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EDITORIAL

Co-creating the future through design-based education in innovation hubs

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With increasing complexity and challenges, innovation practices have been positioned front and center for organizations and societies to thrive for some time now (Kelley, 2001). Unsurprisingly, creativity and innovation have become prominent in higher education curricula. Applying a design paradigm has been frequently used to build innovative and creative skills in graduates across different discipline domains. After all, rather than attempting to analyze an existing situation, or predict an uncertain future, design focuses on creating a preferred future (Joore et al, 2022; Simon, 1969). The design perspective has been increasingly disseminated in higher education among various disciplines. In engineering education, for instance, design capstone courses have become widely adopted (e.g., Howe and Goldberg, 2019; Howe et al., 2017; Ward, 2013) and design cornerstone courses have been created even for first-year engineering students (Dym et al., 2005) to anticipate and increase the design innovation focus in engineering curricula.

However, the design approach certainly isn't limited to the engineering disciplines, as Herbert Simon (1969) observed, 'Engineers are not the only professional designers. Everyone designs who devises courses of action aimed at changing existing situations into preferred ones. The intellectual activity that produces material artifacts is no different fundamentally from the one that prescribes remedies for a sick patient or the one that devises a new sales plan for a company or a social welfare for a state. Design, so construed, is the core of all professional training: it is the principal mark that distinguishes the professions from the sciences. Schools of engineering, as well as schools of architecture, business, education, law, and medicine, are all centrally concerned with the process of design.' Echoing this observation, some universities now apply the design paradigm to all of their studies, introducing a design-based education approach as an alternative for problem-based learning or challenge-based learning (Assen et al., 2021; Geitz and De Geus, 2019).

Besides the design approach, another element that is important to increase innovation in organizations and society involves multidisciplinary and cross-sectoral cooperation. To truly develop the Neue Kombinationen that Schumpeter (1934) refers to, it is essential to bridge the borders between different disciplines. This has been reflected in higher education. For example, in Finland, Aalto University was established in 2010, creating a new innovative university merging science and technology, design and art, and business and economics. As a frontrunner of this new collaborative approach, the first Design Factory was created in 2008 to act as an integrative, multidisciplinary platform for design and experimentation.

A hub for co-creation, the Design Factory envisioned and prototyped what the upcoming university merger of Aalto University could look like, bringing together different disciplines and stakeholders. Championing change, and thus co-creating the future, has been at the heart of the Design Factory mission since the start (Björklund et al., 2019). Offering vision, space, and courses focused on building capabilities to collaborate and innovate, Aalto Design Factory started sharing its reference model with other universities and supporting the establishment of other Design Factories worldwide. At the time of publication, the Design Factory Global Network (DFGN) includes 37 co-creation platforms in 25 countries across the world. The participating members range from research and applied science universities to research institutions and infrastructure.

Instead of following a rigid set of rules, the Design Factory reference model is flexible to be adapted to various particularities of each institution, while keeping the goal of acting as a change agent in supporting innovation and education in the local ecosystem (Björklund et al., 2019). As the number of Design Factories started increasing worldwide, these different adaptations of the principles essentially act as Petri dishes for supporting design-based innovation in different contexts. Sharing and learning from these experiences has become a crucial resource to develop DFGN operations further. One avenue where this takes place is a yearly meeting between the partners of the Design Factory Global Network. In order to broaden the discussion beyond current Design Factories, as well as extend considerations from teaching and management to research, this year the first Design Factory Global Network Research Conference (DFGN.R) was piloted.

In October 2022, 68 participants from 11 countries presented 22 studies at the first DFGN.R that took place at NHL Stenden University of Applied Sciences in Leeuwarden, The Netherlands.

This special issue presents five selected papers that were first discussed at the DFGN.R 2022. Revised and extended based on further reviewer and editorial feedback, the five studies approach innovation and education from complementary perspectives and methods. Most of the studies have been conducted at one of the Design Factory hubs, showcasing the range of collaborative activities that happen in these hubs to increase innovation capabilities. Across these five studies, we note an emphasis on the diverse collaboration needed to create the future - indeed, the Design Factory Global Network has been built around the premise that co-creation across disciplines will lead to better results than siloed, individual efforts.

Tan et al. (2022) from Design Factory Melbourne, Australia, explore how joint goal setting can help research to contribute to hub goals. In their study, they examine how the staff of co-creation hubs can negotiate what teams should prioritize, finding that a research team disregarded, reduced, accumulated, multiplied, and operationalized goals rather than simply collating individual ones to set a joint agenda. They share a sailboat workshop model that can be used by teams to examine challenges and enablers for reaching such valued goals.

Figueiredo et al. (2022) examine the skills students perceive gaining in a master's (graduate) level interdisciplinary project-based course in Finland. Students in the studied course work in multidisciplinary project teams, and report communicating with team members from different backgrounds as the most frequently acquired critical skill for their success. Results such as these provide further support for the relevance of project-based courses in building collaborative innovation capabilities.

Feng and Björklund (2022) dive into collaboration perspectives of faculty and students in a Nordic mechanical engineering program. They examine the starting point for education from the perspective of what kinds of gaps exist between students and faculty in the types of collaboration they see as relevant. As faculty perceive a broader scope in collaboration needs, both in terms of the range of collaborators and the depth to which they are integrated in the process, the results highlight the need for higher education to explicate the benefits of diverse collaboration to promote innovation.

Deo and Malge (2022) examine factors contributing to the innovativeness of student deliverables in a bachelor-level course in India. When examining students' creativity outcomes in relation to their perception of curiosity, diligence, and perseverance, they find that curiosity has the strongest relation to creative outcomes. The authors argue that understanding the relationships between curiosity, diligence, perseverance, and creativity is relevant to education practices aimed at fostering innovation.

Finally, Iandoli and James (2022) from the Design Factory in New York aim to contribute to the debate on the role of making in entrepreneurial problem-solving, by developing and testing a learning exercise using cooking as a metaphor for design-driven innovation, inspired by Sarasvathy's (2001) effectuation theory. They propose a pedagogic framework to model design-driven discovery in an effectuation setting and present an experiential learning exercise that is grounded on effectuation theory, design-driven entrepreneurship, and pedagogic approaches relying on an intensive use of co-creation and prototyping.

Taken together, these five papers from three different continents give a glimpse into the activities taking place in the various Design Factories around the world. The special issue explores how new approaches to innovation and creativity in Higher Education can take place, through applying effectuation theory and social learning theory, featuring metaphors such as cooking and sailing to inspire co-creation in action. Further, it provides practical insights into building communication and curiosity related skills in creative-problem solving, and highlights the need to explicate the value of collaboration across disciplines when educating future innovators. Innovation and creative practices align with many anticipated future work skills across disciplines including problem-solving, self-management and working with people. These skills are imperative for graduates to continually adapt their professional selves to the changing needs of industries and society, brought about by digital disruption (World Economic Forum, 2020). We encourage educators, researchers, students, and organizations active in Design Factory's and similar co-creation platforms, to continue experimenting with the design paradigm, by exploring approaches and skills towards innovation and creativity that are imperative to champion change.

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