

D-SAIL - Transformative Curriculum Design: Digitalisation, Sustainability, and AI Literacy for 21st Century Learning

Martin Ruskov¹, Dimitri Ognibene^{2,3}, Davinia Hernández-Leo⁴, Davide Taibi⁵,
Yannis Dimitriadis⁶, Giovanni Fulantelli⁵ Uwe Handmann⁷, George K. Zarifis⁸,
Yan Wu⁹, and Paolo Maria Ferri²

¹ University of Milan, 20100 Milan, Italy
`martin.ruskov@unimi.it`

² University of Milan Bicocca, 20100 Milan, Italy
`{dimitri.ognibene,paolo.ferri}@unimib.it`

³ National Research Council - Institute for Cognitive Sciences and Technologies,
00196 Rome, Italy

⁴ Pompeu Fabra University, 08002 Barcelona, Spain
`davinia.hernandez-leo@upf.edu`

⁵ National Research Council - Institute for Educational Technology,
90146 Palermo, Italy
`{davide.taibi,giovanni.fulantelli}@itd.cnr.it`

⁶ University of Valladolid, 47011 Valladolid, Spain
`yannis@tel.uva.es`

⁷ Hochschule Ruhr West, 45407 Mülheim an der Ruhr, Germany
`uwe.handmann@hs-ruhrwest.de`

⁸ Aristotle University of Thessaloniki, 541 24 Thessaloniki, Greece
`gzarifis@edlit.auth.gr`

⁹ Agency for Science, Technology and Research, 138632 Singapore
`wuy@i2r.a-star.edu.sg`

Abstract. This half-day workshop invites educators, researchers, practitioners, and other stakeholders to reimagine traditional curricula by integrating AI-driven insights, sustainability principles, and digitalisation. The rapidly evolving technological landscape around teaching and learning calls for innovative approaches to foster adaptive, inclusive, and future-ready learning experiences. The workshop will explore how generative AI can enhance smart learning environments and how comprehensive data analysis can inform effective curriculum development. Current efforts lay the groundwork for embedding data analysis and AI methodologies across diverse higher education disciplines. However, concerns have been raised about the unequal access to these technologies. These directions can provide valuable insights into creating transformative educational experiences that not only leverage cutting-edge digital tools but also embed sustainability and ethical practices into curriculum design. Multidisciplinary research could reveal limitations of current approaches and propose improvements and alternatives. A non-exhaustive list of topics of interest is innovative pedagogical frameworks, sustainability and digitalisation in education, human-AI collaboration, ethical and societal

considerations, and others. The workshop will provide a platform to share research findings, discuss innovative pedagogical frameworks, and explore interdisciplinary strategies that prepare students for the demands of the 21st century.

Keywords: transformative curriculum design· digitalisation· sustainability· AI literacy.

1 Introduction

Generative AI has become a continuous source of change in our society. Inevitably, this has an enormous impact on teaching and learning, with adoption happening at a diverging pace [4, 7]. While some excitedly rush to embrace opportunities [9, 3, 6, 8], others warn of threats and challenges related to unequal access, model hallucinations, biases in models, environmental cost, etc [1, 2]. In the rapidly evolving technological landscape, both innovative approaches and reflections on the state of affairs are needed to foster an adaptive, inclusive, and future-ready educational ecosystem. Generative AI has grown far beyond the traditional boundaries of computer and data sciences and has become relevant to all of our society [5, 3]. This is why an interdisciplinary and holistic approach towards developing AI literacy is crucial for sustainable education and learning. This is particularly so considering the broad spectrum of methodologies in education from formal sciences to humanities, from cognitive to physical, from coaching to self-directed learning.

This workshop invites educators, researchers, practitioners and other stakeholders to reimagine traditional curricula across the disciplines by integrating AI-driven insights, sustainability principles, and digitalisation. The workshop will explore how generative AI can enhance smart learning environments and how comprehensive data analysis can inform effective curriculum development. Ongoing research is demonstrating the potential of human-centered, AI-enhanced smart learning environments that support hybrid learning scenarios by overcoming conventional limitations. Moreover efforts are being made to lay the groundwork for embedding data analysis and AI methodologies across diverse educational disciplines. When considered in combination with potential risks, these directions can provide valuable insights into creating transformative educational experiences that not only leverage cutting-edge digital tools but also embed sustainability and ethical practices into curriculum design. Multidisciplinary research could reveal limitations of current approaches and propose improvements and alternatives. The workshop will provide a platform to share research findings, discuss innovative pedagogical frameworks, and explore interdisciplinary strategies that prepare students and learners for the demands of the 21st century.

2 Call for Papers

We invite submissions of papers that examine and expand upon innovative strategies for curriculum transformation at the intersection of AI, sustainability, and digitalisation. We welcome original research, case studies, conceptual frameworks, and best practice reports. Real-world research, such as in-the-wild studies, design-based research, and analysis of public data are of particular interest.

Relevant topics include, but are not limited to:

Innovative Pedagogical Frameworks: Approaches that integrate AI-driven insights and data analytics into curriculum design to create adaptive and personalized learning environments.

Sustainability and Digitalisation in Education: Strategies for embedding sustainability principles and digital tools into curricula, ensuring that educational practices are both future-proof and environmentally responsible.

Human-AI Collaboration: Case studies and research on effective models for human-AI collaboration in the design and delivery of learning experiences, including insights from generative AI applications. **Interdisciplinary Curriculum Integration:** Approaches for leveraging data analysis and AI across various academic disciplines.

Ethical and Societal Considerations: Discussions on the ethical challenges and societal implications of integrating advanced digital technologies into educational settings, with a focus on inclusivity and equitable access.

Submissions should clearly articulate both theoretical and practical dimensions of curriculum transformation, with an emphasis on real-world applications, challenges, and future directions. Authors are encouraged to discuss the implications for teaching, learning, and academic policy in a digitally transformed educational landscape.

Submissions should be anonymized, as part of a double-blind review process. Authors of accepted papers will be allocated slots to present their contributions.

2.1 Submission Guidelines

Contributions should present original research and clearly articulate both theoretical and practical dimensions of curriculum transformation, with an emphasis on real-world applications, challenges, and future directions. Authors are encouraged to discuss the implications for teaching, learning, and academic policy in a digitally transformed educational landscape.

Accepted paper formats:

- Full papers (10-12 pages) - original research with detailed analysis and conclusive findings
- Short papers (6-9 pages) - work in progress, early results feasibility studies or reproducibility studies.
- Project and position papers (5 pages) - new visions or initiatives, building on rigorous previous research.

We envision 8 presentations (invited and submitted) of interest to educators, researchers, and practitioners, curriculum designers and policymakers. Submissions should be anonymized, as part of a double-blind review process. All submissions will be evaluated by at least two experienced reviewers and detailed feedback will be provided to each submission. Authors of accepted papers will be asked to present their contributions orally and with slides. Each paper will be allocated 15 minutes (short) or 20 minutes (long) with 5 more minutes for questions and discussion.

Proceedings will be published with CEUR-WS, will be assigned an URN and indexed by SCOPUS, Web of Science, and other major indexes. Authors are asked to follow the one-column CEURART format for their submissions.

2.2 Important Dates

All dates are in the Anywhere-on-Earth time zone.

- Abstract submission deadline: 19 May 2025
- Paper submission deadline: 26 May 2025
- Acceptance notification: 20 June 2025
- Camera ready submissions: 1 July 2025
- Workshop: 22 July 2025

Join us in shaping the future of higher education by transforming curricula to meet the evolving demands of a digital, sustainable, and AI-enhanced world.

3 Organizers

Martin Ruskov is a researcher at the Department of Languages, literatures, cultures and mediations at the University of Milan. He has stated his research in the field of game-based learning, working on numerous international research projects with threshold concepts, variation theory and design-based research at University College London, Zentrum für grafische Datenverarbeitung, Darmstadt and Sofia University. He has also spent a period outside of academia working on mobile-assisted language learning, offender rehabilitation and gamification. His research interests include awareness development, life-long learning and intangible cultural heritage.

Dimitri Ognibene is an Associate Professor at the University of Milano-Bicocca and an Associate Researcher at ISTC CNR in Rome, whose multidisciplinary work spans artificial intelligence, robotics, and cognitive neuroscience. His distinguished career includes roles at Universitat Pompeu Fabra, King's College London, and Imperial College London, and most recently he has been serving as Visiting Professor in the Department of Education at the University of Tokyo. His research bridges theory and practice—most notably in exploring the interplay between attention and learning in computational models. While his Ph.D. work underscores the importance of this interaction, his varied publication record suggests that exceptions are indeed possible.

Davinia Hernández-Leo is a Full Professor at the Universitat Pompeu Fabra's Department of Engineering and a Serra Hùnter and Icrea Academia Fellow. Her multidisciplinary work bridges human-computer interaction, network applications, and learning sciences, positioning her as a leader in technology-enhanced education. As head of the Interactive and Distributed Technologies for Education (TIDE) research group, she has made significant contributions to learning design and computer-supported collaborative learning. She is currently engaged in proposing data-driven and AI-supported methods to improve learning design and smart learning environments, emphasizing human rights and ethics.

Davide Taibi is a Senior Researcher at the Institute for Educational Technology of the National Research Council of Italy (CNR-ITD). His research primarily focuses on the application of innovative technologies to support education at various levels, covering areas such as Mobile Learning, Semantic Web and Linked Data for e-learning, standards for educational processes design, Open Education, Learning Analytics, Augmented and Virtual Reality for education, and Artificial Intelligence in Education. He has coordinated two EU funded projects in the field of Data Literacy: DATALIT (Data Literacy at the interface of higher education and business), and DEDALUS (DEveloping DAta Literacy courses for University Students). Currently, he is leading two EU funded project focused on Artificial Intelligence in Education named SMERALD (SMEs – Raising Awareness and Learning on Digital data, data analysis and artificial intelligence) and IDEAL (Integrating Data Analysis and AI in Learning experiences). He is also a contract professor at the University of Palermo.

Yannis Dimitriadis is Full Professor of Telematics Engineering and ex Dean of the Doctoral School, University of Valladolid, Spain. He is also the coordinator of the GSIC/EMIC research group, an inter-disciplinary group, integrating over 20 researchers and practitioners from the field of Information and Communications Technologies and Pedagogy. His recent research work has focused on learning analytics and smart learning environments, alignment of learning design and learning analytics, design patterns, conceptual and technological support to the orchestration of computer-supported collaborative learning processes, active

pedagogies at scale, and across-spaces (Web, 3D worlds and augmented reality) learning. He has participated in more than 50 competitive research projects on technology-enhanced learning, co-authored more than 100 journal papers and 215 conference papers (including several papers at LAK), and organized several workshops and symposia, at ECTEL, CSCL, ISLS, etc. Dr. Dimitriadis is also a senior member of IEEE, member of ISLS.

Giovanni Fulantelli is Senior Researcher at the Institute for Educational Technology of the National Research Council of Italy (CNR), and contract professor at the LUMSA University, where he holds a course in Digital technologies for learning. In 2005 he was awarded as one of the excellent researchers at the CNR. His research interests are inspired, on the one hand, by the open education movement, and the principle that technologies must and can guarantee universal access to quality education; on the other hand, by the awareness that the rapid diffusion of social media and AI-based solutions requires special attention to avoid compromising the potential for educational development and personal growth offered by digital technologies.

Uwe Handmann is a distinguished academic and industry expert whose multifaceted work spans neuroinformatics, artificial intelligence, and sensor data fusion. He is a Professor of Neuroinformatics at Hochschule Ruhr West – University of Applied Sciences, He also directs the Computer Science Institute and leads multiple innovation centers focused on digitalization and the twin transition towards a circular economy. His extensive career includes leadership roles in both academia and industry, from heading research projects on intelligent systems and image processing to serving as Managing Director at iQServ GmbH. He also enriches international academic collaboration as a Visiting Professor at Babeş-Bolyai University in Cluj, Romania. While his early research laid a strong foundation in AI and computational models, his later work reflects a broad engagement with cutting-edge applications and digital transformation, highlighting that even focused research has a strong practical relevance.

George K. Zarifis is Professor of Continuing Education in the Faculty of Philosophy, Department of Education at the Aristotle University of Thessaloniki. His research interests focus on adult educators' and teachers' training and professionalisation, university continuing education, curriculum design and learning outcomes, and comparative examination of adult learning and vocational education and training policies and practices in Europe. He is the convener of the ESREA's Research Network on the Professional Development of Adult Educators (ReNAdET). He publishes, edits and co-authors in the area of adult and continuing education, and participates in a large number of national and European research projects in the same field.

Yan Wu is the Deputy Head of the Robotics and Autonomous Systems Department at A*STAR Institute for Infocomm Research, where he also works as a

Principal Scientist and Leader of the Manipulation Group. Since Sept 2023, he is concurrently the Co-Lead (Technology) at the Robotics Horizontal Technology Coordinating Office at Agency for Science, Technology and Research, Singapore. Yan is the current Chair of the IEEE Systems, Man and Cybernetics Society, Singapore Chapter and Member of the IEEE Robotics and Automation Society Technical Committees on Cognitive Robotics, Haptics and Neuro-Robotics Systems. He is also the current President of the Pattern Recognition and Machine Intelligence Association. He serves or has served as an Associate Editor at various editorial boards, such as IEEE Transactions on Automation Science, IEEE Robotics and Automation Society Conference Editorial Board, IEEE Intelligent Transport Systems Society Conference Editorial Board and Frontier in Robotics and AI. Yan is a Senior Member of the IEEE. His research interests include dexterous manipulation, embodied robot learning and interaction, and service and assistive robotics.

Paolo Maria Ferri is a Full Professor of Teaching and Special Pedagogy at the University of Milan Bicocca. He coordinates research in digital learning environments and “digitally augmented” pedagogies within the Department of Human Sciences “Riccardo Massa.” His work focuses on integrating emerging technologies, such as AI, into formal education, with particular attention to 0-10 children and primary school. He has supervised doctoral students and contributed to national guidelines for MOOCs on behalf of CRUI. Ferri has led several funded projects under Horizon 2020 and the Italian Ministry of Education (Miur). He regularly consults for leading publishing groups, designing digital teaching content and training programs for educators. His publications include “Nativi Digitali” (Bruno Mondadori, 2011) and “I Nuovi Bambini” (Rizzoli, 2014), among others. He was a founding member of SIREM and serves on editorial boards of academic journals such as TD and Je-LKS. Ferri’s ongoing research investigates the interplay between digital media appropriation, teacher professional development, and e-learning, with a particular focus on the use of AI in Schools and Universities.

3.1 Program committee members

- Ishari Amarasinghe, Open University of Catalonia, Spain
- Albena Antonova, Sofia University, Bulgaria
- Gabriella Casalino, University of Bari, Italy
- Alessandro Ciasullo, University Federico II of Naples, Italy
- Lukas Erle, Hochschule Ruhr West – University of Applied Sciences, Germany
- Raffaele Di Fuccio, Pegaso University, Italy
- Cansu Koyuturk, University of Milan Bicocca, Italy
- Carla Limongelli, Roma Tre University, Italy
- Nicola Orio, University of Padova, Italy
- Maria Perifanou, University of Macedonia, Greece

- Marco Rondonotti, e-campus University, Italy
- Daniele Schicchi, ITD CNR, Italy
- Giulia Sironi, University of Milan Bicocca, Italy
- Marco Temperini, Sapienza University, Italy
- Emily Theophilou, Pompeu Fabra University, Spain
- Ricardo Torres Kompen, Ramon Llull University, Spain
- Daniel Zilio, University of Padua, Italy

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