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Methodologies and Technologies
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The 7th International Conference on Higher Education Learning Methodologies and Technologies Online (HELMeTO 2025) highlights the growing interest in merging learning methods with educational technology. This year's event once again embraced a cross-disciplinary approach, bringing together researchers, educators, and practitioners from various fields to explore innovative solutions for the future of higher education. HELMeTO has evolved significantly, marking its fourth year as a full-scale conference after starting as a workshop. Its growth has been impressive, attracting 143 submissions from more than 325 authors in 18 countries, including Italy, Brazil, Morocco, Ukraine, the United Kingdom, Hungary, Nigeria, Croatia, France, Germany, Latvia, Canada, Denmark, India, Slovenia, Spain, Sweden and the United Arab Emirates. This broad international participation showcases the conference's crucial role as a hub for exchanging ideas and best practices in online learning.

Hosted by the University of Napoli, the 2025 edition offered a rich programme. The event featured dozens of high-quality contributions, organized into seven special tracks and two general tracks. Presentations and discussions explored the complex link between technology and teaching, focussing on both established topics and emerging trends like artificial intelligence, augmented and virtual reality, learning analytics, and big data analytics in education. This volume aims to capture the depth and variety of research presented, serving as a valuable resource for academics and professionals interested in the current and future state of education. The contributions reflect the international landscape of online education and provide insights into the ongoing transformations in higher education driven by the combination of teaching methods and technology. This editorial is designed to help readers navigate the different tracks and find research that aligns with their interests, fostering further collaboration within the HELMeTO community. Note that this editorial provides a high-level overview of the main themes covered in the conference tracks rather than a detailed review of each individual paper.

The conference's main tracks are General Track 1 (GT1), focussing on "Online Pedagogy and Learning Methodologies," and General Track 2 (GT2), on "Learning Technologies, Data Analytics, and Educational Big Data Mining." GT1 centres on the strategies and practices for effective teaching and learning in digital environments, exploring how traditional pedagogical approaches can be adapted for online platforms using various digital tools. Meanwhile, GT2 investigates how learning technologies, data analytics, and large-scale data are transforming education by enhancing teaching, learning, and decision-making processes.

Special Track 1, "Rethinking Education: The Opportunities and Challenges of Artificial Intelligence," addresses the profound impact of AI on learning environments. This track promotes a critical dialogue on how AI can be leveraged to revolutionize education through personalized learning, intelligent tutoring systems, and automated feedback. It also tackles essential challenges, from ethical considerations and potential algorithmic bias to data privacy and the changing

role of educators in an AI-powered classroom. Ultimately, this track showcases innovative applications, highlights the need for robust teacher training, and discusses the future of responsible AI implementation to create more equitable and effective educational experiences.

Special Track 2, "Formative Assessment in Higher Education: Conceptual Framework," focuses on the pivotal role of formative assessment in improving student learning. This track fosters academic dialogue on the conceptual and practical dimensions of continuous feedback, exploring its integration with summative strategies and its impact on instructional practices. It highlights how digital tools and learning analytics can enhance these processes across various learning environments, from traditional to hybrid and distance education. The track also considers the diverse cultural and contextual factors that shape effective assessment, offering valuable case studies and best practices from various disciplines.

Special Track 3, "AI-enhanced E-learning for 'Augmented' Mathematics Education at University Level," explores the integration of artificial intelligence into university-level mathematics education. This track examines how AI-based platforms, intelligent tutoring systems, and automated feedback technologies can be combined with traditional teaching methods to create innovative hybrid learning environments. It invites a discussion on the synergies between concrete and digital resources and the design of effective e-learning strategies for mathematics.

Special Track 4, "The Art of Learning Online: Creative Practices in Digital Higher Education" explores how art can be integrated into digital higher education to make online learning more engaging and human-centered. It focuses on using artistic practices, like visual arts, music, creative writing, and performance, not just as content but as pedagogical methods. The goal is to move beyond standardized, technical online education by investigating how aesthetics, storytelling, and improvisation can foster deeper connection, critical thinking, and collaboration. The track welcomes various contributions, from theoretical papers to case studies, examining how art can be a tool for creating inclusive, relational, and participatory online learning environments. It seeks to answer if and how art can generate new and effective pedagogical methodologies for distance education.

Special Track 5, "AI in Higher Education: Empowering Design, Critical Thinking, and Reflective Learning", focuses on integrating AI into higher education to enhance instructional design, critical thinking, and reflective learning. It aims to contribute to the global discourse on using AI to develop effective, inclusive, and adaptable educational practices. The research emphasizes AI's role in fostering metacognitive skills, self-regulation, and learner autonomy. It explores AI in three complementary dimensions: as a design partner for educators, a critical friend that provides constructive feedback to students, and a participant in group work to stimulate critical thinking and comparative analysis. The track

welcomes empirical, theoretical, and review-based contributions on these topics.

Special track 6, “UDL and AI in Higher Education and in Pre Service Teacher Education: strategies, experiences, and perspectives for inclusive innovation” examines the intersection of Universal Design for Learning (UDL) and Artificial Intelligence (AI) to create more inclusive higher education. It focuses on how UDL principles, enhanced by AI, can improve accessibility, participation, and success for all students in digital, distance, and blended learning environments. The track serves as a forum for educators, researchers, and policymakers to share experiences and research on implementing these strategies. A key focus is on pre-service teacher education, exploring how AI can be used to train future educators in inclusive practices. The goal is to foster a university culture that values equity, innovation, and diversity through technology.

Finally, Special Track 7, titled “Human rights-based approach and practices for preventing and countering online hate speech: digital strategies and educational challenges in Higher Education”, explores how higher education can use digital strategies and technologies to prevent and counter online hate speech. It addresses the ethical and practical concerns of using AI and other digital tools, focusing on building inclusive and critically aware learning environments. The aim is to leverage technology and pedagogical approaches, alongside legal and ethical frameworks, to foster digital literacy and civic engagement. The track welcomes contributions on anti-hate strategies, human rights-based education, and the role of online learning and media literacy in combating toxic narratives, encouraging a multidisciplinary approach in cooperation with various stakeholders.

In conclusion, the 7th International Conference on Higher Education Learning Methodologies and Technologies Online underscores the evolving relationship between pedagogy and technology while stressing the value of inter-disciplinary collaboration. With tracks dedicated to themes such as Artificial Intelligence, assessment in higher education, reflective learning, inclusion, and innovative teaching, the conference offers a platform for meaningful exchange. The seven selected special tracks foster exploration of emerging research and practical applications, highlighting how diverse disciplines can converge to shape the future of learning. By engaging with both established and cutting-edge trends, HEL-MeTO 2025 delivers critical insights into the ongoing transformation of higher education.

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General Track 1

Online pedagogy and
learning methodologies

From Planning to Action: The DUE Model as a Resource in Critical Moments

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1 Introduction

Teaching in today's complex post-digital society [1] involves navigating multiple crises and rapid technological, digital, and socio-cultural changes, which often render traditional educational paradigms quickly outdated [2][3]. In this scenario, trainee teachers must develop the ability to handle uncertainty and the unexpected, along with the capacity to manage stress. The unpredictable nature of modern classrooms challenges both rigid, highly structured lesson plans - unable to adapt to emergent situations - and overly flexible ones, which require teachers to plan in detail directly in the situation [4]. To meet these contemporary challenges and support future teachers in managing uncertainty and stress, the Design for the Unexpected in Education (DUE) model [5] was developed and tested within the Master's program in Primary Education at the University of Macerata. While several studies have confirmed the model's effectiveness in helping trainee teachers plan and redesign during action, its potential to help trainees manage the stress and anxiety that often accompany the implementation phase - especially in the presence of unforeseen and destabilizing events - remains under-researched.

Starting from this gap, the research narrated in this paper aims to investigate whether the DUE model is a valid support, both theoretical and operational, for contemporary teachers so that they can identify the unexpected events and moments that are most anxiety-provoking for them and feel supported by the design artifact in dealing with them. From this initial hypothesis, the following research questions were formulated:

1. Can the triangulation between biometric data, personality profile identification, and direct observation of the teaching action help to identify critical moments of stress or teaching regulation?
2. Do the design strategies included in the DUE model support teachers during particularly anxious phases, helping them to manage the emotionality experienced during critical and unexpected moments?

2 Methods

The research was conducted with the voluntary participation of five students attending the third and fourth year of the Master's degree course in Primary Education at the University of Macerata. All five students, at the time of data collection, were engaged in direct internships in the classrooms of some Italian primary schools. Each participant was asked to design and implement a complete teaching session using the DUE model, which the participants were already thoroughly familiar with, having completed the Theories and Methods of Lesson Planning and Evaluation course in the third year of their program. During this course, each trainee had the opportunity to explore theoretical aspects related to the complex society, to experiment with the model under the guidance of the workshop tutors, and to discuss its criticalities and potential with the course lecturers.

The experimentation narrated in this paper focuses on the implementation phase of the lesson, conducted in a real-life context. Before the lesson, each trainee was asked to complete a personality survey questionnaire, the MBTI (Myers-Briggs Type Indicator) test [6], which made it possible to extrapolate some relevant personality traits of future teachers. During the course of their teaching, each trainee was equipped with a Polar OH1 optical heart rate (HR) monitor, a wearable IoT device capable of capturing 60 HR recordings per minute and storing them in CSV format that can be downloaded through the online Polar Flow application [7]. This device was chosen for its accuracy and non-invasiveness, allowing participants to carry out the educational intervention without interruption.

In parallel, a non-participating silent observer was present in the classroom to take structured field notes, focusing on: (1) the occurrence of unexpected events (e.g. student behavior, technical problems, misunderstandings about content); (2) the teachers' responses and regulation strategies; (3) their use of planning materials (both paper and digital) to regain control or adapt the flow of the lesson.

At the end of each session, the observer's notes were correlated with biometric data, interpreted in relation to individual characteristics identified through the MBTI test. This allowed the identification of moments of heightened physiological activation in response to classroom events. For each case, HR data were analyzed alongside evidence of action regulation and potential use of the DUE model's structure, as observed during the management of critical situations. The integration of physiological-quantitative and observational-qualitative data within a mixed-methods framework [8] provided initial insights into how trainee teachers function under classroom stress and whether the DUE model offers effective support for emotional self-regulation during action.

3 Conclusion

The comparative analysis of the five observed cases shows that all the subjects involved faced complex situations and difficult moments during the lesson. The triangulation between qualitative observations, personality profiles, and biometric HR data allowed us to outline how different trainees dealt with unexpected events and stressful moments

in the classroom. The HR curves showed a common tendency for physiological activation coinciding with events such as loss of control of the class, unforeseen technical difficulties, unexpected demands from pupils, or interference from other actors (e.g. tutors, visiting lecturers). However, the use of the design artifact and the intensity, frequency, and duration of the peaks showed significant variations and could be linked to the personality profile to be better understood.

Despite individual differences, all trainees used the DUE model during the implementation phase, though in different ways: as an operational guide for more reflective individuals, as a restraining tool for those inclined to control, or as reassuring support in challenging relational situations. The integration of qualitative observations and biometric data showed that emotional activation peaks often occurred during relational breakdowns, unexpected demands, or external disruptions. This confirms DUE's potential in managing the unexpected, as long as a path of personal awareness supports it. From this perspective, the most significant insights from this experiment concern initial teacher training, which should not only promote structured yet flexible planning models but also foster the development of differentiated emotional self-regulation strategies tailored to individual profiles and needs.

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