

PREFACE

Smart Learning Ecosystems - Technologies, Places, and Human-Centered Design

Learning ecosystems are getting smarter and play a central role in regional development and social innovation. “Smart”, thus, are not simply technology-enhanced learning ecosystems but, rather, learning ecosystems that promote the multidimensional well-being of all players of learning processes (i.e., students, professors, administrative personnel and technicians, territorial stakeholders, and parents) and that contribute to the increase of the social capital of a “region”, also thanks to the mediation of the technologies.

The papers included in this special issue aim to inform the understanding of learning ecosystems and accompanying design for “smartness”, foster the development of policies and action plans and support technological impact. The special issue call welcomed extended papers from the Smart Learning Ecosystems and Regional Development (SLERD) conference held in Aalborg in 2018 as well as new submissions. We received a total of 15 papers for the special issue out of which we selected six, after having passed through a rigorous reviewing procedure.

The special issue starts with the paper “Design recommendations for designing smart and ubiquitous learning environments to be used at outdoor cultural heritage” by Alaa SA Alkhafaji, Sanaz Fallahkhair, and Mihaela Cocea. Along with a theoretical framework for smart and ubiquitous learning environments (FoSLE) the paper presents a series of design recommendations for the context of cultural heritage on three concerns: content provisioning, learning experience design, and interaction with context design. The work was based on a user-centered design approach relying on three field studies and the evaluation of a proof-of-concept application.

In the second paper, entitled "Pass or Fail? Prediction of Students' Exam Outcomes from Self-reported Measures and Study Activities", Bianca Clavio Christensen, Brian Bemman, Hendrik Knoche and Rikke Gade propose a learning ecosystem for identifying at-risk undergraduate students. The study takes place in the context of an introductory programming course in a Problem-Based Learning (PBL) environment. Two data analysis methods were applied: best-subset-regression and lasso regression, which yielded several significant predictors for the final grade. These predictors include midterm exam results, self-assessment quizzes, peer reviewing activities and interactive online exercises. The study findings help to identify strategies for supporting struggling students and reducing dropout rates in PBL environments.

The third paper, “The model of self-organization in digitally enhanced schools” by Eka Jeladze and Kai Pata looks into different types of learning ecosystems that include digital components. Based on data from more than 400 schools in 13 countries the authors developed a holistic model through K-means clustering. The model accounts for differences in how innovative changes were maintained in schools and details four approaches to self-organization A) organizational learning-driven; B) digital infrastructure-centered, C) mediating loop-centered schools, and D) digital teaching strategies-centered.

In the fourth paper, entitled "The chance for sociability. How participation and interaction structures of adolescents with brain injury on an institutional corridor

inform smart learning ecosystems", Antonia Lina Krummheuer, Matthias Rehm, Maja K.L. Lund, Karen N. Nielsen address a less studied side of learning, which is socially situated and interactional. More specifically, the authors focus on young people with brain injury in a rehabilitation and education center and explores how they engage in social interaction. The main corridor of the institution is found to play an important role, as a place which fosters informal and social learning. The findings aim to inform the design of a smart learning ecosystem for adolescents with brain injury.

The fifth paper called "CiudadelaSim Urban Modeling Framework and Human-Centered Design (HCD) Learning based Approaches: A pedestrian mobility case study in Monterrey, Mexico" by Emmanuel Lopez-Neri, Javier Alonso Gomez-Davila and Miriam Carlos-Mancilla used HCD as a learning methodology for architecture and design students. This was coupled with an urban modeling tool to foster student skills and competencies development in team-work, research, social empathy and digital tools. According to focus group data the students deemed this approach successful for such skills and competencies, which are otherwise difficult to obtained in a traditional lecturer-centered learning approach.

In the last paper, entitled "Turning zoos into smart learning ecosystems", Terje Våljataga & Katri Mettis investigate the potential of zoological gardens for environmental education. A SmartZoos service package was developed, aiming to transform the animal parks of the Central Baltic region into smart learning ecosystems. The package supports mobile learning, by integrating location-based interactive adventure games relevant for zoo settings. A study exploring the students' behavioral patterns while interacting with the application was also performed. Results suggest that techno-deterministic learning experiences should be avoided and that more engaging, but at the same time less technology-driven smart services may be needed.

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