically	Ideas organised and presented logically	Organisation and presentation of ideas could be improved	Inadequate organisation of ideas
Fact 4	No spelling or punctuation errors	No spelling or punctuation errors	Some spelling or punctuation errors	Spelling or punctuation errors

Table 3. Facts for assessing Creativity, initiative, and motivation item, in Work ethic & attitude dimension

	10-9	*8-7*	*6-5*	*<5*
Fact 1	Excellent at proposing ideas	Original in some aspects	Lacks original ideas	Does not propose own solutions
Fact 2	Works with enthusiasm	Works with enthusiasm	Poor enthusiasm	Does not show enthusiasm
Fact 3	Highly motivated	Motivated	Partially motivated	Not motivated

The rubric also considers a progressive assessment across all academic levels, from undergraduate apprenticeships to bachelor's and master's degree final projects. This means that extra items are assessed in the master's degrees, such as:

39. Undertaking complex or multidisciplinary projects ("Technical capacity" dimension).
40. Acquiring knowledge beyond their specialisation ("Technical capacity" dimension).
41. Ensuring holistic vision ("Oral communication" dimension).
42. Being aware of the impact of their work ("Work ethic & attitude" dimension).

As face-to-face evaluation of all the defined items could be lengthy in the final assessment, tutors prepare pre-analysed suggestions for the grading of each dimension. The company tutor is asked to take the responsibility of grading "Technical capacity" and "Work ethic & attitude" dimensions, given their close oversight of the student's development. On the other hand, "Written communication" and "Project impact analysis", owing to their academic focus, are most appropriately assessed by the academic tutor, who can ensure adherence to established benchmarks. Lastly, the "Oral communication" dimension is jointly assessed by both tutors in the evaluation session, after the student's presentation takes place.

In addition, the student is required to self-assess their technical capacity. This evaluation is conducted on the basis of the planning established for the project, and takes into account the complexity of the tasks, the quality of the work performed, and the level of autonomy shown, which enhances reflection and awareness of the student's own learning process. Self-assessment fulfils the following functions in the evaluation process: providing qualitative evidence of learning depth, enabling comparative analysis between student and tutors' perspectives, and enhancing feedback quality by revealing potential expectation gaps. While not directly influencing the quantitative assessment, this approach engages students as active participants in their evaluation and progress, and offers tutors valuable insights into workplace learning experiences.

With all this information, tutors collaboratively ratify the final grade for each dimension, integrating student self-assessment and tutor co-evaluation, to reach the overall final mark.

Results & Discussion

This methodology and assessment framework are currently undergoing validation by academic staff and industry-based company tutors. Preliminary feedback highlights significant improvements in both confidence and collaboration among stakeholders. Key outcomes emerging from the validation phase include:

43. Enhanced confidence in assessment consistency. Both academic and company tutors report a significant increase in confidence in the accuracy of the marking. This reflects the robustness of the rubrics for dual activities and the clarity of the co-assessment process.
44. Strengthened engagement of company tutors. The new framework reinforces the involvement of industry professionals in student training. Company tutors play a more active, structured role in mentoring and evaluation, integrating theoretical knowledge with workplace competencies.

45. Fostered academia-industry collaboration. The new methodology boosts stronger partnerships between academic institutions and the World of Work (WoW). Regular dialogue between tutors (grounded in shared rubrics and co-assessment practices) creates a coherent, reciprocal approach to student development. Co-assessment eliminates ambiguity because of sharing a common language between academia and industry partners, which benefits both students and curricula design.
46. Self-assessment as a tool for reflective learning. Student self-evaluation, integrated into the process, becomes instrumental in fostering metacognitive skills. Learners demonstrate greater awareness of their progress in dual competencies, aligning self-perception and tutor feedback.

Nevertheless, the specialised training of academic and business tutors was identified as a key element to ensure the effectiveness of the framework. Key components of the training include:

47. Contextualisation of the pedagogical importance of dual training.
48. Definition of the roles and responsibilities of each tutor.
49. Key milestones in the process.
50. Practical guidance and tools for giving constructive feedback.
51. Guidelines and tools to ensure objective, consistent and evidence-based evaluation.

Effective tutor training, both in academic and workplace settings, substantially strengthens dual programmes by bridging academic and workplace culture and assessment practices. However, significant challenges persist in implementation. Company tutors frequently face time constraints as they combine mentoring responsibilities with their regular professional workload, inevitably limiting training availability. Furthermore, the varied educational backgrounds of company tutors demand highly adaptable training approaches to ensure effective engagement. To address these challenges, initiatives like the EU4Dual project (European Commission, 2023) are developing structured training modules that combine pedagogical foundations with practical tools and mentoring strategies, offering flexible formats as blended learning and micro-credentials.

Once the design phase of the rubric is completed, pilot implementation tests are planned to evaluate its added value in enhancing assessment quality, and to identify optimisation needs through real-case applications. A recognised consideration is whether the new rubric may impose additional workload demands on tutors. This aspect will be objectively evaluated during pilot testing through quantitative time-tracking measures and qualitative feedback. The goal of the proposed rubric is to save tutors time, not create extra work, by making assessments clearer and less tedious.

The preliminary findings confirm the potential of the methodology to reshape dual-activity assessment in higher education. By combining academic and industry perspectives, the framework not only increases the rigour of assessment, but also enriches the student experience and prepares learners to thrive in an evolving professional landscape.

Conclusions

The assessment of dual activities in higher education demands an approach that balances academic rigour with workplace relevance. This work proposes a methodology designed to address these complexities through three pillars:

52. A multi-dimensional assessment framework. By standardising criteria across five core dimensions (technical capacity, written and oral communication, work ethic and attitude, and project impact analysis) the proposed rubric ensures a comprehensive evaluation of student skills. This structure not only mitigates subjectivity but also aligns academic and industry expectations, guaranteeing grading consistency across assessment panels.

53. Evidence-based grading through identifiable benchmarks. The systematic identification of observable, evidence-supported facts for each assessment item has proven critical to objectivity. By anchoring grades to recorded data the methodology ensures homogeneity of assessments while providing transparent evidence for accountability.

54. Holistic and collaborative assessment. Integrating co-assessment (between academic and company tutors) with student self-evaluation creates a 360-degree view of apprentice progression. This triangulation of perspectives enriches the quality of feedback, enabling students to merge self-perception with external observations. Furthermore, continuous improvement loops are embedded into the process, ensuring iterative refinement of both student skills and assessment practices.

The success of the methodology relies on providing tutors with the resources to effectively engage with the combined academic and professional dimensions of the framework. Targeted training for both academic and industry tutors must address the pedagogical and professional significance of dual higher education, roles and responsibility of tutors, process milestones, assessment tools, and strategies and guidelines for feedback, among others.

Preliminary validation underscores the potential of the methodology to bridge the academia-industry gap, transforming dual-activity assessment a tool for student and institutional growth.

Acknowledgment

The authors would like to thank the Provincial Council of Gipuzkoa for their support in the development of the project “ENPHEZI: Enpresa Hezitzaileak Eraikitzen Gipuzkoan” (EZAGUTZA-28/2024), as well as to all participating companies for their invaluable contributions.

References

Carless, D. (2018). Feedback loops and the longer-term: towards feedback spirals. Assessment & Evaluation in Higher Education, 44(5), 705-714. https://doi.org/10.1080/02602938.2018.1531108

Cockett, A., & Jackson, C. (2018). The use of assessment rubrics to enhance feedback in higher education: An integrative literature review. Nurse Education Today, 69, 8-13. https://doi.org/10.1016/j.nedt.2018.06.022

Dragan, M. & Hochrinner, H. (2024). Dual education in Austria: a new pathway to workforce-ready alumni. European Journal of Dual Higher Education (Online), 1, 31-39. https://doi.org/10.25162/EJDHE-2024-0003

Dupouy, A. & Bakni, M. (2024a). Dual higher education in Belgium. European Journal of Dual Higher Education (Online), 1, 41-51. https://doi.org/10.25162/EJDHE-2024-0004

Dupouy, A. & Bakni, M. (2024b). Dual higher education in Luxembourg. European Journal of Dual Higher Education (Online), 1, 73-83. https://doi.org/10.25162/EJDHE-2024-0007

European Commission (2023). EU4Dual - European Dual Studies University (Grant Agreement No. 101089937 — EU4DUAL — ERASMUS-EDU-2022-EUR-UNIV). Erasmus+ Programme. https://eu4dual.education/

Fialho, I., Cid, M., & Coppi, M. (2023). Pedagogical assessment in higher education: The importance of training. Education Sciences, 13(12), 1248. https://doi.org/10.3390/educsci13121248

Halista-Telus, E. (2023). Practical education at universities in Poland – Legal regulations and reflections. Gradus, 10(2), 1-5. https://doi.org/10.47833/2023.2.ART.005

Hand, L., & Clewes, D. (2000). Marking the difference: An investigation of the criteria used for assessing undergraduate dissertations in a business school. Assessment & Evaluation in Higher Education, 25(1), 5-21. https://doi.org/10.1080/713611416

Jackson, D. (2018). Challenges and strategies for assessing student workplace performance during work-integrated learning. Assessment & Evaluation in Higher Education, 43(4), 555-570. https://doi.org/10.1080/02602938.2017.1378618.

Laukkanen, V., Viklund, P., Kaarakainen, M. (2024). Finnish universities of applied sciences – Not 'dual', though strongly work life oriented. European Journal of Dual Higher Education (Online), 1, 21-29. https://doi.org/10.25162/EJDHE-2024-0002

Merlo, C., Millet, A., Hernando Gil, I. & Fischer, X. (2023). French dual and practical training approaches. Gradus, 10(2), 1-10. https://doi.org/10.47833/2023.2.ART

Montalto, M. & Agius, C. (2024). Mapping out dual higher education in Cyprus and Latvia. European Journal of Dual Higher Education (Online), 1, 103-111. https://doi.org/10.25162/EJDHE-2024-0010

Panadero, E. & Jonsson, A. (2020). A critical review of the arguments against the use of rubrics. Educational Research Review, 30, 100329, https://doi.org/10.1016/j.edurev.2020.100329

Sági, N. & Fülöp, T. (2024). Dual higher education in Hungary. European Journal of Dual Higher Education (Online), 1, 11-19. https://doi.org/10.25162/EJDHE-2024-0001

Turk, M. (2023). Dual higher education in Croatia: a long way to go. Gradus, 10(2), 1-6. https://doi.org/10.47833/2023.2.ART.003

Varga, S. & Sági, N. (2024). Review of dual higher education in the EU. Gradus, 11 (3), 1-6. https://doi.org/10.47833/2024.3.ART.009

Varga, S. (2024). A critical analysis of the current state of dual higher education in Slovakia. European Journal of Dual Higher Education (Online), 1, 63-71. https://doi.org/10.25162/EJDHE-2024-0006

Viklund, P. & Elgundi, Z. (2024a). Work-integrated education in the Swedish education system, European Journal of Dual Higher Education (Online), 1, 53-61. https://doi.org/10.25162/EJDHE-2024-0005

Viklund, P. & Elgundi, Z. (2024b). Aim high and work hard: The Estonian way. European Journal of Dual Higher Education (Online), 1, 85-93. https://doi.org/10.25162/EJDHE-2024-0008

Digital Tools for Inclusive Learning: A Scoping Review of Case Studies Supporting Autistic Students

Angel Gabriel Meela1,2, Sabine Moebs3, Amela Ibrahimagic4

1Institute of Accountancy Arusha (IAA), 2The Nelson Mandela African Institution of Science and Technology (NM-AIST), 3Duale Hochschule Baden-Württemberg (DHBW), Heidnheim, 4University of Tuzla

Abstract: Equitable access to education is a cornerstone of inclusive learning environments, yet autistic students often encounter persistent barriers to participation, communication, and engagement. Digital technologies including assistive devices, adaptive learning platforms, and interactive tools offer significant potential to reduce these barriers and foster more equitable practices. However, their integration requires careful consideration of context, design, and stakeholder perspectives to ensure that technology enhances inclusion rather than reinforcing existing inequalities.

This study undertakes a scoping review of published case studies and existing literature to examine how digital tools have been used to support autistic learners across diverse educational settings. The review maps current evidence on the role of digital innovations in improving accessibility, supporting learner engagement, and enabling individualized pathways. Case studies are drawn from peer-reviewed research and institutional reports in both low-resource and higher-resource contexts, including Tanzania, Germany, and selected African initiatives. This multi-context approach provides comparative insights into opportunities, challenges, and culturally responsive practices.

By synthesizing existing evidence, the review identifies key themes, highlights gaps in current practice, and outlines considerations for sustainable integration of digital tools in inclusive pedagogy. The findings aim to inform educators, policymakers, and technology developers by providing a structured framework for advancing inclusive education for autistic students.

Keywords *Inclusive Education, Autism, Digital Tools, Accessibility, Equity*

Why Focusing on Higher Academic Education for Experienced Nurses Matters for Health System Transformation in Germany

Background The German healthcare system faces major challenges, including demographic change, increasing care complexity, workforce shortages, and ongoing health policy reforms. These developments require an expansion and redistribution of professional competencies within healthcare teams. Despite long-standing recommendations, the proportion of academically qualified nurses in Germany remains low. Vocational nursing education often does not provide direct access to higher education, contributing to professional fragmentation. Experienced nurses without formal higher education entrance qualifications are particularly underrepresented, highlighting the need for more permeable educational pathways.

Objective This study presents a best-practice model of a block-based, vocationally integrated Bachelor's programme in Applied Nursing Science. It examines graduates' academic performance and career trajectories and discusses the relevance of such programmes for future-oriented higher education structures and sustainable healthcare workforce development.

Methods Two data sources were analysed. An alumni follow-up survey of graduates from 2016–2024 (N = 74), conducted at least one year after graduation, assessed career retention, professional roles, and development goals using an online questionnaire. Additionally, a descriptive analysis of all graduates from 2016–2025 (N = 165) examined academic performance, including Bachelor's thesis grades and higher education entrance pathways, using Jamovi (ANOVA) and SPSS.

Results Most graduates remain in nursing or related healthcare fields and take on expanded roles in clinical practice, education, management, and quality development. No significant differences in academic performance were found between different higher education entrance pathways, indicating that certificate-based access routes allow equitable academic outcomes.

Conclusion Vocationally integrated study formats represent a key pathway for widening access to higher education and supporting healthcare system transformation. Dual academisation models for experienced nurses promote educational participation, professional mobility, and innovation, and contribute to a more sustainable and resilient healthcare workforce.

(283 words)

Keywords *lifelong learning, shaping future of healthcare, educational permeability, academisation nursing, applied nursing science*

Authors information:

Prof. Dr. Katrin Heeskens

Professor of Applied Health and Nursing Sciences DHBW Stuttgart

Katrin.heeskens@dhbw-stuttgart.de

Gesa Meyer, M.Sc.

Research assistant, DHBW Stuttgart

Gesa.meyer@dhbw-stuttgart.de

Future Skills for Future Health Professionals: Spotlight on

Laura Eigbrecht (DHBW Karlsruhe), Jörn Allmang (DHBW Karlsruhe), Prof. Dr. med. Margrit Ebinger (DHBW Stuttgart), Prof. Dr. Ulf-Daniel Ehlers (DHBW Karlsruhe)

Abstract text

Future Skills (FS) have become a key concept in higher education research and policy, particularly in response to rapidly changing professional and societal contexts (Ehlers, 2020). In Health and Nursing Sciences, FS such as communication, reflection, and ambiguity competence are increasingly discussed as essential for professional agency in complex care environments (Demir Erbas et al., 2025; Lüttmann et al., 2026, Matusiewicz & Werner, 2021). At the same time, competence-based education has gained further importance through the Bologna process and the growing demand to prepare graduates for evolving contexts of action (Cendon, 2017).

Dual Higher Education (DHE), characterised by the systematic alternation of academic learning and workplace-based practice, offers favourable conditions for competence development through experiential learning and structured reflection processes (Kolb, 1984; Ehlers & Hudak, 2018).

This contribution presents a research and education initiative aiming to integrate FS learning into DHE study programmes. The initiative follows a Design-Based Research approach, involving learners, educators, and practice partners in iterative cycles of design, implementation, and evaluation (Design-Based Research Collective, 2003; McKenney & Reeves, 2012).

A toolbox was developed to support Future Skills learning across several DHE programmes, including digital reflection tools, portfolio-based instruments, co-design workshops for curriculum development, and learning materials such as card-based activities and story-based reflection processes.

This contribution presents insights from the integration of FS learning in an Applied Health and Nursing Sciences study programme in DHE, involving approximately 25 second-year undergraduate students. It illustrates how practice experiences can become a valuable resource for FS development when supported by dedicated reflective spaces, peer exchange, and discipline-sensitive learning designs.

Ongoing evaluation highlights both potentials and barriers, such as time constraints and the challenge of embedding competence-oriented learning within highly structured curricula. The findings underline the need for co-designed and context-aware Future Skills programmes to strengthen professional competence development in DHE.

References

Cendon, Eva (Ed.) (2017). Die kompetenzorientierte Hochschule. Kompetenzorientierung als Mainstreaming-Ansatz in der Hochschule. https://www.pedocs.de/volltexte/2017/14563/pdf/Cendon_etal_2017_Die_kompetenzorientierte_Hochschule.pdf

Demir Erbas, S., Gencer Sendur, E., & Akman Yilmaz, A. (2025). The influence of 21st-century skills on clinical decision-making in nursing students: A cross-sectional study. Teaching and Learning in Nursing, 20(2), e464–e469. https://doi.org/10.1016/j.teln.2024.12.011

Design-Based Research Collective (2003). Design-based research: An emerging paradigm for educational inquiry. Educational Researcher, 32(1), 5–8.

Ehlers, U.-D. (2020). Future Skills. Lernen der Zukunft – Hochschule der Zukunft. Springer VS.

Ehlers, U.-D. & Hudak, R. (2018). A framework model for professional, cooperative higher education – New perspectives on the internationalisation of cooperative studies. WACE – 3rd international Research Symposium. Stuttgart.

Kolb, D. A. (1984). Experiential Learning: Experience as the Source of Learning and Development. Prentice-Hall.

Lüttmann, C., Halek, M., Kalthoff, D., & Büscher, A. (2026). Entwicklung eines Kompetenzmodells zu Future Skills für Pflegefachpersonen: Eine qualitative Studie. Pflege, 0(0). https://doi.org/10.1024/1012-5302/a001061

Matusiewicz, D. & Werner, J. A. (eds.) (2021). Future Skills in Medizin und Gesundheit: Kompetenzen. Stärken. Menschen. MWV.

McKenney, S., & Reeves, T. C. (2012). Conducting Educational Design Research. Routledge.

Key Words *Future Skills, Dual Higher Education, Nursing Sciences, competence development, experiential learning.*

Behavioral Determinants of Investment Decisions Among Young Adults – Implications for Education and Labor Market Competencies

Authors and affiliations: PhD Anna Szczepańska-Przekota, Koszalin University of Technology

Abstract text

In recent years, investment activity among young adults has been steadily increasing. Early adulthood is a key stage in forming patterns and attitudes toward risk, losses, and gains, which may later influence both financial choices and career-related decisions. There is limited knowledge about whether and to what extent investment choices reflect competencies relevant to the labor market.

The aim of this study is to identify the behavioral determinants of investment decisions among young adults. A key objective is to assess whether decision-making under risk can be treated as an indicator of competencies relevant to the labor market.

The pilot study was conducted on a sample of 62 students representing economics, humanities, and engineering and technology fields. It combined scenarios to identify heuristics (disposition effect, loss aversion, overconfidence), a personality test based on the Big Five (OCEAN) model, an investment simulation, and a decision evaluation questionnaire. Data analysis included the chi-square test, contingency coefficient, and mean comparison tests.

The results indicate significant differences in investment behavior depending on the field of study and gender. Economics students demonstrated a more analytical approach and lower susceptibility to cognitive biases; engineering students showed higher confidence and greater investment activity; humanities students exhibited stronger loss aversion and greater emotional reactivity. Consistency was also observed between declared tendencies toward heuristics and actual behavior in the investment simulation.

The results suggest that decision-making under risk can serve as an indicator of competencies relevant to the labor market. In particular, individuals who achieve better investment outcomes may also demonstrate a greater ability to make effective career decisions. Since heuristics have predictive value and shape specific behavioral patterns, greater attention should be paid to these issues in education. Incorporating behavioral aspects into education can support the development of emotional and psychological maturity in young people, thereby influencing career choices.

Key Words *Behavioral finance, Investment decision-making, Cognitive biases, Financial education, Labor market competencies*

Shaping the Future Workforce: How Nursing Education Influences Gerontogeriatric Competencies

Maria José Catalão1,2,3,4 *, Helena Arco1,2, Nuno Carrajola1,2, João Tavares5.
1Department of Health Sciences and Technologies, School of Health, Portalegre Polytechnic University, Campus Politécnico 10, Portalegre 7300-555, Portugal
2CARE-Research Center on Health and Social Sciences, Portalegre Polytechnic University, Portalegre 7300-555, Portugal
3Department of Education and Psychology, University of Aveiro, Aveiro 3810-198, Portugal
4ICBAS, University of Porto, Porto 4050-313, Portugal
5RISE-Health Sciences Research Unit, School of Health Sciences, University of Aveiro, Aveiro 3810-198, Portugal
Corresponding author:
**Maria José Catalão, Department of Health Sciences and Technologies, School of Health, Portalegre Polytechnic University, Campus Politécnico 10, Portalegre, 7300-555, Portugal.*
email: maria.catalao@ipportalegre.pt
Abstract text

Background Portugal is currently classified as a hyper-aged society, creating an urgent imperative for healthcare systems to secure a workforce proficient in gerontogeriatric care. Despite this demographic shift, concerns remain regarding the readiness of newly graduated registered nurses (NGRNs) to manage the complex multidimensional needs of older adults, raising questions about the effectiveness of current educational curricula. Objective: This study investigated the determinants of gerontogeriatric competencies in NGRNs, specifically assessing the predictive value of sociodemographic characteristics versus educational factors, clinical training quality, and curricular structure. Methods: A quantitative, cross-sectional nationwide survey was conducted with 242 NGRNs (graduates of 2021–2022). Participants completed the validated Gerontogeriatric Competency (GGC) scale for newly graduated nurses. Multiple linear regression models were employed to identify predictors, distinguishing between personal variables (age, gender, contact with older adults) and educational factors (curriculum structure, supervision quality, training duration). Results: The regression models revealed that sociodemographic variables were not significant predictors of competency. Instead, self-perceived confidence emerged as the strongest positive predictor ($\beta = 0.114$). Crucially, the study identified specific barriers: NGRNs exposed to clinical training restricted to "basic care" routines or supervision that reinforced ageist stereotypes exhibited significantly lower scores in the Family/Caregiver and Management domains. Conversely, adequate training duration in long-term care settings was consistently associated with higher global competency scores. Conclusion: These findings indicate that NGRN readiness is driven by curricular design and the quality of clinical mentorship rather than personal demographics. To ensure a competent workforce, nursing education must prioritize meaningful clinical placements in long-term care and eliminate ageist biases in supervision, supporting safer and higher-quality gerontogeriatric care.

Key Words *Gerontogeriatric Nursing, Nursing Education, Competency-based Education, Newly Graduated Registered Nurses.*

Mental Health under Dual Pressure: A Two-Stage Pilot Study on Impostor Feelings and Digital Prevention Strategies in

Abstract text

1) Background / Context

Dual higher education is widely valued for its strong employability outcomes through the close integration of academic learning and professional practice. At the same time, this structural design exposes students to sustained psychological pressure arising from high workload, continuous

performance assessment, role ambiguity between student and employee identities, and pronounced heterogeneity in prior knowledge and experience. Existing research in higher education and professional contexts links these conditions to elevated stress, reduced self-efficacy, and impostor-related self-doubt. These pressures are increasingly intensified by the rapid diffusion of artificial intelligence, which introduces existential uncertainty regarding future career prospects and fuels concerns among students that their studies may lose relevance or meaning. Despite growing attention to student wellbeing, mental health is still insufficiently examined as a systemic design challenge within dual higher education.

2) Objective / Purpose

This contribution aims to investigate impostor feelings as a mental health–relevant phenomenon in dual higher education and to evaluate digital prevention strategies that strengthen self-efficacy and resilience. It addresses the question of how preventive, design-oriented interventions can mitigate self-doubt and psychological strain in dual study contexts. The paper follows a two-stage pilot approach combining an existing international study with a forthcoming empirical investigation among dual students at the DHBW.

3) Methods / Approach / Case

Stage one consists of an exploratory pilot study conducted in Malaysia and published in an IEEE conference paper (n = 68). A structured online survey captured (1) demographic and contextual variables, (2) impostor severity using the Clance Impostor Phenomenon Scale (CIPS), (3) perceptions of digital prevention strategies (e.g. personalised dashboards, mentoring platforms, peer-matching, learning tools, AI-based feedback), and and (4) optional cultural and spiritual support elements.

Stage two replicates and adapts this comparative exploratory design for dual students at the DHBW and will be completed prior to the EU4Dual conference. Analyses focus on prevalence patterns, perceived stressors, and acceptance of digital prevention strategies under dual study conditions.

4) Results / Findings

Findings from stage one reveal a consistently high prevalence of impostor feelings across demographic groups and strong acceptance of structured, feedback-oriented, and socially supported digital interventions. Preliminary results from the DHBW pilot study will be presented to identify convergences and context-specific characteristics of dual higher education.

5) Conclusion / Implications

By integrating international pilot data with an institution-specific dual study context, this contribution delivers empirically grounded insights into mental health challenges and preventive design strategies in dual higher education. It supports EU4Dual's objective of developing healthier, more resilient, and future-oriented dual learning environments that align wellbeing with employability. Furthermore, both pilot studies provide a robust foundation for future third-party funded research by identifying promising digital and AI-supported technologies for scalable, preventive mental health interventions and informing evidence-based institutional and policy-level decision-making within dual higher education.

Keywords

Dual Higher Education; Mental Health; Impostor Syndrome; Digital Prevention; Self-Efficacy

Sustainable Dual Education: Student Well-Being, Resilience and Loyalty at the Campus–Workplace Interface

Tatjana Marinkovic, Marina Stamenovic, Predrag Maksic
Academy of applied studies Polytechnic, Belgrade, Serbia

Dual study models in higher education integrate academic learning with work-based experience and are increasingly recognised for their contribution to graduate employability. However, the dual burden of academic and workplace demands exposes students to elevated levels of stress, making mental health and well-being a critical dimension of programme quality and sustainability.

This paper applies a stress–coping and resilience framework to analyse student experiences in dual study programmes. Drawing on the transactional model of stress and coping, student well-being is conceptualised as the outcome of interactions between external demands (academic workload, workplace expectations, scheduling conflicts) and internal and contextual coping resources, including acquired soft skills, mentoring support, and institutional structures. Resilience is understood as students' capacity to adapt, recover, and maintain engagement under sustained pressure.

Empirical data were collected from dual students in several higher education institutions in Serbia. The analysis focuses on students' satisfaction with key generic competences—communication, teamwork, autonomy, time management, adaptability, and self-directed learning—which function as protective factors supporting effective coping and psychological resilience. A composite Loyalty Index, measuring students' intention to continue studies, pursue higher-level dual education, and recommend the dual model, was developed and integrated into an extended Employability and Loyalty Index (ELEI+).

The findings indicate a strong positive relationship between satisfaction with soft skills, resilience, and student loyalty. Students reporting higher levels of autonomy, time management, and mentoring support demonstrate better stress regulation, lower perceived overload, and higher loyalty scores. Conversely, inadequate coordination between academic and workplace obligations and insufficient mentoring increase stress and undermine well-being.

The paper argues that mental health, resilience, and coping capacity should be treated as core quality indicators of dual study programmes, requiring systematic integration into programme design, mentoring systems, and quality assurance frameworks.

Keywords *dual students' mental health, loyalty, soft skills*

A Dual Tutoring and Mentoring Model to Enhance Student Well-being: Lessons from Mondragon University's Final Degree Project in Global Digital Humanities

Aitor Zuberogoitia, Arantza Ozaeta
Mondragon Unibertsitatea

Abstract text

Abstract proposal length: Max 300 words (main text)

Structure:

55. **Background / Context** Briefly introduce the problem or topic, and explain why it matters or what gap it addresses.

    Higher education is increasingly expected to prepare students for professional life while also supporting their mental well-being. However, many final degree projects lack sustained real-world engagement as well as sufficient emotional and academic support, which may negatively affect students' well-being and professional development.

56. **Objective / Purpose** State the aim of your research or project (what question are you trying to answer?)

    This study examines how a dual tutoring model—combining academic supervision with external professional mentoring—can enhance graduate professional development while fostering student well-being within a real-world project framework.

57. **Methods / Approach / Case** Describe how the study was conducted or explain the case. Include techniques, data sources, or frameworks used.

    The study analyses the Final Degree Project in the Global Digital Humanities programme at Mondragon University (2025–2026). Each project addresses a realorganisational need and is supported by both an academic tutor and an external mentor. Data will be collected through a focus group with academic tutors (March 2026), two reflective workshops with students (March–April 2026), and semi-structured interviews with participating mentors (March 2026)

58. **Results / Findings** Summarize key outcomes or discoveries.

    Preliminary feedback from the pilot phase suggests that the dual tutoring and mentoring structure strengthens both academic quality and professional relevance. It is hypothesised that, by the end of the process, students will report higher levels of well-being, increased self-confidence, and a clearer sense of professional direction. The planned workshops and interviews aim to systematically explore how emotional and procedural support contribute to student well-being during intensive project work

59. **Conclusion / Implications** What do the results mean? Practical implications? Highlight the significance, impact, or future directions.

    The proposed model integrates dual tutoring and mentoring with structured reflective dialogue to support both professional development and mental well-being. It offers a transferable framework for dual higher education programmes. Findings from the forthcoming data collection will provide deeper insights into effective support mechanisms for learner well-being in work-integrated learning contexts

Key Words *dual tutoring and mentoring; final degree projects; work-integrated learning; higher education*

MENTAL SUPERPOWERS VR: EMOTION-CENTERED DESIGN FOR MENTAL HEALTH LEARNING IN HIGHER EDUCATION

Authors and Affiliations: Ilona Hoppe M.A.1, Kerstin Kron M.A.2

1 DHBW Stuttgart, Faculty of Social Sciences 2 DHBW Stuttgart, Education Service Centre

Context

Since mental health issues among young adults are rising, higher education must develop students' mental skills such as resilience, creativity, curiosity, and coping strategies. However, mental health education faces significant barriers like topic abstraction, stigmatization, and heterogeneous prior experience. Additionally, emotion formation involves individual and unpredictable factors, making frontal educational approaches insufficient.

Objective

This interdisciplinary project investigates how virtual reality and emotion-promoting design methods can provide accessible entry points to mental health education. The research examines how immersive VR environments can support two critical emotion-related processes: (1) mentalization – understanding emotional processes to prevent mental shutdown and harmful behavioural patterns, and (2) embracing emotions to develop exploratory mindsets, fostering self-efficacy and agency through creative interactions.

Approach

For the project MENTAL SUPERPOWERS, a VR conference environment was extensively enhanced with emotion-promoting design (atmosphere, storytelling, interaction, gamification) aiming for emotional appraisal by fostering predictive errors and dynamics. Within this immersive "Dual Minds Superhero Training Camp," students collaborate in interactive missions to explore emotionally challenging topics like "Negative Feelings", "Chronic Stress & Mental Illness", "Neurodiversity", and "My Self/Selves & Story." The fictional superhero narrative provides an overarching structure, supporting learners who benefit from predictability, while multisensory and creative environments address engagement needs of learners with attention differences. This hands-on approach combines psychoeducational content with therapeutic methods in multisensory learning spaces.

Results & Implications

Initial testing revealed curiosity and engagement, validating the transdisciplinary approach to emotional learning design and innovative technology application in higher education. This opens research directions around the balance between cognitive-reflective and intuitive-creative processes: (1) examining mentalization within immersive environments, (2) investigating design mechanisms in sensory perception, emotion formation and exploratory behaviour, including opportunities for neurodivergent learners. Upcoming research will explore how digital media design can contribute to future-oriented learning and the acquisition of essential future skills in emotionally sustainable ways.

Key Words *Student Mental Health Education, Virtual Reality, Emotion-Centred Design, Creative Learning Spaces, Experiential Storytelling*

References:

Dalmış, A. B., Büyükatak, E., & Sürücü, L. (2025). Psychological resilience and future anxiety among university students: The mediating role of subjective well-being. Behavioral Sciences, 15(3), Article 244. https://doi.org/10.3390/bs15030244

Immordino-Yang, M. H., & Damasio, A. (2007). We feel, therefore we learn: The relevance of affective and social neuroscience to education. Mind, Brain, and Education, 1(1), 3–10. https://doi.org/10.1111/j.1751-228X.2007.00004.x

Jokinen, J. P. P., & Silvennoinen, J. (2020). The appraisal theory of emotion in human–computer interaction. In R. Rousi, J. Leikas, & P. Saariluoma (Eds.), Emotions in technology design: From experience to ethics (pp. 27–39). Springer. https://doi.org/10.1007/978-3-030-53483-7_3

Scherer, K. R. (2009). Emotions are emergent processes: They require a dynamic computational architecture. Philosophical Transactions of the Royal Society B: Biological Sciences, 364(1535), 3459–3474. https://doi.org/10.1098/rstb.2009.0141

Scherer, K. R., & Moors, A. (2019). The emotion process: Event appraisal and component differentiation. Annual Review of Psychology, 70, 719–745. https://doi.org/10.1146/annurev-psych-122216-011854

Schrader, C., Kalyuga, S., & Plass, J. L. (2022). Motivation and affect in multimedia learning. In R. E. Mayer & L. Fiorella (Eds.), The Cambridge handbook of multimedia learning (3rd ed., pp. 121–131). Cambridge University Press. https://doi.org/10.1017/9781108894333.012

Schwarzer, N.-H. (2022). Mentalisieren und psychische Gesundheit [Mentalizing and mental health]. In H. Kirsch, T. Nolte, & S. Gingelmaier (Eds.), Soziales Lernen, Beziehung und Mentalisieren [Social learning, relationships, and mentalizing] (pp. 131–142). Vandenhoeck & Ruprecht.

Stöffer, A. (2023). Mentalisierung in Supervision und Coaching: Ein Leitfaden psychodramatischer Prozesse [Mentalization in supervision and coaching: A guide to psychodramatic processes]. Tectum. https://doi.org/10.5771/9783828879164

Tyng, C. M., Amin, H. U., Saad, M. N. M., & Malik, A. S. (2017). The influences of emotion on learning and memory. Frontiers in Psychology, 8, Article 1454. https://doi.org/10.3389/fpsyg.2017.01454

Taubner, S., & Kotte, S. (2018). Mentalisierung im Coaching [Mentalization in coaching]. In S. Greif, H. Möller, & W. Scholl (Eds.), Handbuch Schlüsselkonzepte im Coaching [Handbook of key concepts in coaching] (pp. 353–361). Springer. https://doi.org/10.1007/978-3-662-49483-7_41

Techniker Krankenkasse. (2024, January 15). Gesundheitsreport 2023: Wie geht es Deutschlands Studierenden? [Health report 2023: How are Germany's students doing?]. https://www.tk.de/lebenswelten/gesunde-hochschule/studien-und-analysen/gesundheitsreport-2023-studierendengesundheit--2151494

From Education to Research: Strengthening Advanced Practice Nursing through Research-Oriented Academic Practice Partnerships

Author Marion Burckhardt, Professor of Applied Health Sciences in Nursing, Baden-Württemberg Cooperative State University (DHBW),

Background

In Germany, Advanced Practice Nurses (APNs) engage in research, innovation and transfer (Forschung, Innovation und Transfer [FIT]) activities, yet face limited mentoring and research infrastructure. While research-oriented Academic Practice Partnerships (APPs) show international potential to support nursing's academic development, their design within the German dual higher education system remains unclear.

Objective

The study examines how education-focused cooperation between Baden-Württemberg Cooperative State University (DHBW), a German dual university, and its clinical partners can be expanded into a research-oriented collaboration to address APNs' support needs in FIT-related activities.

Methods

An exploratory qualitative study was conducted using semi-structured expert interviews with 12 APNs and 10 FIT-responsible nursing leaders from DHBW's partner hospitals. Data were analysed using structured qualitative content analysis to identify support needs and derive design requirements for research-oriented APPs within the German dual higher education system.

Results

APNs and FIT-responsible nursing leaders highlighted the need to strengthen FIT-related competencies of APNs and to enhance their role development, careers and academic visibility. In addition, participants emphasised the need for structured support in FIT activities, for example mentoring. Two main paths can be derived from the data: APN role implementation and evidence generation, which, when supported, may improve care quality and sustain the APN role.

Regarding the design of research-oriented APPs, the findings underline the relevance of clear governance, well-defined roles and responsibilities, structured collaboration processes, adequate resources and shared infrastructure, as well as strategies to ensure sustainability. Research-oriented collaborations were perceived as a promising model within dual higher education structures, while challenges mainly concerned resource availability.

Conclusion

Research-oriented APPs offer a viable framework to expand education-focused cooperation within the German dual higher education system. By addressing identified support needs, such partnerships can support APN role implementation and evidence generation, thereby contributing to improved quality of care and the sustainable establishment of the APN role.

Key Words

Academic Practice Partnership, Higher Education, Advanced Practice Nursing, Dual Higher Education

Key Words *max 5 keywords*

Designing a European Double Degree in Tourism: Lessons from the EU4Dual Alliance on Collaboration and Employability

Authors Ingerid Dommersnes, Solja Ryhänen, Petra Laakso, Manuela Tooma, Eva-Maria Adamer-König

This abstract presents the development and planned implementation of the first EU4Dual double degree programme in tourism at the bachelor level, a collaborative initiative between FH JOANNEUM (Austria) and SAVONIA (Finland). Designed to foster international collaboration and enhance student employability, the programme enables its students to earn two diplomas, gain work experience abroad, and study in two distinct national contexts. The curriculum is structured to educate tourism professionals with comprehensive knowledge of both the Finnish and Austrian tourism, health and wellness sectors.

The programme's design process revealed structural challenges, most notably the alignment of programmes with differing credit frameworks, academic calendars, national legal regulations and nomenclature. Addressing these constraints required curriculum mapping, legal clarification, and institutional negotiation to ensure academic coherence without compromising national requirements. The resulting program integrates curriculum alignment, possibilities for joint supervision of bachelor theses, and a robust dual education component. Students complete at least 675 hours/27 ECTS of practical training in the industry during their degree, a substantial amount thereof completed during their stay abroad. Additionally, the candidates will gain proficiency in the host country's language, next to English, significantly boosting graduates' competitiveness in the international job market. Next to its focus on tourism, the program offers a strong focus on health management, equipping the students to seek employment in other sections outside of the tourism sphere.

This presentation will examine the key challenges and solutions encountered during the development of the programme, particularly the harmonisation of two distinct study programs to facilitate a seamless double degree pathway, while maintaining the dual elements of each program. By addressing these challenges, the initiative not only reinforces the academic partnership between the institutions but also establishes a scalable model for cross-border educational cooperation in Europe, contributing to the development of a new generation of internationally oriented tourism professionals.

Key Words *Double degree, dual higher education, tourism, European University Alliance*

Authors Michel Bakni, Miguel Segui, Sylvain Grillet, Sebastien Isserte

Eye-tracking-based study for enhancing dense infographics design: colour selection and data distribution

Dual education systems aim to reduce students' commute between the workplace and the university by promoting e-learning and remote learning, where visual content is essential for creating attractive, simple and meaningful learning materials. However, many educational infographics remain difficult to interpret, which can increase the time needed to extract useful information and reduce learning efficiency. The objective of this study is to enhance infographic design from the students' perspective, paying particular attention to data distribution and colour selection. A

comparative study was carried out using infographics with different shapes, layouts and colour schemes. Eye-tracking technology was used to analyse visual behaviour when extracting information, including fixations, saccades, scanpath length, heatmaps and task completion time. The results show that data format significantly influences the time required to identify relevant information, while the choice of colour plays a crucial role in guiding the visual scanpath towards accurate content. Appropriate use of colour improves orientation and reduces visual effort. These findings demonstrate that optimised infographic design can support faster and clearer information processing. The study provides practical insights for designing simpler and more effective infographics that better match human visual perception, particularly in e-learning contexts.

Key Words *eye-tracking, infographics, data distribution, colour-based-design*

1) Conference track: 1) Dual Higher Education; 1.2 Best Practices in Dual Academisation of Health Professions (VET)

2) a) oral and b) poster presentation

Lost in Translation: An Early Grounded Theory of Navigating Institutional Dissonance in HEI-Micro organisation Innovation collaboration within the Small Island Nation of Malta

Robert Cassar- MCAST Robert.cassar@mcast.edu.mt Eu4Dual Higher Education Track

Context

Innovation between Higher Education Institutions (HEIs) and Micro-organisations is often touted as a driver of economic growth, yet the mechanisms of how these asymmetric partnerships function remain misunderstood.

Objective

The primary research question guiding this inquiry is: How do micro-organisations and HEIs successfully negotiate the structural asymmetries inherent in their innovation partnerships?

Methods

Adopting a modified objectivist stance, this doctoral study, currently in the third year of development, utilises a classic (Glaserian) Grounded Theory approach. The data collection employs unstructured open interviews conducted simultaneously with ongoing comparative analysis via theoretical sampling. The research is currently at the selective coding stage, focusing on the delimitation and integration of the emerging theory.

Interim Results

Early findings suggest that the main concern for participants is the existential and operational friction caused by the partnership. The emerging substantive theory proposes that participants resolve this through the core category of "Navigating Institutional Dissonance." This social process involves actively bridging the structural gaps that threaten the innovation lifecycle.

Preliminary analysis indicates a causal hierarchy among the identified dimensions of dissonance. The data suggests that Semantic Dissonance (linguistic barriers) acts as the catalyst. When key concepts are misunderstood, it triggers Competence Dissonance (doubts regarding a partner's abilities), which ultimately precipitates Temporal Dissonance (operational delays and missed horizons). This implies that failure in these partnerships is often a cascading effect starting from linguistic misalignment.

Conclusion & Implication

These initial findings offer a novel, predictive framework for understanding the HEI-Micro divide. By identifying the causal linkage between these variables, the study highlights the need for early "translation" interventions to prevent the downstream escalation of dissonance.

Keywords *University-Industry Collaboration (UIC); Micro-organisations; Glaserian Classic Grounded Theory; Institutional Dissonance; Collaborative Asymmetry; Open Innovation.*

Poster Presentations

Healthy Living

Dr Patrycjusz Zarębski
Assistant Professor
Koszalin University of Technology, Poland

Knowledge-based territorial inequalities and wellbeing in peripheral regions

Abstract

1) Background / Context

Healthy living is shaped not only by medical care but by structural territorial conditions that determine access to stable employment, education, adaptive capacity and institutional support. Peripheral regions often accumulate structural disadvantages that weaken these social determinants of health. However, the role of knowledge intensity as a territorial foundation of healthy living remains underexplored.2)

2) Objective / Purpose

The objective of this paper is to examine how territorial differentiation based on knowledge intensity shapes wellbeing conditions in peripheral regions, with particular attention to structural inequalities that influence social inclusion and long-term development prospects.

3) Methods / Approach / Case

The study covers 2,477 municipalities in Poland and is based on enterprise-level REGON data (PKD/NACE 2007). Seven sectoral groups reflecting technological and knowledge intensity were constructed according to OECD and Eurostat standards. Principal Component Analysis identified three latent dimensions of knowledge intensity explaining 59.6% of total variance. These components were used in a k-means clustering procedure. The optimal four-cluster solution (R^2 = 0.525; Silhouette = 0.280) identified statistically robust functional municipality types.

4) Results / Findings

Four territorial profiles were identified: knowledge-intensive municipalities (513 units), industrially transitioning municipalities (445), traditionally structured municipalities (660), and peripheral municipalities with low knowledge intensity (859). Knowledge-intensive municipalities cluster in peri-metropolitan areas and display structural characteristics associated with favourable social determinants of health, including diversified labour markets, higher adaptive capacity and stronger institutional environments. In contrast, peripheral low-knowledge municipalities concentrate in more remote regions and exhibit cumulative structural constraints linked to limited employment opportunities and weaker institutional density.

5) Conclusion / Implications

The findings demonstrate that wellbeing in peripheral regions is strongly shaped by structural and territorial factors related to the distribution of knowledge-based activities. From this perspective, dual higher education can be understood as an indirect determinant of healthy living by strengthening local knowledge bases, supporting inclusive labour markets and reducing territorial inequalities. The paper supports a health in all policies approach and highlights the role of education- and knowledge-based interventions in fostering healthier and more equitable territorial development pathways.

Key Words *Healthy living, Social determinants of health, Wellbeing, Territorial inequalities, Knowledge intensity*

Limitations of Volumetric Energy Density (VED) in Predicting Properties of Ti-6Al-4V Components Manufactured by L-PBF

Remigiusz Kołtonowski, Błażej Bałasz – Koszalin University of Technology, Faculty of Mechanical and Energy Engineering

Abstract: L-PBF technology enables the processing of Ti-6Al-4V into ultra-lightweight, topologically optimized structures that drastically reduce carbon footprint in the aerospace sector, as well as into biocompatible implants precisely matched to patient anatomy. This is pivotal for achieving green economy goals through waste minimization and lightweighting, and for advancing personalized medicine (Healthy Living) via custom implant production. However, ensuring the reliability of these critical applications requires precise process control, which often relies on the simplified Volumetric Energy Density (VED) index. This paper challenges the validity of treating VED as a unique parameter determining the quality and structure of manufactured Ti-6Al-4V components. Numerical and experimental analysis demonstrated that parameter sets generating identical VED result in distinct physical effects, such as residual stresses, hardness, melt pool dimensions, and average grain size. It was shown that relying solely on the VED parameter is insufficient and carries significant risks when scaling the process or transferring parameters between different machines.

Key Words *sustainable development, medical engineering, L-PBF, Ti-6Al-4V, volumetric energy density*

Promoting Mental Health and Academic Success in Higher Education: The Integrated Impact of the 2ProMES and Academic Boost Programs at IP Portalegre.

Cristina Guerra 1,2, Raúl Cordeiro 1,3, Helena Morgado1,4, Helena Arco1,3, Paula Oliveira1,3, Bruno Morgado1,3, Pedro Amaro1, Ana Serra1

1 Portalegre Polytechnic University
2 CIEQV – Life Quality Reserach Centre - This research was funded by Fundação para a Ciência e a Tecnologia, (grant nº UID/CED/04748/2025)
3 CARE - Research Center on Health and Social Sciences - This research was funded by Fundação para a Ciência e a Tecnologia (grant UID/06173/2025
4 CLISSIS (Centro Lusíada de Investigação em Serviço Social e Intervenção Social)
Structure:

60. **Background** The transition to higher education and persistence in academic life pose significant challenges to students' mental health. In Portugal's interior regions, these challenges are further intensified by sociodemographic factors and by the need for locally based support systems.
61. **Objective** This study analyses the impact of two institutional programs of the Polytechnic Institute of Portalegre (IPP) — 2ProMES and Academic Boost — as determinants of improved student well-being and academic integration.
62. **Methods** A descriptive-analytical study was conducted based on monitoring data from these programs. 2ProMES focuses on primary prevention and psychological support, while Academic Boost targets the development of transversal competences (soft skills), time management, and pedagogical support.
63. **Results / Findings** Monitoring data suggest that students at the Polytechnic Institute of Portalegre exhibit higher levels of resilience and lower risk of academic burnout. Academic Boost emerges as a key opportunity for students to manage the pressure of dual responsibilities, providing tools that reduce anxiety associated with academic performance. In parallel, 2ProMES offers a safe environment for early mental health intervention, reducing the stigma associated with help-seeking behaviors.
64. **Conclusion / Implications** The integration of mental health support with academic success tools is a critical determinant of student retention and success. These programs demonstrate that Higher Education Institutions (HEIs) must go beyond traditional teaching, acting as active agents in health promotion to ensure balanced student development in complex contemporary contexts.

Key Words *Mental Health; Academic Success; Higher Education; Dual Learners; Student Support.*

Empowering Future Leaders: Needs Assessment for a Competency-Based "Master of Healthy Living" in the EU4Dual Programme

Authors Staubmann Wolfgang1, Amort Frank1, Carabott James2, Cordeiro Raul3, Ebinger Margrit4, Friedrichs Kathrin4, Fuchs-Neuhold Bianca1, Gonzalez de Heredia Lopez de Sabando Arantxia5, Grotz Sonja6, Huotari Nina7, Jocham Andreas1, Korhonen Teija7, Madárné Toma Zsanett8, Mayer-Bonde Conny4, Pechstädt Katrin1, Thier Bianca4

Affiliations:

1 FH JOANNEUM University of Applied Sciences, Graz & Bad Gleichenberg, Austria

2 Malta College of Arts Science & Technology, Malta

3 Politecnico de Portalegre, Portalegre, Portugal

4 Baden-Württemberg Cooperative State University, Stuttgart & Heilbronn, Germany

5 Mondragon Unibertsitateko Goi Eskola Politeknikoa, Mondragon, Spain

6 PAR University of Applied Sciences, Rijeka, Croatia

7 Savonia University of Applied Sciences, Kuopio, Finland

8 John von Neumann University, Kecskemét, Hungary

Background According to the European Approach for Quality Assurance of Joint Programmes, stakeholders should also be involved in curriculum development, also for reasons of sustainability (1, 2). To ensure an evidence-based design of the planned EU4Dual master's programme "Healthy Living & Integrated Health in Modern Societies," students and employers were surveyed during the development process as key stakeholders regarding programme content, competency targets, teaching/learning formats, and participation barriers.

Methods Two online surveys were conducted in Germany, Austria, Finland, Malta, Croatia, Hungary and France, combining quantitative ratings/rankings with open-ended responses (students: n=173; employers/organisations: n=103). The survey instrument included rating, ranking and open-ended items covering competency needs, motivational drivers, curriculum expectations and participation barriers. Data analysis comprised descriptive statistics and thematic synthesis of qualitative responses.

Results Both stakeholder groups supported a competency-based curriculum with a clear practice- and systems-oriented focus. Students prioritised leadership and management competencies, interprofessional collaboration, and digital and AI-related skills; they also reported substantial participation barriers (costs, time demands) and marked uncertainty about labour market prospects. Employers rated the dual organisational model as highly suitable (mean 8.7/10) and identified particularly relevant competency areas at the interface of health and social care (including case/care management), patient empowerment/inclusion, cross-organisational collaboration, as well as problem-solving and critical thinking. Open-ended responses from both groups additionally highlighted recurring calls for clearly defined professional profiles, application-oriented learning settings (practice projects, case-based learning), and cross-cutting curriculum components (ethics, communication, use of evidence).

Conclusion:

The study demonstrates how transnational stakeholder evidence can inform competency-based curriculum development for international dual master's programmes. It contributes (1) empirical insights into convergences and divergences between key stakeholder groups, (2) a traceable link between identified needs and curriculum design decisions, and (3) transferable design principles for governance, co-creation and practice integration. Further research should evaluate programme implementation and impact, particularly regarding employability outcomes and the effectiveness of dual learning formats.

References:

65. European Quality Assurance Register for Higher Education (EQAR): European Approach for Quality Assurance of Joint Programmes, Oct. 2014, https://www.eqar.eu/
66. Leal Filho, Walter et al.: Promoting sustainable development via stakeholder engagement in higher education. Environmental Sciences Europe 37 (2025)

Reframing Engagement and Access through Connected Healthcare for Chronic Illness on the Elderly: a brief approach

Abstract

Background:

Chronic diseases such as diabetes mellitus pose significant challenges to healthcare systems, namely when we analyze ageing, low-density, and geographically dispersed territories. Telemedicine and AI-assisted tools are increasingly mobilized to enhance access and continuity of care also in this kind of context, but their effectiveness depends not only on purely technical performance, but also on how they are socially framed, appropriated, and integrated into everyday clinical interactions.

Objective:

This pilot project aims to improve effective access to healthcare for chronic diabetes patients by analyzing and enhancing nursing teleconsultations through a sociologically informed integration of telemedicine and explainable artificial intelligence (XAI).

Methods:

The study adopts an interdisciplinary qualitative design combining ethnographic observation of nursing teleconsultations, in-depth interviews with nurses and patients, and frame analysis of interactional practices. Grounded Theory procedures guide data analysis. Sociological findings are iteratively translated into XAI prompts and decision-support memos, co-developed with nursing professionals, to support communication, judgment, and patient engagement in teleconsultation contexts.

Results and conclusions:

The project expects to identify a plurality of interaction frames mobilized by nurses during teleconsultations, including clinical, pedagogical, and solicitude-oriented frames, and to analyze how these different framings shape communication quality, patient engagement, and self-management in diabetes care. We expect that sociologically informed XAI tools, designed through a careful, comprehensive method, to be sensitive to these interactional frames, will support clearer communication, strengthen trust, and enhance continuity of care among older patients and populations with heterogeneous levels of health literacy in low density territories.

Key Words *Digital health; Telemedicine; Explainable AI (XAI); Chronic illness; Diabetes; Frame analysis; Healthcare access.*

Authors Alexandre Martins (CARE – Research Center on Health and Social Sciences, Portalegre Polytechnic University), Adriano Pedro (CARE – Research Center on Health and Social Sciences, Portalegre Polytechnic University), José Maria Carvalho (CARE – Research Center on Health and Social Sciences, Portalegre Polytechnic University), Valentim Realinho (CARE – Research Center on Health and Social Sciences, Portalegre Polytechnic University), Catarina Delaunay (CICS.NOVA – Interdisciplinary Center of Social Sciences, New University of Lisbon).

Inclusive Care Communication with a Personalized Multilingual and Multimodal Interface based on Open Source AI Systems

Ina Steinmetz

Duale Hochschule Baden-Württemberg Stuttgart
Germany

ina.steinmetz@dhbw-stuttgart.de

Karin Harbusch

Universität Koblenz
Germany

harbusch@uni-koblenz.de

AI systems are increasingly used in health situations (for example, for dialog-based self-diagnosis using ChatGPT Health (2026) or doctor's visits) to bridge communication gaps arising from language barriers, low health literacy, technical jargon and clinical time constraints. However, these systems are not inclusive for individuals with low literacy, which accounts for approximately 20% of adults in Germany according to recent studies (Leo, 2018; PIAAC, 2023). ICC_M2E is an Inclusive Care Communicator with a Multimodal, Multilingual interface aiming to bridge medical communication barriers in doctor-patient dialogues. It employs user-centered/Easy language to translate concise medical descriptions from language Ldoc into effective, reliable, and accurate descriptions with visual aids in language Lpat. Therefore, we equip open source generative and machine translation AI with tailored user interfaces. Initially, symptoms are communicated through body maps, symbols or pain scales with automatically generated, easy-to-understand questions in

the user's language. The same happens to clarifying follow-up questions posed by a doctor or an AI (for example, regarding the specific pain type) to compile a concise bulletin in the doctor's language Ldoc. The inverse translation into language Lpat ensures patient comprehension of diagnoses and treatments. Here, the additional challenge is to support the physician by suggesting empathetic phrasing that is appropriate for the emotional impact of medical results. Finally, consultation protocols including treatment plans in both target languages are generated to ensure transparency and adherence for both parties. We strive for an adaptable system (for example, personal visuals and language complexity) to mitigate medical communication barriers. The overarching objective is to use open source AI with a personalized patient interface. We present an early prototype outlining the main components and techniques of our system which will be tested with low-literate users to support them in clinical situations where comprehension is vital to health outcomes. Initial experiments will focus on effectively describing symptoms in structured scenarios, such as ‘night-time abdominal pain while lying down’ and ‘throbbing headaches at work’ to answer the research question of how to design a medical communication interface in plain language for low-literate users whose primary language is German.

Organizational Well-Being in Virtual, Multinational Teams: The Case of the EU4Dual University Alliance

Ines Kipperer1* and Harald Wipfler1

*1Research Organization and Services, FH JOANNEUM University of Applied Sciences, Alte Poststrasse 147, 8020 Graz, Austria * Corresponding author Email: ines.kipperer@fh-joanneum.at*

Employee well-being is a fundamental condition for sustainable organizational development, particularly within complex, network-based structures such as a European University Alliance. In this setting, the project team comprises staff members who collaborate within a cross-border virtual team and pursue the alliance's strategic objectives. Within EU4Dual, nine universities collaborate across diverse organizational, cultural, and employment systems. This creates a unique organizational setting in which day-to-day working conditions are shaped by hybrid responsibilities, distributed teamwork, and varying degrees of engagement within the alliance.

Understanding well-being in such a cross-institutional environment is therefore essential, not only to support staff satisfaction and motivation, but also to ensure the long-term effectiveness and resilience of the alliance model. The aim of this project was to implement a common well-being questionnaire for all EU4Dual staff, aligned with the alliance's sustainability strategy, which also emphasises social responsibility alongside ecological commitments.

We use the case of the EU4Dual alliance to examine the challenges of working within a virtual network organization. To assess various dimensions of well-being, a questionnaire was administered to members of the project team. 46 respondents evaluated team dynamics, workload, collaboration practices, communication structures, and motivational factors.

The results of the survey reflect the project staff's perceptions in the areas of (1) information provision and decision-making processes, (2) team collaboration, (3) perceived stress levels, (4) technical conditions, and (5) motivation.

The survey demonstrates that well-being in a virtual, multicultural alliance depends heavily on organizational coherence and predictable processes. It provides insights into how the team perceives its collaboration and which factors are experienced as challenging. These insights can help improve the framework conditions for project work. The findings will inform the development of alliance-wide indicators and targeted actions, thereby strengthening both staff well-being and long-term sustainability within EU4Dual.

Keywords *well-being, virtual teams, European University Alliance, cross-university collaboration*

Financial well-being of senior households in the context of health, environmental and systemic challenges: a scoping review

Authors and affiliations: Dr. Agnieszka Strzelecka, Faculty of Economic Sciences, Koszalin University of Technology

Abstract:

Background / Context Household financial decisions and financial behaviour shape the allocation of resources, risk management, and economic security across the life course. In recent years, research on household financial decision-making has gained increasing importance due to growing economic uncertainty and systemic instability. These dynamics are particularly relevant for senior households, whose financial well-being is often constrained by fixed incomes, rising health-related expenditures, and limited capacity to absorb economic shocks. As a result, financial well-being has emerged as a critical dimension of health and welfare in later life. Despite growing scholarly attention, research on the financial well-being of older adults and senior households remains fragmented across the economic, health, and social policy literature, and lacks integrative synthesis.

Objective / Purpose The objective of this study is to explore and map existing literature on the financial well-being of senior households across countries, addressing key questions concerning how it is conceptualised, which health-related, environmental, and systemic factors are examined, and where research gaps remain.

Methods / Approach / Case This study adopts a scoping review methodology based on established approaches to evidence mapping and thematic synthesis. The review is currently in progress and includes peer-reviewed publications identified in Scopus, Web of Science, and PubMed. Studies addressing financial well-being, economic vulnerability, or financial resilience among older adults, including household-level studies, are considered. Data are analysed thematically to identify key themes and research gaps.

Results / Findings The study is currently in progress, and the findings will be presented during the conference. It is expected that the review will highlight how health-related costs, environmental pressures, and systemic conditions are discussed in relation to the financial well-being of senior households across countries.

Conclusion / Implications This scoping review aims to contribute to a clearer understanding of financial well-being as a social determinant of health and welfare in later life. The findings are expected to support policymakers and practitioners in designing policies and interventions addressing the financial vulnerability of older adults, particularly in the context of rising health expenditures, environmental pressures, and economic instability.

Key Words *financial well-being, older adults, senior households, social determinants of health, scoping review*

Allelopathy-Based Bioherbicide as an Innovative and Sustainable Tool to Mitigate the Human Health and Economic Burden of Common Ragweed (Ambrosia artemisiifolia) in Urban Environments

Keywords

Common ragweed, bioherbicide, urban health, climate change, economic burden

Poster presentation

Abstract

Background / Context:
Common ragweed (Ambrosia artemisiifolia) is an invasive weed species in Europe and represents one of the most severe environmental and human health challenges; beyond Hungary, its presence is also significant in the Rhône Valley in France, Austria, and Croatia. Its highly allergenic pollen leads to widespread allergic diseases and substantial economic losses associated with high pollen concentrations. Climate change has further exacerbated this problem by prolonging the pollen season and increasing allergenic exposure, particularly in densely populated urban areas.

Objective / Purpose:
One of the aims of this study is to assess the potential human health and economic benefits of an innovative, allelopathy-based bioherbicide developed by Dr. Pölös Endre at John von Neumann University as a sustainable alternative for ragweed control in urban environments.

Methods / Approach / Case:
Field applications of bioherbicide were conducted in urban, high-traffic public areas where conventional chemical herbicides are restricted. The product's effectiveness against ragweed was evaluated alongside its environmental safety profile, focusing on the absence of chemical residues. In parallel, a health-economic assessment framework is currently being developed within an ongoing doctoral research project with the aim of estimating potential reductions in healthcare costs and productivity losses associated with ragweed-induced allergic diseases.

Results / Findings:
Initial results demonstrate successful suppression of ragweed populations in treated urban areas without chemical residues, enabling safe application in locations frequently visited by the public. The proximity-based control of ragweed near residential and recreational zones indicates a high potential for reducing direct allergen exposure among affected populations.

Conclusion / Implications:
Allelopathy-based bioherbicides offer a promising, climate-adaptive and health-oriented solution for urban ragweed management. Their broader implementation could significantly reduce the human health burden and associated economic costs of ragweed-related diseases, contributing to healthier living environments and sustainable urban green management under changing climatic conditions.

Future of Work

ηNet – Cyber-Physical and Data Managed System

Florian Stöckl, Ferhat Aslan, Harald Wehner and Marcus Strand Duale Hochschule Baden-Württemberg Karlsruhe (Germany) florian.stoeckl@dhbw-karlsruhe.de

3) Future of Work

Although scientific research often focuses on sustainability, the research process itself is often resource-intensive, consuming large quantities of energy, water, chemicals, and raw materials. Internal analyses at the Plastics Laboratory at DHBW Karlsruhe suggest that there is substantial untapped annual savings potential, which is currently being overlooked due to a lack of granular data and digital control. The project ηNet, funded by the Ministry of Science, Research and the Arts Baden-Württemberg, aims to address this issue by developing a cyber-physical laboratory management system designed to capture, control, and optimise resource flows in a highly efficient manner.

The technical architecture connects the physical laboratory to a digital infrastructure. Using a dual-server approach connected via a central OPC UA-based gateway, ηNet implements a digital twin that enables bidirectional synchronisation: physical actions influence the virtual space and vice versa, including immersive interaction via VR interfaces. Smart sensors and devices record all resource inputs and outputs, while a second server provides webbased services for energy monitoring and modular resource management. A key focus is managing the complexity of these intelligent controls through robust security mechanisms and rigorous risk assessments, ensuring the safety of personnel and equipment while maintaining human oversight and straightforward workflows. Open-source software is used wherever possible, and adapted or expanded according to the application.

The initial findings demonstrate the cost-saving benefits of automated data collection and shared equipment usage. The project, which is running until July 2026, is acting as a pilot for a statewide rollout. Future work will focus on integrating AI-based optimisation algorithms to identify usage patterns and enable automated resource coordination. Ultimately, the ηNet project will create a scalable foundation for transforming university laboratories into intelligent, resource-efficient research environments.

Key Words *Green lab, sustainability, shared economy, managed lab, cyber-physical twin*

Experiential Learning through a Regional Academic Space Center: The ESTIA–NAASC Case within the EU4Dual Framework

Arnaud CATINOT - ESTIA Tech
Dimitri MASSON - ESTIA Recherche
Key Words *Dual education, experiential learning, space engineering education, academic space centers*

The rapid transformation of the space sector driven by New Space dynamics has increased the demand for engineers capable of operating complex, interdisciplinary systems under professional constraints. Engineering education must therefore evolve towards experiential and dual education models that better align academic learning with real-world practices.

This paper presents a case study of the ESTIA contribution to the Nouvelle-Aquitaine Academic Space Center (NAASC), developed within the EU4Dual dual education framework. NAASC is a regional academic space center that immerses students in realistic space missions while integrating academic institutions, industry partners and institutional stakeholders. At ESTIA, NAASC projects are fully embedded in the engineering curriculum through project-based learning, internships and long-term student involvement.

Students work on real space missions and are required to comply with the same engineering standards, norms, documentation practices and review processes used in professional space programs. The pedagogical approach combines experiential learning https://www.learning-theories.com/experiential-learning-kolb.html , project-based learning https://www.pblworks.org/what-is-pbl and the CDIO framework https://www.cdio.org/ , covering the full lifecycle of space systems. Formal design reviews, including Critical Design Reviews, are conducted with external professionals from the space sector (e.g. CNES Nanolab Academy, ArianeGroup).

A qualitative analysis of feedback from five participating students was conducted to assess learning outcomes, skill development and career orientation. Results highlight significant gains in technical competencies, systems engineering rigor, interdisciplinary collaboration and professional motivation. Students also report increased clarity and commitment regarding careers in the space sector.

The ESTIA–NAASC experience demonstrates how a regional academic space center can effectively support dual education objectives, enhance employability and contribute to healthier, more sustainable professional trajectories by bridging academic learning, professional standards and real-world engineering practice.

RHEIN TO RHIN: Developing Accessible, Highly-specialized, Innovative and Modular Certificate Programmes for French-German Competencies in the Context of Changing Labour Markets Across Borders

Prof.in Dr.in Angela Diehl-Becker, DHBW Karlsruhe, Saskia Rebmann, DHBW Karlsruhe
Sophie Kränkel, DHBW Karlsruhe, Amira Basli, DHBW Karlsruhe
Abstract text

Karlsruhe is located only a few kilometers from the French border. This creates numerous opportunities for cross-border cooperation and increases the demand for professionals who can operate on both sides of the Rhine, including the health sector. Two studies conducted at DHBW

Karlsruhe, surveying 150 companies in the Upper Rhine region, highlight this development: the share of companies reporting a need for French-German competencies increased from 30% in 2013 to 84% in 2022. This demand spans multiple sectors and includes, alongside intercultural and linguistic abilities, specialized expertise, resulting in highly diversified competency profiles.

The project RHEIN TO RHIN, financed by the Helga Schulz-Zöller foundation, examines whether accessible, innovative, highly specialized and modular certificate programmes can address the diversified demand for French-German competencies in changing labour markets across borders.

A market study including a survey and qualitative interviews with key stakeholders informed the design of a two-pillar concept:

(1) RHEIN TO RHIN CAMPUS, offering, together with French partner institutions, interdisciplinary certificate programmes for students as part of regular curricula or as extra-curricular activities.

(2) RHEIN TO RHIN PRO, providing specialized coaching and course formats tailored to organizational needs, that are stackable and enable professionals to build individual lifelong learning pathways.

A first programme within RHEIN TO RHIN CAMPUS, serving as a proof of concept, was launched in January 2026 with students from a French partner university and three DHBW campuses. The broad institutional participation, strong engagement of dual partners, positive student feedback and concrete steps towards follow-up programmes confirm the success of this program.

Overall, the findings suggest that modular certificate programmes combining disciplinary and sector-specific content with intercultural and linguistic aspects represent a promising approach to strengthening cross-border employability, sharpening French-German profiles and addressing changing labour markets.

Keywords *future of work, certificate programmes, lifelong learning, franco-german competencies, cross-border cooperation*

Artificial Intelligence Adoption in Small Enterprises: Reality, Requirements, and Challenges in Hebron Governorate, Palestine

Authors and Affiliations Saba Romel Sameer Shalaldah Palestine Polytechnic University, Palestine Email: 238005@ppu.edu.ps

Background / Context:

Artificial Intelligence (AI) has become a key driver of digital transformation, reshaping organizational processes and the nature of work. Despite its increasing importance, AI adoption among small enterprises in developing economies remains limited, raising concerns about their readiness for the future of work.

Objective / Purpose:

This study aims to examine the level of AI adoption among small enterprises in Hebron Governorate, Palestine, identify the key requirements for its implementation, and explore the main challenges affecting adoption.

Methods / Approach:

A descriptive-analytical approach was adopted using a structured questionnaire distributed to 158 enterprises, with 101 valid responses analyzed using SPSS. The study is grounded in established technology adoption models, including the Technology Acceptance Model (TAM), the Technology-Organization-Environment (TOE) framework, and the Unified Theory of Acceptance and Use of Technology (UTAUT), to interpret behavioral, organizational, and technological factors influencing AI adoption.

Results / Findings:

The findings indicate that AI adoption is moderate, with a positive tendency among current users, while overall diffusion remains limited. No statistically significant differences were found across demographic variables (business type, education level, and experience), indicating that AI adoption is influenced more by organizational and technological factors than by individual characteristics. Key challenges include high implementation costs, lack of technical skills, weak digital infrastructure, and resistance to change.

Conclusion / Implications:

The study highlights a gap between awareness and the actual implementation of AI. It contributes by providing empirical evidence from the Palestinian context, which remains under-researched. Enhancing AI adoption can support workforce upskilling, improve operational efficiency, and reshape job roles and skills requirements, enabling small enterprises to better adapt to the evolving demands of the future of work.

Keywords:

Artificial Intelligence, Small Enterprises, Technology Adoption, Digital Transformation, Future of Work

AI-Driven Automated Market Makers for Smarter Liquidity Management in the

Abstract Text

Background Decentralised Finance (DeFi) has emerged as a rapidly growing digital domain of work, relying heavily on Automated Market Makers (AMMs) to enable permissionless liquidity provision. Despite their success, most AMMs operate using static, rule-based mechanisms that fail to adapt to volatile market conditions, leading to capital inefficiencies and increased exposure to impermanent loss. This highlights a critical gap in the application of intelligent, adaptive systems within decentralised financial infrastructures.

Objective The objective of this project is to investigate whether artificial intelligence, specifically reinforcement learning (RL), can be used to dynamically optimise liquidity management in AMMs, improving capital efficiency and resilience while supporting more sustainable digital work ecosystems.

Approach An applied research approach is adopted, combining dual higher education principles with industry-oriented experimentation. Reinforcement learning algorithms—including Deep Q-Learning, Proximal Policy Optimisation, and Soft Actor-Critic—are implemented within a simulated AMM environment. The agents learn optimal liquidity allocation strategies based on market inputs such as price movements, volatility, and pool state variables. Performance is evaluated through simulation-based benchmarking against traditional AMM models and validated through testnet experimentation.

Results Preliminary results indicate that AI-driven AMM agents adapt more effectively to changing market conditions than static mechanisms, demonstrating improved capital utilisation and reduced exposure to impermanent loss during periods of high volatility. The dual innovation framework facilitated rapid prototyping and practical validation of the proposed approach.

Conclusion The findings suggest that integrating AI into AMM design can contribute to more intelligent, resilient, and human-centred financial infrastructures. This work supports the future of digital finance as a sustainable field of work and provides a scalable model for applied AI innovation within Europe’s evolving digital economy.

Keywords *Automated Market Makers, Artificial Intelligence, Reinforcement Learning, DeFi, Future of Work*

Digital diplomacy – review of the challenges to foreign policy professionals

Adrijan Štivić

Juraj Dobrila University of Pula

adrijan.stivic@uniri.hr

Digital technologies, namely mass communication media, have a great impact on the future of work, and this paper will address the issues of the challenges posed by digital technologies on the work of professional diplomats. In the form of oral presentation, the paper will discuss the historical changes of diplomatic professional service. From the affirmation of diplomacy in early modern Italy and France, diplomacy was always in relationship with the public. While foreign offices throughout Europe influenced press media up until 1914., the interwar period transformed diplomacy to adopt the paradigm of public diplomacy. Technological progress, most notably live television broadcast and World Wide Web made the public a powerful agent of foreign policy.

The aim of this paper is to examine the main new challenges posed by digital technology to diplomacy in the 21st century and how they can be addressed. Methods used are comparative history, in examining the diplomacy-public relationship in 1914. and contemporary era. There are also case study methods, drawing examples of digital diplomacy of Ethiopia, bilateral relationship of Iran-China and Saudi Arabia-China and the case of Al-Jazeera as a global media with geopolitical agenda.

Findings show that the challenges of digital diplomacy are not new, in essence, but they are issuing the change of educational system and the very definition of on what characteristics diplomats are to be recruited. Diplomats of 21st century need to have outstanding informal communication skills, be trained to detect fake news and multitask and to communicate digitally, meaning to create a balance between seriousness of foreign policy topics and a short text limit and attention span of the general user of tech platforms.

Keywords *digital diplomacy, public diplomacy, foreign policy professionals, international relations, disruptive technologies*

Educational Transformation via digital Skills Ecosystems: A Critical Analysis of Collaborative Frameworks, Organizational Learning, and Future of Work Dynamics in Pan-European Skills Development

Stenzel, J.*, Steck, R., Rupp, K.-D.

*Cooperative State University Baden-Wuerttemberg, Heidenheim, Marienstr. 20, 89518 Heidenheim, Germany * Corresponding Author E-Mail: jan.stenzel@.dhbw.de*

Although educational transformation and scalable up-and reskilling are increasingly mediated by digital platform development, little is known about how such digital Ecosystems interact with the wellbeing of the underlying human factor driving innovation in Europe's dual higher education landscape. This study examines Erasmus+ Centres of Vocational Excellence (CoVE) as large-scale innovation hubs in which sophisticated digital infrastructures and a transnational workforce from public (H-VET) and private training providers shape the future of dual learning in Europe. The Study asks under which conditions digital and human networks operate as systemic competitors or synergistic facilitators and how the different layers of transcultural alterity — among educational

systems, standards, people, KPIs and communication — affect psychological safety, DEIB and sustainabe work-learning constellations within transnational innovation initiatives.

Based on organisational learning theory and the concept of psychological safety (Edmondson, 2018; 2024), as well as evolutionary perspectives on self-managing, purpose-driven organisations (Laloux, 1990; 2024), and DEIB-oriented perspectives on transnational leadership (Akande, 2025) in digital working environments, the study conceptualises CoVEs as large-scale experiments in cross-border 'governance interoperability', transforming heterogeneous education systems into a harmonised digital European skills architecture.

Methodologically, the study uses a qualitative synthesis of project documentation, combining text data mining and isotopy-oriented discourse analysis with an abductive interpretation of productive dissensus among stakholders (Gruschka, 2024) validated in an reflective expert Delphi. The design enables a robust qualitative approach on how cultural and systemic differences (e.g. EQF span, differing levels of digital readiness and ecosystem maturity, and cultural and pedagogical diversity) shapes cooperation patterns, conflict capacity and consensus-building. The study leverages CoVEs' documents (N=50+) to identify healthy and sustainable transnational collaboration patterns—inclusive decision-making, conflict mediation, and stewardship leadership—and their interplay with governance, culture, responsibilities, KPI pressures, and transcultural communication.

Complementing this, a desk research on pandemic-driven digitalization examines how digital workspaces influence reciprocal trans-organizational learning. We propose an DEIB-oriented governance framework with specific design principles to foster team flow (Csikszentmihalyi, 2014), well-being, and commitment to meet the specific systemic conditions of the CoVEs initiative, fostering sustainable innovation communities across European H-VET providers.

Keywords *Dual Higher Education (DHE); organizational learning; diversity, equity, identity and belonging (DEIB); Centres of Vocational Excellence (CoVE); human-centred ecosystems; psychological safety; future of work; governance; transnational collaboration,*

Resources

Akande, A. (Hrsg.). (2025). Modern Cross-Cultural Management: Understanding Diversity in Global Business. Springer Nature Switzerland.

Basel, J., & Manchen Spörri, S. (Hrsg.). (2024). Angewandte Psychologie für die Wirtschaft: Arbeit – Konsum – Gesellschaft. Springer.

Csikszentmihalyi, M. (2014). Applications of Flow in Human Development and Education: The Collected Works of Mihaly Csikszentmihalyi. Springer Dordrecht.

Edmondson, A. C. (2020). Die angstfreie Organisation: Wie Sie psychologische Sicherheit am Arbeitsplatz für Innovation, Lernen und Wachstum schaffen (1. Aufl.). Verlag Franz Vahlen.

Edmondson, A. C. (2024). The Right Kind of Wrong: Warum wir aus Fehlern lernen (und warum manche Fehler besser sind als andere). Verlag Franz Vahlen.

Freudenthaler-Mayrhofer, D. (2024). Future Focused Innovation: Mit zukunftsfähigen Innovationen die Welt von morgen mitgestalten. Springer Gabler.

Gansser, A. S. (Hrsg.). (2015). Markt- und Absatzprognose: Modelle – Methoden – Anwendung. Springer Gabler.

Gruschka, C. (2024). Mit Dissens zum Erfolg: Mediation nutzen, um Fachkräfte zu binden. Springer Gabler.

Herget, J. (2021). Culture Hacks strategisch einsetzen: Mit gezielter Irritation zur gewünschten Unternehmenskultur. Springer Gabler.

Hinkelmann, R., & Enzweiler, T. (2018). Coaching als Führungsinstrument. Springer Fachmedien Wiesbaden.
Inghilleri, P., Riva, G., & Riva, E. (Hrsg.). (2014). Enabling Positive Change: Flow and Complexity in Daily Experience. De Gruyter Open.
Kelley, B. (2023). Charting Change: A Visual Toolkit for Making Change Stick (2. Aufl.). Palgrave Macmillan.
Kutz, A. (2023). Systemik für ganzheitliche Resilienz im permanenten Wandel der agilen VUCA/BANI-Welt (essentials). Springer.
Laloux, F. (2024). Reinventing Organizations: Ein Leitfaden zur Gestaltung sinnstiftender Formen der Zusammenarbeit. Verlag Franz Vahlen.
Loges, B. (2025). Normen in den Internationalen Beziehungen: Eine Einführung. Springer VS.
Meissner, J. O., Sigrist, D., & Heike, M. (2023). Organisationsdesign in einer komplexen und instabilen Welt: Einführung in Modelle und Konzepte sowie deren Anwendung. Springer Gabler.
Nermend, K., & Łatuszyńska, M. (Hrsg.). (2018). Problems, Methods and Tools in Experimental and Behavioral Economics. Springer Nature Switzerland.
Plugmann, P. (Hrsg.). (2018). Innovationsumgebungen gestalten: Impulse für Start-ups und etablierte Unternehmen im globalen Wettbewerb. Springer Gabler.
Schumacher, T., Eppler, M. J., Haas, O., Roehl, H., & Winkler, B. (Hrsg.). (2024). Vordenker der Organisationsentwicklung: Systemisches Management – Impulse für wirksame Veränderungsarbeit. Schäffer-Poeschel.
Senge, P. M. (2017). Die fünfte Disziplin: Kunst und Praxis der lernenden Organisation (11. Aufl.). Schäffer-Poeschel.
Szabla, D. B. (Hrsg.). (2021). The Palgrave Handbook of Organizational Change Thinkers (2. Aufl.). Palgrave Macmillan.
von der Gracht, H. (2022). Management der Zukunft: Spielregeln, Methoden und Erfolgsmodelle des Zukunftsmanagements. Springer Gabler.
Wollmann, P., Kühn, F., & Kempf, M. (Hrsg.). (2020). Three Pillars of Organization and Leadership in Disruptive Times. Springer Nature Switzerland.
European Commission. (n.d.). Centres of vocational excellence. Erasmus+ Programme Guide.

Communication Readiness in Dual Education: Are Practical Experiences Enough?

Mia Maslać, mag. oec.
Dragana Manestar Vuksan, prof., univ. spec. philol.
PAR University of Applied Sciences, Business Management,
Trg Riječke rezolucije 4, 51000 Rijeka, Croatia
Keywords *communication skills, workplace communication, dual education, professional development, mentor support*

Abstract

Dual study programmes are widely recognised for their strong focus on practical, work-based learning. While this approach has been proven to help students develop valuable skills for their future careers, it can sometimes overlook the systematic development of professional communication skills. Although business communication is included within the curriculum, many students still struggle to express themselves clearly – often due to limited reading habits and insufficient opportunities to practice professional language. This challenge becomes particularly visible when students undertake professional practice, where they are expected to perform a variety of communication tasks in real workplace environments.

Our research at PAR University of Applied Sciences in Rijeka examines the origins of these communication readiness gaps. Using live assessments, interviews, and focus groups with students who had recently completed professional practice and their mentors, we evaluated students' professional communication skills. The findings suggest that responsibility for communication training is often diffused: students are expected to learn informally, mentors expect the university to provide formal communication training, and the university relies on workplace practice to reinforce these skills.

The results indicate that practical experience alone does not always help students communicate with confidence in professional settings. As a result, students may feel underprepared for effective workplace communication. A more coordinated approach to communication training, supported by clearer guidance during professional practice, may help students develop greater confidence and competence in professional interactions.

Reimagining the Future of Work through Civic Engagement: A Multi-Stakeholder Analysis in Higher Education

As the global labor market undergoes a paradigm shift, companies increasingly expect professionals to not only possess technical expertise but also critical thinking or ethical judgement - competences closely linked to civic and democratic competence in practice. This paper presents the findings of the European project EngageAll, which investigates student civic engagement frameworks specifically within Professional Higher Education Institutions (PHEI). While existing research on citizenship education has traditionally focused on primary and secondary schooling, this study argues that the university is a critical environment for fostering student engagement and thus democratic and civic competence, examining how students internalize these competences. Conceptually, we frame student civic engagement as an experiential and transformative learning context (Kolb, 1984; Mezirow, 1991) in which competences generate social capital relevant to democratic resilience and professional life (Bourdieu, 1986; Putnam, 1993).

The research followed a multi-stage methodology: After a comprehensive literature review to map overlapping concepts such as civic, democratic, and citizenship competences, the study employed a qualitative approach through focus group interviews (n=40 participants). A distinctive feature of this research is the simultaneous inclusion of both experts and students, a dual-perspective approach that remains scarce in current academic literature. The thematic-structuring qualitative content analysis prioritizes "student voice," making visible their perceptions of civic and democratic competences and their actual practices within the university ecosystem, exploring how students internalize these frameworks. Furthermore, the study identifies a set of challenges and "favorable circumstances" designed to help PHEIs transition toward more engaged models of learning.

We conclude that strengthening civic engagement in PHEIs is essential for developing individuals who are equipped to navigate the ethical, social, and collaborative complexities of the future workplace. By bridging the gap between student civic participation and professional identity, PHEIs can ensure that the future of work is not only technologically advanced but also democratically resilient.

Keywords *Civic Engagement, Professional Higher Education, Future of Work, Student Voice, Civic and Democratic Competence*

References:

Bourdieu, P. (1986). The forms of capital. In J. G. Richardson (Ed.), Handbook of theory and research for the sociology of education (S. 241–258). Greenwood.

Kolb, D. A. (1984). Experiential learning: Experience as the source of learning and development. Prentice-Hall

Mezirow, J. (1991). Transformative dimensions of adult learning. Jossey-Bass

Putnam, R. (1993). The prosperous community. Social capital and public life. The American Prospect, 4,13: 35-42.

Green Economy

Using Skin Analysis and Photo-Identification to Explore Environmental Pressures on Bottlenose Dolphins in Maltese Waters.

Michela Aquilina1 Alice Turchi2 Daniela Silvia Pace2 Aldo Drago1 Maria Cardona1 Patrizia Patti3

Affiliations:

1Malta College of Arts, Science and Technology (MCAST) Triq Kordin, Paola, PLA 9032 Malta

2Sapienza Università di Roma - Piazzale Aldo Moro 5, 00185 Roma

3EcoMarine Malta 4, Oakfields. Triq Nicolo' Isouard 18. Mosta MST1135. MALTA

Abstract text

Bottlenose dolphins (Tursiops truncatus) are widely regarded as sentinel species for marine ecosystems due to their long lifespan, high trophic level, and close association with coastal environments. In the Mediterranean, climate change and increasing human pressures are expected to affect marine food webs and habitat use, yet local-scale indicators of these changes remain limited. There is a need for non-invasive, long-term monitoring tools that can link environmental change to biological responses.

This study aims to assess whether long-term photo-identification and skin mark analysis of bottlenose dolphins in Maltese waters can be used to explore patterns related to environmental and human-induced pressures and their potential link to climate-related change.

The research is based on photographic datasets collected over an eight-year period during marine life experiences conducted under sustainable tourism principles. Individual dolphins are identified using unique dorsal fin morphology and stable markings. Images are subjected to quality scoring and selection criteria before inclusion. Skin marks and scars are classified according to mark type and likely origin (natural, social, predatory, or anthropogenic), allowing longitudinal tracking of individuals and mark occurrence.

Preliminary processing indicates successful construction of a photo-identification catalogue and the feasibility of consistent mark classification across years. It is expected that temporal patterns in mark prevalence and individual occurrence will emerge, providing insight into long-term exposure to pressures and changes in dolphin condition.

This study demonstrates the potential of combining photo-identification with skin mark analysis as a non-invasive framework for long-term monitoring of dolphin populations. The approach may contribute to climate-related marine monitoring and support conservation planning in small-island contexts. The results are expected to inform future integration with environmental variables and promote collaboration between research and responsible marine tourism.

Key Words *Bottlenose dolphin; photo-identification; climate change; environmental monitoring; non-invasive methods.*

From Urban Heat to Welfare Outcomes: A Neighborhood-Scale Environmental Quality Index for Budapest

György Csomós1, Edit Hoyk2,5, Zoltán Kovács3,4, Jenő Zsolt Farkas5

1University of Debrecen, Faculty of Engineering, Department of Civil Engineering, Debrecen, 4028, Ótemető út. 2-4. Hungary

2John von Neumann University, Faculty of Horticulture and Rural Development, Kecskemét, 6000, Izsáki út 10. Hungary; Eötvös Loránd University, CERS, Institute for Regional Studies, Kecskemét, 6000, Rákóczi út 3. Hungary

3University of Szeged, Faculty of Natural Sciences and Informatics, Department of Social Geography, Szeged, 6722, Egyetem u. 2. Hungary

4Geographical Institute, HUN-REN Research Centre for Astronomy and Earth Sciences, 1112 Budapest, Hungary

5Eötvös Loránd University, CERS, Institute for Regional Studies, Kecskemét, 6000, Rákóczi út 3. Hungary

Abstract

Climate change is progressively intensifying urban heat islands and other environmental stressors that significantly impact public health and well-being. However, these risks are unevenly distributed within urban environments. This research advances the concept and measurement of environmental segregation, applying it to Budapest, Hungary, to determine where climate-related burdens coincide with socioeconomic disadvantage.

We developed a high-resolution, 100×100-meter environmental quality index (EQI) by integrating four distinct indicators: average land surface temperature (ECOSTRESS, July–August 2023), percentage of tree cover (CLCplus Backbone 2021), average vegetation productivity (Copernicus Total Productivity, 2023), and combined distance to publicly accessible parks and protected urban forests (Overture Foundation map, 2024). These indicators were z-standardized, with temperature and distance inverted, and the EQI was calculated as their mean. We subsequently cross-classified EQI quintiles with income quintiles (GeoX, 2023) to derive 25 socio-environmental categories, allowing us to identify environmentally segregated populations.

The results reveal a sharp Buda – Pest divide: high EQI characterizes the hilly Buda side, whereas low EQI dominates the flatter, denser Pest side. Income correlates positively with EQI, demonstrating that low-income residents are disproportionately concentrated in warmer, enclosed neighborhoods with limited canopy cover and poor access to green infrastructure – conditions linked to heat stress. Specifically, 431,248 residents live in low EQI areas; within this group, 84,919 low-income individuals fall into the critical Low Income – Low EQI category, confirming environmental segregation.

Policy-relevant exceptions exist: low-income groups in peripheral areas enjoy high EQI but suffer poor transport, while high-income inner-city residents trade environmental quality for proximity to services. By measuring segregation at the neighborhood level, this research offers a transferable, data-driven approach for targeted adaptation. It supports planning heat-mitigating greening in disadvantaged Pest districts, expanding canopy cover, and protecting permeable surfaces, effectively aiding cross-sectoral investment planning and tracking welfare co-benefits.

Key Words *Climate change; Urban heat island; Welfare; Environmental inequality; Hungary*

The Role of the EU ETS in Shaping Coal and Gas Prices in Europe

Dominik Katarzyński Koszalin University of Technology/Politechnika Koszalińska

Abstract text

The European Union Emissions Trading System (EU ETS) constitutes a key pillar of the EU's climate policy (d. Green Economy), introduced as a response to accelerating climate change. By internalizing the cost of carbon emissions, the system is designed to influence production decisions and energy prices. However, the direction and strength of the relationship between carbon allowance prices and energy commodity markets remain subject to debate, representing an important research gap in the assessment of market-based climate instruments.

The objective of this poster presentation is to analyze the interdependencies between the EU ETS and wholesale prices of natural gas and coal, with particular attention to whether changes in carbon allowance prices drive changes in energy commodity prices.

The presentation employs quantitative econometric methods. A Vector Autoregression (VAR). Stationarity is examined using the Augmented Dickey-Fuller (ADF) Fisher test, while causal relationships are identified through the Granger causality test. The analysis is based on monthly data for coal prices, natural gas prices, and CO_2 emission allowance prices.

The results suggest an inverse relationship to one expected, changes in gas and coal prices, with time lags, appear to influence the prices of CO_2 emission allowances, rather than allowance prices driving energy commodity prices.

These findings raise important questions regarding the functioning of the EU ETS under free-market principles and its effectiveness as a price-setting mechanism. Moreover, they point to broader implications for the planned EU ETS 2 system, which will directly affect a larger share of European society. A deeper understanding of these dynamics is crucial for future climate policy design and regulatory reforms.

Key Words *EU ETS, coal prices, natural gas prices, green economy, price transmission*

The Influence of LPBF Process Parameters on the Quality and Microstructure of 17-4PH Stainless Steel Components in the Context of Industrial and Bioengineering Adaptation

Authors and affiliations
mgr inż. Paweł Krupski
dr hab. inż. Błażej Bałasz, prof. PK
dr inż. Dorota Laskowska
Abstract text:

Laser Powder Bed Fusion (LPBF) technology enables the manufacturing of components with highly complex geometries and high dimensional accuracy. Additive manufacturing methods represent a promising solution within the context of the green economy, as they help reduce production waste and support the development of more sustainable industrial technologies that are essential for adapting to climate change.

The aim of this study was to evaluate the influence of LPBF process parameters on the quality of manufactured components and to identify conditions that contribute to minimizing structural defects and improving material efficiency.

An analysis was conducted on samples produced using various process parameter settings, including laser power, scanning speed, and laser beam width. The quality of the components was assessed in terms of density, dimensional accuracy, surface quality, and the presence of structural defects.

The results demonstrated that uneven energy distribution within the melt pool leads to the formation of temperature gradients and residual stresses, which promote defects that may reduce the reliability of manufactured components.

The obtained findings provide a basis for optimizing LPBF process parameters to develop more efficient and resilient manufacturing technologies. The possibility of reusing unsintered powder supports the concept of a circular economy and contributes to the creation of innovative industrial solutions that enhance adaptation to climate-related challenges.

Key Words *Laser Powder Bed Fusion (LPBF), Additive Manufacturing, Sustainable Production, Circular Economy, Climate Change Adaptation Technologies*

Sustainable PA11 composites for hydrogen vessel applications

Authors Erika Varga, Attila Bata, Dávid István Kis, Dorottya Antaliczné Nagy, Ferenc Tajti, Gergely Tóth

John von Neumann University, GAMF Faculty of Engineering and Computer Science, Department of Innovative Vehicles and Materials, 10 Izsáki Street, 6000-Kecskemét, Hungary

correspondence: varga.erika@nje.hu

Abstract text

The expansion of hydrogen as a clean energy carrier requires lightweight, durable, and sustainable materials for storage and transport vessels. Conventional materials face challenges related to permeability, thermal stability, and long-term mechanical performance. Thermoplastic composites reinforced with inorganic lamellar fillers offer a promising pathway to address these gaps, particularly for next-generation hydrogen vessel technologies.

The objective of this research was to evaluate the potential of mica-reinforced castor oil derivative polyamide 11 (PA11) composites as sustainable materials for hydrogen vessel applications, focusing on how filler morphology, concentration, and particle size influence mechanical, thermal, and rheological properties.

The study investigated PA11 composites reinforced with mica fillers of varying aspect ratios, particle sizes, and loadings. Mechanical testing was used to assess stiffness and impact behavior, while thermal analysis evaluated stability and crystallinity. Rheological studies examined melt flow behavior and viscoelastic properties, including the effects of filler surface treatment at higher concentrations.

Results show that filler morphology is a critical factor in defining composite performance. High–aspect ratio mica significantly increased the elastic modulus, delivering enhanced stiffness suitable for pressure-bearing components. Although reductions in impact strength and crystallinity at larger particles were observed, PA11 composites demonstrated improved thermal stability. Filler concentration and particle size had a stronger impact on properties than surface chemical treatment. Rheological analysis revealed that surface treatment mainly alters flow behavior, shifting the material toward a more liquid-like viscoelastic response at high filler loadings.

The findings highlight mica-reinforced PA11 as a sustainable and high-performance material for hydrogen vessel liners and structural components. This approach supports lighter, safer hydrogen infrastructure and offers a viable route toward environmentally responsible materials in hydrogen technology, with strong potential for future industrial deployment.

Key Words *hydrogen, storage, materials science, polymer*

From Materiality to Capability: Building Green Skills for Sustainable Transformation in SMEs

Authors:

1st Henry Nicolai Buxmann

2nd Maria Kretschmer

3rd Alice Coen

4th Ronald Orth

All Authors are from the Fraunhofer Institute for Production Systems and Design Technology

Keywords *Green Skills, Materiality Analysis, SMEs, Competence Modelling, Green Economy*

Background The transition towards a green economy requires companies to respond to increasing regulatory, societal, and climate-related pressures. The green transformation is therefore changing the work and job profiles in many companies. Yet many small and medium-sized enterprises (SMEs) lack structured approaches to translate sustainability ambitions into concrete competence development.

Purpose This contribution presents an integrated framework that links a practice-oriented Green Skills competence model with a materiality analysis to enable targeted qualification for sustainable transformation. On this basis, qualification requirements can be systematically determined and specific measures can be derived to achieve corporate sustainability goals.

Approach The approach builds on a multi-level competence model structured along vertical competence layers and horizontal ESG-based clusters, combined with a materiality assessment that evaluates both the relevance of sustainability topics and the organisation's current performance. The competence model itself is grounded in a systematic literature review conducted through a structured Scopus database search, complemented by targeted online analyses to ensure comprehensive coverage of relevant academic and practice-oriented sources.

Results Applied in two manufacturing SMEs, the materiality analysis reveals sustainability topics that are strategically relevant but insufficiently developed, thereby identifying potential Green Skill gaps. The results demonstrate that connecting material sustainability priorities with organisational capability assessments allows SMEs to move beyond reporting-driven analyses towards actionable qualification strategies.

Conclusion By aligning skill development with business-relevant sustainability challenges, the approach supports regulatory compliance, organisational resilience, and long-term transformation within the green economy. For the future, it is important that SMEs are provided with innovative qualification tools that enable employees to acquire sustainability skills. For example, employees can be trained in various sustainability areas via modern learning platforms to better meet the requirements of the green economy. The instruments presented in this article provide a conceptual contribution to the design of such learning environments.

Electrification at Scale: Impacts of Employer-Funded Home Chargers on PHEV Use and Vehicle Choice

Johannes Gessner (Toulouse School of Economics), Wolfgang Habla (DHBW Villingen-Schwenningen), Benjamin Rübenacker, Ulrich J. Wagner (University of Mannheim)

Many European firms are under pressure to decarbonize company-car fleets. Plug-in hybrid electric vehicles (PHEVs) can cut emissions only if drivers charge and drive electrically, yet real-world electric driving shares are often far below technical potential. A key barrier is charging convenience—especially access to reliable home charging. This study asks whether providing private home charging infrastructure (i) increases the electric use of PHEV company cars and reduces CO_2 emissions, and (ii) accelerates subsequent adoption of battery electric vehicles (BEVs) within the fleet.

We analyze a quasi-experimental roll-out of employer-sponsored home chargers in a large German company and dual partner of the DHBW where employees' fuel and electricity costs are covered, making charging primarily a non-monetary convenience decision. Using 266,000+ refueling/charging transactions for 856 PHEV and 407 BEV users (2020–2022), we exploit staggered installation delays and estimate causal effects with Difference-in-Differences estimators. For vehicle-renewal choices, we complement this with a matching approach.

Access to a home charger increases PHEV electricity consumption by 317.9 kWh and reduces fuel use by 97.97 liters per quarter, cutting PHEV CO_2 emissions by 38% (≈ one ton per year). We also find a modest rebound in driving (≈ 15% higher vehicle-kilometers traveled). Importantly, home charging raises the probability of choosing a BEV at the next lease renewal by 28.4 percentage points. For the firm, energy expenditures fall by about €102.5 per quarter for PHEVs, and a cost-benefit analysis indicates payback within 8–16 years under current tax-inclusive energy prices.

Targeted provision of home chargers is thus an effective, scalable lever for firms to decarbonize fleets—both by improving real-world PHEV electric utilization and by catalyzing longer-run electrification via BEV adoption. These findings provide the first causal evidence for expanding private home charging and highlight the opportunities of transfer from the DHBW to dual partners.

Key Words *Home charging infrastructure, Plug-in hybrid electric vehicles (PHEVs), Battery electric vehicles (BEVs), corporate fleet electrification*

PF_DD transforming training to make manufacturing more sustainable

Laurent Terrenoir1, Pierre Michaud1, Christophe Merlo1, Emmanuel Duc1

1 Univ. Bordeaux, ESTIA Institute of Technology, Technopole Izarbel 64210 Bidart, France

PF_DD 'Decarbonized and Sustainable Processes of the Future' project is winner of France 2030 Skills and Jobs of the Future competition, involving 12 partners from secondary and higher education. It contributes to reducing European industries carbon footprint. The aim is to transform teaching on manufacturing processes: machining, composites, additive manufacturing, and robotics, and to train operators and engineers capable of integrating environmental impacts (energy efficiency, sustainable manufacturing) when optimizing processes. The focus is on bachelor's, engineers, and master's degrees, in close collaboration with CompositAdour/Addimadour technology platforms: robotics, additive manufacturing, and composite processes are addressed. First focus point is a detailed analysis of the energy consumption required to perform a process, as a performance indicator, associated to price and manufacturing time indicators. The second focus is on the environmental impact of materials, particularly composites: this is more complex to assess during the development, implementation, and recycling phases.

Two main educational activities are initiated. First best practice guides will be created to offer adapted educational sequences by reformulating the fundamental concepts of decarbonization, detailed for each degree and for each technology and based on experimental studies, doctoral theses, or literature reviews. Examples of learning sequences are proposed. In parallel, the instrumentation of Compositadour/Addimadour technical platforms is implemented, to reach a detailed understanding of the overall environmental impact of a robotic cell, axis by axis and equipment by equipment. The learner can thus assess the impact of choices on the environmental impact of the process. The best practice guides provide a methodological framework for experimental cells, which in turn enrich the guides with measured data. A dedicated thesis is focused on in-situ environmental data monitoring for metal additive manufacturing processes. Subsequently, additional work will propose educational platforms for different school and university levels to raise awareness of these issues among all levels learners.

Key Words *sustainable manufacturing, material recycling, energy consumption, environmental impact.*

Climate-Resilient Legume Species as Sustainable Protein Sources under Drought-Prone Conditions of the Great Hungarian Plain

Zoltán Dávid Oroszi[1], Balázs Horváth[2], Virág Mihálka[1] [1]John von Neumann University, Faculty of Horticulture and Rural Development, Hungary [2]National Centre for Biodiversity and Gene Conservation, Tápiószele, Hungary

Climate change increasingly challenges legume production in Central Europe, particularly in the drought prone regions of the Great Hungarian Plain. Rising temperatures, prolongated dry periods and atmospheric drought reduce the sustainability of several traditionally cultivated legume species and cultivars, making the reassessment and partial replacement of established crops unavoidable to ensure stable yields and sustainable protein supply.

The aim of this study was to identify legume species and genotypes better adapted to extreme climatic conditions and to evaluate their performance under regional conditions assessing their potential to substitute climate sensitive common bean (Phaseolus vulgaris L.) cultivars in resilient cropping systems.

A two-year open-field small plot experiment was conducted in 2024 and 2025 on sandy and loam soils both under irrigated and non-irrigated conditions. Traditional common bean varieties and alternative legume species from the Vigna genus (Vigna unguiculata, V. radiata V. mungo, V. angularis) were tested using selected gene bank accessions. Investigated agronomic parameters included emergence, flowering dynamics, pod characteristic and dry sees yield under extreme heat and drought stresses.

In both years, common bean varieties failed to produce economically viable yields, even under irrigated conditions, indicating declining usability under current climatic conditions. In contrast, cowpea (Vigna unguiculata) produced stable yields on both soil types without irrigation. On loam soil, mung bean (Vigna radiata, cultivar ‘Tico’) also showed consistent performance. These species demonstrated superior tolerance to repeated heat events exceeding 36-38 ˚C.

The results suggest that climate adaptation in legume production requires the partial replacement of traditional common bean cultivation with more resilient species. Integration of drought tolerant legumes can enhance climate resilience and support sustainable protein production in climate-vulnerable regions.

Key Words *legumes, climate change, drought tolerance, sustainable agriculture, plant-based protein*

Dual Higher Education

Redesigning Learning and Teaching Spaces for dual higher eductiaon

Martin Lachmair1,4, Ulf-Daniel Ehlers2,4, Gerhard Götz3,4, Myriam Hamich3,4, & Doris Ternes4

Background The essential ingredient of dual and work-integrated higher education consists of the connection of academic learning with professional practice. Nevertheless, empirical research repeatedly shows that learners often experience these contexts as parallel rather than intervowen and cognitively integrated. Existing approaches to theory–practice integration primarily address structural, curricular, or technological alignment, while leaving the underlying learning problem insufficiently specified. The authors argue that the persistent gap between knowing and doing is not primarily spatial or organizational, but cognitive.

Objective The Cognitive Third Space (CTS) as a mechanism-oriented explanatory model is developed and proposed. CTS reconceptualizes the "Third Space" not as an additional learning environment, but as a cognitive-functional space that emerges in transitions between understanding, action, and reflection.

Method The model was developed based on an integrative, theory-building review across educational psychology, cognitive science, and instructional design.

Results The synthesis identifies recurring design conditions including externalization of thinking, reflexive interruptibility, feedback quality, cognitive load management, social sense-making, and the epistemic treatment of errors that shape learners' engagement in transitional situations. These conditions influence learning outcomes indirectly through four cognitive transition mechanisms: sensemaking, metacognitive regulation, abstraction and generalization, and reconstruction of knowledge.

Conclusion The CTS model specifies a mediation logic linking designable features of learning situations to outcomes such as transfer, problem-solving capability, knowledge robustness, and adaptive expertise. By shifting the unit of analysis from learning environments to cognitively fragile transition episodes, CTS integrates insights from transfer research, reflection-in-action, boundary crossing, and cognitive load theory into a coherent framework. The proposed CTS model allows to derive testable propositions and thus contributes to research and design in dual and work-integrated higher education from both, learner's and teacher's perspective.

Key Words *dual higher education; work-integrated learning; theory–practice integration; Cognitive Third Space; cognitive transition mechanisms*

1 Duale Hochschule Baden-Württemberg Villingen-Schwenningen, Germany

2 Duale Hochschule Baden-Württemberg Karlsruhe, Germany

3 Duale Hochschule Baden-Württemberg Mosbach, Germany

4 Institut für Hochschul- und Bildungsforschung, DHBW, Germany

Enhancing Emotional Self-Regulation Through Play-Based Simulation: Development of a Serious Game to Foster Resilience in Health and Social Care Professions

Amelie Büchler, M.A., Prof.in Bettina Flaiz, Sabine Münzenmay, M.A.

Type: Poster Presentation

No GC price

Abstract:

Background Learners in work-integrated health programs face profound systemic pressures, including chronic high workloads and staffing shortages. Current literature indicates burnout prevalence among nursing staff can reach 80%, often leading to maladaptive "coolout" strategies such as cynicism or moral desensitization. These factors not only deteriorate the mental health of nursing students but also threaten patient safety through the phenomena of missed nursing care.

Objectives: To address the gap between systemic deficits and individual coping capabilities, the Erasmus+ project Simply4Emotions aims to develop an interactive intervention, namely a game called Resilience Ridge. The objective is to strengthen emotional self-regulation and professional resilience in nursing trainees and other health and social care professionals through a serious game.

Methods The project utilizes a game-based learning approach grounded in two psychological frameworks: Lazarus & Folkman's Cognitive Appraisal Theory and Gross's Process Model of Emotion Regulation. In a collaborative simulation using a mountaineering narrative, learners face simulated crises (e.g., ethical dilemmas). They must actively select and apply specific regulation strategies (e.g., cognitive reappraisal vs. suppression) to navigate these scenarios.

Results / Findings The simulation provides a "safe space" for experiencing self-efficacy and "graceful failure." The game offers immediate feedback on the effectiveness of chosen strategies, illustrating their impact on both the professional's stress levels and the quality of patient care. It successfully trains learners to distinguish between healthy professional distance and harmful emotional numbness.

Conclusion & Implications: While not a substitute for structural reform, Resilience Ridge serves as a vital, low-threshold educational tool. As an Open Educational Resource (OER), it offers institutions a scalable method to integrate resilience training into curricula. This equips learners with adaptive coping skills, helping to prevent burnout and ensure sustainable mental well-being in high-stress clinical environments.

Keywords *Nursing Education, Game-Based Learning, Emotional Regulation, Resilience, Mental Health, Simulation*

Empowering students' learning through Dual Higher Education: Insights from Multidisciplinary Thesis Models in Savonia UAS

Kinnunen, Anu, Principal lecturer, Master School, Savonia University of Applied Sciences
Luojus, Maria, Principal lecturer, Master School, Savonia University of Applied Sciences
Pekkarinen, Ulla, Senior lecturer, Master School, Savonia University of Applied Sciences
Suhonen, Anssi, Senior lecturer, Master School, Savonia University of Applied Sciences

Backround

Global changes—including climate change, digitalisation, and increasing societal complexity—demand that higher education respond more effectively to evolving professional and societal needs. Dual and cooperative higher education (DHE) models offer a strong framework for this by integrating academic study with authentic work-based practice. Universities of Applied Sciences are particularly well positioned due to their practice-oriented pedagogies and close employer collaboration. At Savonia University of Applied Sciences, this potential has been advanced through strategic development and the piloting of phenomenon-based, multidisciplinary, and work-life-integrated thesis models.

Objective

This article examines how two pilot models—a group-supported thesis supervision model and a multidisciplinary work-integrated thesis model—promote student learning, enhance societal agency, and strengthen the implementation of DHE within Savonia's Dual 2.0 framework.

Methods

Two Master's-level pilots were implemented, each drawing on phenomenon-based and group-supported pedagogy. The study was conducted using a cross-sectional descriptive quantitative research design.

1. Group-Supported Thesis Model: Applied in Rehabilitation and Sustainable Future programs with 67 students and 15 lecturers. Data were collected through participant surveys and analyzed using a SWOT framework.

2. Multidisciplinary Thesis Pilot: Initiated in autumn 2025 with 18 students working alongside three employers in RDI-integrated research groups supported by multidisciplinary teacher teams and industry partners.

Pilot experiences were compared with international research on dual and interdisciplinary education.

Results

Collaborative and group-supported learning increased student motivation, deepened understanding, and strengthened social, self-regulation, and critical thinking skills. Structured processes and digital platforms supported progress, though challenges included differing levels of commitment, balancing group and individual supervision, and the need for clear guidance. The multidisciplinary pilot effectively connected academic work with real-world challenges, improved cross-disciplinary competence, and enriched learning through employer collaboration. Findings aligned with international evidence on the benefits—and recurring challenges—of interdisciplinary and dual models, including communication barriers, institutional silos, and assessment complexity.

Conclusion

Savonia's pilots demonstrate how DHE can enhance future readiness by integrating multidisciplinary teamwork, work-life problem-solving, and collaborative supervision. These models strengthen students' professional competence, societal engagement, and contribution to regional development, while highlighting the need for supportive structures to ensure full realization of their potential. In the future, it must be taken into consideration how Thesis group supervision will be implemented in terms of promoting students' engagement and providing congruent instructions.

Authors & Affiliation (in alphabetical order): Sandal, Cüneyt (DHBW Karlsruhe); Schreiber, Anne (DHBW Karlsruhe); Heusohn, Silke (DHBW Karlsruhe); Kolano-Law, Lydia (DHBW Karlsruhe)

„Hidden Treasures“ – closing the gap between theory and practice by guided (self-)reflection on experiences in different learning environments

The interlinking of theory and practice on several levels is a defining feature of dual study programs. Previous studies show that the content level in particular is regularly criticized, especially from the students' perspective. On closer inspection, it becomes apparent that students often feel left to their own devices when it comes to bridging the gap between theory and practice. The lack of connection between the two learning environments can lead to a lack of coherence and other burdens.

(Guided) reflection appears to be a promising method for helping students connect academic knowledge and practical action, thereby completing a previously hidden learning process. This empowers students to recognize their own (even informally acquired) skills and strengths and to use them to define future goals.

Dual³, funded by the Stiftung Innovation in der Hochschullehre, aims to develop a support program for students to promote these reflection processes, consisting of an AI-supported ePortfolio and individual coaching. An ePortfolio can not only accompany the entire course of study, but also offers opportunity to stimulate reflection and reach all actors in the dual study system. Integrated AI provides on-demand feedback and guides students through reflective processes and their results. An additional coaching program is designed to ensure that students also receive support in the technical application, allocation of results, and pursuit of the resulting new learning objectives. To ensure the program fits all learning environments, stakeholders participate in needs analyses, iterative evaluations and adjustments, and impact studies throughout the entire project period.

The poster presented in the track „Dual Higher Education” shows the prototypical structure of the program as currently developed from first results of expert discussions with program directors (Studiengangsleitungen). The poster is also designed to interactively engage conference participants to comment on the further development of the concept.

Key Words *theory-practice-gap, (self-)reflection, ePortfolio, AI, coaching*

References

Ahrens-Fischer, W., & Dinkelborg-Ripperda, K. (2021). Dimensionen des Transfers in der Theorie-Praxis-Verzahnung. Eine kompetenzorientierte Analyse. Duales Studium, 2(2021), 33-43. https://www.journal-duales-studium.de/de/handbuch/gliederung/#/Beitragsdetailansicht/842/3339/Dimensionen-des-Transfers-in-der--Theorie-Praxis-Verzahnung---Eine-kompetenzorientierte-Analyse

Dickhäuser, C. (2024). Mehr Kompetenzerleben und Autonomie. Förderung von Motivation und mentaler Gesundheit im dualen Studium. Duales Studium, 1(2024), 19-31. https://www.journal-duales-studium.de/de/handbuch/gliederung/#/Beitragsdetailansicht/841/3853/Mehr-Kompetenzerleben-und-Autonomie---Foerderung-von-Motivation-und-mentaler-Gesundheit-im-dualen-Studium

Deuer, E., & Wild, S. (2018). Arbeitspapier 12/2018. Theorie-Praxis-Beziehung im Kontext des dualen Studiums – Erwartungen und Wahrnehmungen aus der Perspektive der dual Studierenden. Hochschulforschung an der DHBW. Studienverlaufspanel 2015-2019. https://www.dhbw.de/fileadmin/user_upload/Dokumente/Schrifterzeugnisse/Theorie-Praxis-Beziehung_im_Kontext_des_dualen_Studiums_2018_3.pdf

Geier, N., Eigbrecht, L., Ehlers, U.-D., & Winkler, K. (2022). Kompetenzlernen im Theorie-Praxis-Studium – Report 1 für das Projekt „DIRK Dual – Digitales Reflexionstool zur Kompetenzentwicklung im dualen

Studium“. https://www.dhbw.de/fileadmin/user_upload/Dokumente/Projekte/DIRK_Dual/2022-05-03-Report-Kompetenzlernen-Version11_final.pdf

Gerstung, V., & Deuer, E. (2021). Forschungsbericht 8/2021. Ein Markenzeichen auf dem Prüfstand: Die studentische Perspektive auf die Theorie-Praxis-Verzahnung im dualen Studium. Hochschulforschung an der DHBW. Studienverlaufspanel 2019-2023. https://www.dhbw.de/fileadmin/user_upload/Dokumente/Schrifterzeugnisse/Forschungsbericht_8_2021_Gerstung_Deuer_2021_Markenzeichen_auf_dem_Pruefstand_Teil1_Forschungsbericht_8_2021.pdf

Heinz, A. (2022). Gelingensbedingungen für die Verzahnung von Theorie und Praxis. Erkenntnisse aus Gruppendiskussionen mit Studierenden der Dualen Hochschule Baden-Württemberg. Duales Studium, 2 (2022), 109-127. https://www.journal-duales-studium.de/de/handbuch/gliederung/#/Beitragsdetailansicht/843/3587/Gelingens%25C2%25ADbedingungen-fuer-die-Verzahnung-von-Theorie-und-Praxis---Erkenntnisse-aus-Gruppendiskussionen-mit-Studierenden-der-Dualen-Hochschule-Baden-Wuerttemberg

Kizinna, S., Dinkelborg-Ripperda, K., & Ahrens-Fischer, W. (2022). Anforderungen und Erwartungen an ein ePortfolio. Workshopkonzept zur Erhebung der Studierendenperspektive. Duales Studium, 2(2022), 97-107.

Krone, S. (2023). Qualität der Praxisphasen im dualen Studium. Ergebnisse einer bundesweiten Studierendenbefragung. Duales Studium, 2(2023), 61-75. https://www.journal-duales-studium.de/de/handbuch/gliederung/#/Beitragsdetailansicht/842/3779/Qualitaet-der-Praxisphasen-im-dualen-Studium---Ergebnisse-einer-bundesweiten-Studierendenbefragung

Rachbauer, T. (2024). KI-Folio: E-Portfolio-gestütztes Reflektieren mit generativer KI begleiten. In Gabi Reinmann (Hrsg.), Impact Free, 59(2024), 1-11. https://www.researchgate.net/profile/Tamara-Rachbauer/publication/385687177_KI-FOLIO_E-PORTFOLIO-GESTUTZTES_REFLEKTIEREN_MIT_GENERATIVER_KI_BEGLEITEN/links/672ff1a9ecbbde716b6437af/KI-FOLIO-E-PORTFOLIO-GESTUeTZTES-REFLEKTIEREN-MIT-GENERATIVER-KI-BEGLEITEN.pdf?_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InB1YmxpY2F0aW9uIiwicGFnZSI6InB1YmxpY2F0aW9uIn19

Rank, A., Neppl, S., & Rincke, K. (2019). Begegnung mit sich, Begegnung mit anderen. In Verzahnung von Theorie und Praxis im Lehramtsstudium. Erkenntnisse aus Projekten der “Qualitätsoffensive Lehrerbildung” (S. 104-111). Bundesministerium für Bildung und Forschung. https://www.qualitaetsoffensive-lehrerbildung.de/lehrerbildung/shareddocs/downloads/files/bmbf-verzahnung_von_theorie_un-m_lehramtsstudium_barrierefrei.pdf?__blob=publicationFile&v=2

Schellenbach-Zell, J., Rochnia, M., & Hartmann, U. (2024). Core Practices für das Praxissemester. Eine Delphi-Studie. Bildungsforschung, 30(2024) 1, 30. https://www.pedocs.de/volltexte/2024/30901/pdf/Bildungsforschung_2024_1_SchellenbachZell_et_al_Core_Practices.pdf

Mentoring in DHE: The Case for a Graduate-Based Third Pillar

The mentoring system in place in our dual IT degree program as well as in other dual degree programs, focuses on two complementary pillars of learning and support - one university-based and one company-based. Given the assistance and guidance that dual students often seek and the current labor market in which job seekers must make increased efforts to find employment, we hypothesize that a third mentoring pillar formed by graduates from the same degree program would benefit everyone involved, i.e. the dual students, the graduates, the partner companies and the university department administering the dual degree program.

The purpose of our research is to identify the shortcomings associated with the prevailing two-pillar system, and to assess the acceptance as well as the expected benefits such a proposed graduate-based third pillar has for both students and graduates.

A review of the literature shows that company-based mentoring carries the risk of focusing on results and companies' goals instead of the person and the learning process. A further shortcoming identified in our case is that both types of mentors are involved in the assessment process, which may limit their ability to act as genuine mentors.

Surveys were conducted with 18 students in their first and third semester of the dual phase; one third and almost three quarters, respectively, responded positively to graduate-based mentoring. Of the 21 graduates surveyed, a third indicated readiness to mentor. Among the benefits suggested in the survey, the students considered the expansion of their network the most important, while graduates valued the opportunity to make a meaningful contribution most.

The findings can provide the basis for strategic decision making about the systemic expansion of the mentoring system through a graduate-based third pillar. Above all, the momentum arising from a potentially strengthened community is worth considering in future strategic planning.

Key Words *mentoring, mentor, dual teaching, dual phase, community, strategic planning, graduates*

A review of the student assessment process: A longitudinal analysis in quality retention facing online lecturing and plagiarism challenges. A case study within within MCAST.

Dr. Inġ Karl Camilleri
Deputy Director, Institute of Business Management & Commerce (Malta College of Arts, Science & Technology)

Abstract text:

Malta College of Arts, Science and Technology (MCAST) is one of the largest academic Vocational Professional Education and Training institution in Europe delivering a wide range of qualifications, fulfilling its ethos by providing industry focused courses based on the highest standards of best practice. Its assessment processes ensure that students have the required technical knowledge and ability to analyse problems and apply solutions within their field of training. This study focused on the challenges faced by the faculty of the Institute of Business Management and Commerce (IBMC) between 2017 and 2025, to retain the quality of student assessments despite the rise of plagiarism during the forced online lecturing of the COVID-19 pandemic, and the use of Generative Artificial Intelligence (GenAI).

A qualitative longitudinal study was undertaken through one-to-one discussions with faculty staff, identifying key themes through thematic analysis. This data was supported by secondary research on the assessment data deployed in IBMC over these eight years. This study explains the adaptive evolution of the assessment process, how challenges were turned into opportunities by shifting assessments from an inquiry-based method to an individual thematic understanding. IBMC lecturing staff focused on retaining the highest quality of education and assessment whilst being faced with worldwide impact phenomena. They ensured the day to day running of classes and the completion of unit syllabi, driven by MCAST's ethos, finding new and various ways to cope, adopting alternative assessment methods to avoid plagiarism, and learning new skills to be able to retain students' interest. Specific recommendations propose creating a more structured collaboration between MCAST management and lecturing staff to ensure that ongoing challenges are better managed.

Key Words *Vocational Education, Assessment Innovation, Online Lecturing, Individuality, Plagiarism*

Learning by doing through IoT labs - A way to gain multidisciplinary skills and meet industrial needs

G. Terrasson*, D. De Castro and A. Llaria

Univ. Bordeaux, ESTIA-Institute of Technology, EstiaR, F-64210 Bidart, France
**Corresponding author Email: g.terrasson@estia.fr*

ORCID 0000-0002-3468-5883

Keywords *Learning by doing, Internet of Things, Scientific and soft skills, Multidisciplinary profiles, IoT platforms and labs*

The rapid growth and evolution of Internet of Things (IoT) technologies across diverse sectors—from smart industry to healthcare and environmental monitoring—have created a need for a wide range of professional profiles with multidisciplinary skills. Technicians, engineers, data scientists, and PhD researchers are effectively essential to ensure industries remain competitive in the development of innovative IoT-based applications capable of tackling critical global challenges, such as climate change, energy efficiency, and the aging population. IoT is inherently a multidisciplinary domain, spanning embedded systems, telecommunications, computer science, and data processing, requiring professionals to master not only scientific skills but also soft skills, such as in project management for example.

To meet these demands, pedagogical tools and practices must evolve to provide a comprehensive and realistic vision aligned with industrial needs, and Dual Education (DE) is a keystone for this purpose. The development of IoT platforms or labs that offer a global IoT network infrastructure, compatible with multiple technologies (LoRaWAN, WiFi, etc.) and embedded systems (Arduino, STM32, etc.), is an interesting additional solution, since such environments enable students to acquire hands-on experience through "learning by doing," not only in DE contexts but also through internships, entrepreneurship, and student mobility programs.

The ESTIA IoT Lab, rolled out across the ESTIA Campus as part of the CAP ELENA project funded by France 2030, exemplifies this approach while also providing a way to raise awareness and promote this field of work to students, as requested by the electronics industry. By providing a supportive and flexible infrastructure, this Lab fosters the acquisition of practical IoT skills and encourages innovation. Based on concrete examples and through students' feedback, this paper illustrates how such platforms bridge the gap between academic training and industrial requirements, preparing the next generation of IoT professionals to tackle real-world challenges effectively.

GC price: no

Social Innovation and Co-Creation from Global Digital Humanities: Mapping Final Degree Projects in Dual Education

Abstract text

The conference track: 1) Dual Higher Education. It aligns with the conference's Track 1.5 on employability and wellbeing.

67. **Background** / Context:

This study examines how Final Degree Projects (FDPs) from Mondragon University's Global Digital Humanities Degree (HDG) integrate social innovation, co-creation, and community engagemen. These FDPs demonstrate dual education's potential to bridge academic learning with real-world problem-solving.

68. **Objective / Purpose** State the aim of your research or project (what question are you trying to answer?)

This research maps and analyzes 20 HDG FDPs to explore how dual education combines technical skills, well-being and social innovation. The key question is: How can dual models like HDG prepare students for contemporary challenges while enhancing employability and wellbeing?

69. **Methods / Approach / Case** Describe how the study was conducted or explain the case. Include techniques, data sources, or frameworks used.

The study carried out a detailed content analysis of the 20 FDWs, which made it possible to identify seven thematic axes developed inductively. This structure helps to identify the main areas of convergence, tension, and gaps within the corpus.

70. **Results / Findings** Summarize key outcomes or discoveries.

These are the seven thematic blocks identified in the analysis.

71. Citizen Participation and Digital Transformation (e.g., community empowerment).
72. Education and Youth (e.g., cooperative values and youth inclusion).
73. Sustainability and Social Economy (e.g., responsible consumption and urban space naturalization).
74. Health and Wellbeing (e.g., quality of life for vulnerable groups).
75. *Technology and Co-Creation (e.g., Future Studies and scenario design).*
76. Culture and Identity (e.g., humanist traditions and social cohesion).
77. Governance and Participatory Democracy (e.g., community-driven transformation).

The methodology of FDP combines qualitative research (action-research approaches), co-creation with social actors, and digital tools. Each FDP is evaluated for its impact on professional development and social innovation.

These findings underscore the potential of dual education to enhance employability while simultaneously fostering social innovation and wellbeing. The key lies in designing projects that are deeply rooted in community needs and collaborative problem-solving, thereby creating tangible

social improvements. This connection between education and real-world impact reinforces the value of dual training as a catalyst for both individual and collective progress.

78. **Conclusion / Implications** What do the results mean? Practical implications? Highlight the significance, impact, or future directions.

The HDG model offers a replicable framework balancing technical training with well-being and social impact. By emphasizing co-creation, digital innovation, and community engagement, it prepares students for contemporary labor markets while contributing to sustainable societies. Future research should explore scalability and cross-regional collaboration This study highlights interdisciplinary collaboration as key to shaping dual education's future.

Key Words *Dual Education, Social Innovation, Co-Creation, Wellbeing, Community Engagement*

Gesund durchs Studium – Staying healthy during your studies

Laura Pleyer1*, Erika Günther-Deimling1, Saskia Buschler1 and Rebecca Bindschädel1

1Kompetenzzentrum Wissenschaftliches Arbeiten (KOWISSA), Baden-Wuerttemberg Cooperative State University Mosbach, Lohrtalweg 10, 74821 Mosbach, Germany

**Corresponding author Email: laura.pleyer@mosbach.dhbw.de*

1) Dual Higher Education

79. **Background** / Context:

How can we support learners in focusing on their physical and mental health in order to cope with the challenges of a dual study routine in a healthy way?

80. **Objective** / Purpose:

Creation of motivational online resources for students and teachers with the aim of raising awareness and providing support regarding physical and mental health. The material allows to address the topic intensively or selectively, either through self-study or as part of a course.

81. Methods / Approach / Case

In the interests of a sustainable and resource-optimized approach we reviewed existing OER materials and based on those developed a modular online training course for use in self-study, enriched with didactic concepts and collections of methods for teachers. All materials were designed for reuse as open educational resources, thus contributing to the sustainable development of educational resources across universities.

82. Results / Findings

The online training addresses four key modules.

Within the stress and resilience module students explore the implication of stress for learning with a special emphasis on measures to combat digital stress. It concludes with an exploration of resilience and presenting strategies to strengthen personal resilience.

The physical activity and relaxation module examines the consequences of physical activity on learning. A part oft the module are relaxation methods, such as autogenic training.

In the nutrition module, the fundamental principles of healthy eating are presented.

In the sleep module students can learn about different sleep-chronotypes and phases.

83. **Conclusion** / Implications:

The Online training "Gesund durchs Studium" is published as OER according to the DHBW Open Science Policy. The course is freely available on the ZOERR, making it accessible for reuse, adaptation, and further distribution. Ongoing development is ensured, as the topic will continue to gain relevance.

Key Words *dual students, digital stress, resilience, self-care*

Developing an International Dual Master Programme in Health: Lessons, Survey Insights and Transferable Design Principles from EU4Dual

Authors Staubmann Wolfgang1, Amort Frank1, Carabott James2, Cordeiro Raul3, Ebinger Margrit4, Friedrichs Kathrin4, Fuchs-Neuhold Bianca1, Gonzalez de Heredia Lopez de Sabando Arantxia5, Huotari Nina6, Jocham Andreas1, Korhonen Teija6, Mayer-Bonde Conny4, Pechstädt Katrin1, Thier Bianca4

Affiliations:

1 FH JOANNEUM University of Applied Sciences, Graz & Bad Gleichenberg, Austria
2 Malta College of Arts Science & Technology, Malta
3 Politecnico de Portalegre, Portalegre, Portugal
4 Baden-Württemberg Cooperative State University, Stuttgart & Heilbronn, Germany
5 Mondragon Unibertsitateko Goi Eskola Politeknikoa, Mondragon, Spain
6 Savonia University of Applied Sciences, Kuopio, Finland

Abstract text

Background International dual master's programmes in health are gaining relevance within the European Higher Education Area by integrating academic qualifications with work-based competence development (1). Their implementation is complex, as curricula, governance, quality assurance and practice integration must be aligned across institutions and national contexts. European university alliances offer opportunities for innovative, labour-market-oriented and student-centred study models.

Methods This paper outlines the development of a European joint dual master's programme in health, collaboratively designed by six institutions within the EU4Dual Consortium. The process was guided by defined governance structures and outcomes-oriented curriculum design (CALOHEE—framework for measuring learning outcomes; EQF Level 7—European master level; 2), combined with co-creation aligned with the European Approach for Quality Assurance of Joint Programmes (3). A survey captured perspectives of practice organisations (n=103) and students (n=173). Iterative workshops, structured coordination and continuous quality assurance supported development. Survey topics included motivation, future competencies and participation barriers.

Results Key successes included early agreement on shared competencies and learning outcomes, integration of theory and practice, and stakeholder involvement in curricular decisions. Survey results confirmed demand for practice-relevant, future-oriented competencies (e.g. interdisciplinary care, health technologies), flexibility for working students, and clear career pathways, while financial and time constraints were key barriers. This informed a programme focusing on interdisciplinarity, inclusion, prevention, climate-related health challenges, digital health and community-based care. Transparency, trust and labour-market relevance were strengthened. Challenges included differing institutional decision-making, national accreditation requirements and high coordination efforts.

Conclusion Developing international master's programmes requires early alignment of curriculum, organisational structures and practice integration. The study provides transferable elements, including a competency-based framework aligned with European standards, a co-creation process integrating academic and practice stakeholders, and evidence-informed design using stakeholder surveys.

References:

1) European Commission, Directorate-General for Education, Youth, Sport and Culture. (2025). Report on the outcomes and transformational potential of the European Universities initiative. Publications Office of the European Union. https://doi.org/10.2766/32313

2) Wagenaar Robert et al. (2018). Measuring and Comparing Achievements of Learning Outcomes in Higher Education in Europe (CALOHEE). https://www.calohee.eu/wp-content/uploads/2018/11/4.1-Assessment-Reference-Frameworks-for-Civil-Engineering-Teacher-Education-History-Nursing-and-Physics-FINAL-v2.pdf

3) European Quality Assurance Register for Higher Education (EQAR) (2015). European Approach for Quality Assurance of Joint Programmes. https://www.eqar.eu/assets/uploads/2018/04/02_European_Approach_QA_of_Joint_Programmes_v1_0.pdf

Dual Higher Education as Professional Formation: Integrating Employability, Wellbeing and Reflective Practice

Dr Heathcliff Schembri – Malta College of Arts, Science and Technology (MCAST)

Dual higher education is frequently advanced as a mechanism for enhancing graduate employability and strengthening alignment between higher education and labour market needs. However, such framings often prioritise short-term occupational outcomes, while under-theorising the conditions required for sustained professional wellbeing, reflective capacity and long-term resilience. This paper advances a design-oriented account of dual higher education that reconceptualises employability as adaptive professional agency, cultivated through the deliberate integration of work-based learning, applied research and reflective professional formation.

The paper draws on the design and delivery of two vertically aligned programmes at the Malta College of Arts, Science and Technology (MCAST): the *Bachelor (Honours) in Vocational Education and Training (BVET)* and the *Master in Vocational Education Applied Research 4.0 (MVEAR)*. Together, these programmes constitute a dual higher education continuum integrating practice placements, industry placements and research-mediated inquiry across multiple vocational sectors, including health and social care. Central to this model is the structured alternation between professional practice, collective reflection and applied research, positioning placement as an epistemic space rather than a peripheral requirement.

The analysis is informed by two complementary theoretical lenses. First, work-integrated learning theory, particularly Billett's conception of workplace learning as participatory practice, foregrounds the pedagogical value of boundary-crossing between educational and occupational contexts. Second, Schön's theory of the reflective practitioner frames professional learning as systematic inquiry into action, enabling practitioners to interrogate uncertainty, exercise judgement and develop professional coherence over time. Using a design-informed analytical approach, the paper examines how curriculum sequencing, placement progression, mentoring structures and applied research tasks are intentionally configured to support employability, professional wellbeing, reflective capacity and resilience as interrelated outcomes.

The paper argues that wellbeing is embedded structurally through programme design, dialogic learning spaces and research-informed reflection, rather than treated as an individual responsibility. It concludes by offering design principles for dual higher education providers seeking to foster healthier, more sustainable professional lives while maintaining intellectual rigour and societal relevance.

Keywords: dual higher education; employability; professional wellbeing; reflective practitioner; work-integrated learning

References:

Billett, S. (2001). Learning through work: Workplace affordances and individual engagement. Journal of Workplace Learning, 13(5), 209–214. https://doi.org/10.1108/EUM0000000005548

Billett, S. (2011). Vocational education: Purposes, traditions and prospects. Springer. https://doi.org/10.1007/978-94-007-1954-5

Billett, S., & Choy, S. (2013). Learning through work: Emerging perspectives and new challenges. Journal of Workplace Learning, 25(4), 264–276.

Schön, D. A. (1983). The reflective practitioner: How professionals think in action. Basic Books.

Schön, D. A. (1987). Educating the reflective practitioner: Toward a new design for teaching and learning in the professions. Jossey-Bass.

IS PEER LEARNING SUPPORTING STUDENTS IN GAINING SOFT SKILLS?

M. Dragan1

1Institute of Applied Production Sciences, Department of Engineering, University of Applied Sciences FH JOANNEUM Gesellschaft m.b.H, Eggenberger Allee 11, Graz Austria

ORCID: 0009-0006-9817-6347

Email: maja.dragan@fh-joanneum.at

Keywords *Dual Higher Education, Peer Learning, Soft Skills, Student Wellbeing*

84. Context

Peer learning has been used as a tool in Higher Education Institutions (HEI) since the 80s. Students collaborate to deepen their understanding, develop soft skills such as critical thinking, problem solving, resilience etc. The aim of this abstract is to focus on students' view and to explore how peer learning shapes their educational experience and prepares them for the world of work. By focusing on students' experience within a study course, it aims to give practical insights to enhance both learning outcomes and student wellbeing.

85. Purpose

The objective of this paper is to explore how peer groups influence student wellbeing, skills gaining, and employability, drawing on both practical course experiences and empirical survey data. In the courses Business communication (BKOM) and Work Term (WT) at FHJ (dual study program: Production Technologies and Organisation), students had the task of forming and self-organizing peer groups, designing a group identity (including a logo and purpose), and collaborating on academic tasks. This practical exercise revealed preliminary insights into the benefits and challenges of peer learning as well as mentoring, such as increased engagement and easier skill development.

Additionally, the students of the cohort (3rd semester, 27 students) had to implement and demonstrate their peer group and reflect on skills which they gained in the company and the skills which they learn in an organized setting in an educational institution. The main goal was to explore the students' perceptions of peer learning's impact on their satisfaction, motivation, and employability, as well as the role of peer groups in a real setting.

86. Case

As part of the BKOM course, students engage in discussions about mentoring, its various forms, and the role of peer groups in academic and professional development. The course emphasizes active learning and student autonomy, encouraging students to apply theoretical knowledge to practical tasks. One of the key assignments requires students to:

87. Organize themselves into peer groups based on shared academic or professional interests.
88. Develop a group identity, including creating a logo and defining a purpose for their peer group.
89. Collaborate on tasks, such as discussing course content and professional experiences, solving problems, or preparing presentations.
90. Reflect on their experiences, including the benefits and challenges of peer learning.

This practical task serves as a real-world case study for understanding how peer groups perform in an academic setting. It also provides a foundation for the survey, as students who participated in this task will have and report firsthand experience.

91. Results

Preliminary observations from the course suggest that students who actively participated in forming and working within peer groups reported higher engagement with course material and greater motivation to collaborate. The task of creating a logo and defining a purpose fostered a sense of ownership and identity within the groups, which may contribute to stronger group cohesion. Some students faced difficulties in self-organization and conflict situations with colleagues. Students noted improvements in communication, teamwork, critical and analytical thinking, as well as

problem-solving skills, which are critical for employability. These observations align with the World Economic Forum White paper [1], the initiative from the European Commission Union of Skills [2], and findings of the focus groups and reinforce the importance of student-led peer learning in Dual Higher Education (DHE).

92. Conclusions

The BKOM and WTS courses demonstrate that structured, yet autonomous peer learning activities can significantly enhance student engagement, skill development, and satisfaction. The practical task of forming peer groups not only reinforces theoretical knowledge but also prepares students for real-world collaboration—a key competency in the workforce.

Peer groups build teamwork and social influence, directly matching WEF's top human skills demands, as peers teach and mentor each other, enhancing emotional intelligence and active listening. Peer learning promotes curiosity and adaptability, key for WEF's reskilling priorities in universities and beyond. But foremost it enables students to solve problems within their workplace independently and in a team. Students who think critically can tackle complex assignments, research questions, and exams more effectively, as they learn to approach problems logically and creatively. It enables them to adapt to new challenges, make informed decisions, and innovate – all the necessary skills for the world of work.

References:

[1] World Economic Forum (2025). The Future of Jobs Report 2025. January 2025. Geneva: World Economic Forum. Retrieved January 10, 2026 from https://www.weforum.org/reports/the-future-ofjobs-report-2025/

[2] European Commission (2025). The Union of Skills. March 2025. Brussels: European Commission. Retrieved May15, 2025 from https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex:52025DC0090