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Editorial 27.1

Back to the future

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Welcome to the first issue of the journal for 2022. Looking back to a year ago, to the first DATE editorial of 2021, we hoped that we were entering the final chapter of the pandemic, and were speculating about how things might change and what future design education research may focus on. Now it appears that rather than conquering the pandemic we are being advised to 'learn to live with Covid' and work around it as best we can, using our own judgement and personal responsibility. Those hoping for an official roadmap out of the pandemic, or looking for roads to recovery back to those pre-pandemic times of 2020 may be disappointed. External stakeholders suggest that education, in particularly HE, requires a radical rethink, with many universities worldwide beginning to adopt a "future-back" approach to ensure future growth according to the Ernest and Young 2022 report *Are universities of the past still the future?* (https://www.ey.com/en_sy/education/are-universities-of-the-past-still-the-future). As our special issue 26.4 from December 2021 clearly demonstrated, the design education community will continue to study the effects of the previous two years on our practice and propose new ways of working, learning and teaching, and look to the future with cautious optimism. To paraphrase everyone's favourite Hollywood physicist Emmett Lathrop "Doc" Brown, PhD, "*Roads? Where we're going we don't need roads".*

Anyway, back to the future, or rather to the contents of this current issue, which includes eight research articles and a book review. The first seven research articles report directly on research in design and technology learning and teaching activities around the world, in areas such as collaboration, communication, equitable learning, core skills, digital/traditional mediums, and audio feedback with the final research article looking at developing new curricula, in this case focusing on sustainability, within institutional frameworks.

The first research article focuses on the way that designers and design students collaborate and communicate in design processes. In *Creating new 3D forms in collaborative product design***,** Weishu Yang from University of Helsinki, Finland & Yunnan University of Finance and Economics, Kunming, China, and Henna Lahti and Pirita Seitamaa-Hakkarainen from University of Helsinki, Finland present research from an exploratory case study on students from three design disciplines (interior design, product design, and graphic design) engaging in a re-design workshop developing 3D product forms. The paper seeks a clearer understanding of the role of co-evolution in student design teams made up of different disciplines, and how a mix of domain-specific skills can help to frame the problem and drive the co-design of a solution. Following a workshop on Rapid Modelling Techniques a structured design brief was given and the student responses and design activities were observed, with flow charts created to log the processes. The duration and distribution of activities varied between the groups with considerable differences in emphasis on design stages across the disciplines. While all of the

groups produced a workable design that met requirements, the processes they used to get to their endpoints were quite unique. Some focused more on their previous user-centred design domain-specific knowledge, while others concentrated more on the visual aspects of the form or the overall functionality of the model. While the authors state that there is a need for future studies to deepen the analysis of problem-solving co-evolution between different design fields and professional experiences, it is clear that the students involved in the workshop gained a great deal from their cross-disciplinary experiences of product co-design and co-evolution.

A second **case** study from Finland exploring collaboratory design processes is presented by Noora Bosch, Tellervo Härkki, and Pirita Seitamaa-Hakkarainen (University of Helsinki). In *Design Empathy in Students' Participatory Design Processes* they present research conducted with 14-15 year old students to explore how design empathy manifested in their design processes. Their brief '*co-design and make an e-textile product for kindergarteners according to their wishes and needs*' was used to explore the end user related considerations of the students and signs and dimensions of empathy. The authors explore how design students can develop a more participatory and collaborative design process in order to make more meaningful design solutions, and they suggest that there is little research in this area at primary and secondary education levels. Through a textile-based brief the secondary level students took the role of participatory designers in front of the pre-schoolers, with the teachers and the kindergarteners being considered end users. 12 sessions were used to develop the design process following the Double Diamond model, and the design outputs are analysed in terms of product-centric and human-oriented considerations and mapped against a design empathy framework. While it is evident that the students could show empathic design skills in their work, and the interaction with the end users has certainly helped to engage and motivate them, there are still difficulties with defining what empathy is and how it can be identified and developed. Clearly there are many opportunities for further work in this area of participatory design at primary and secondary level, and the authors suggest that community based participatory projects such as this may be particularly relevant for improving girls' motivation and engagement in wider design technology and STEAM activities.

A further article exploring gender and equitable learning comes from Dhriti Dhaundiyal from Doon University, India and Shruti Dhaundiyal from Cambridge University, UK. In *Gendered Pathways in Design Education: Findings from a Public University in India*, they present research on how the emergence of 'industrial' and 'communication' domains in design, or 'hard and soft design' has contributed to the creation of gendered educational pathways in Indian design education. Through an analysis of Indian design education and it's recent growth in scale, and the creation of categories of exclusion noted by other researchers the authors note that there remains the perception that technology education is a male domain. The reasons for lower female enrolment and technical design gender bias however are more complex, with the authors drawing from 5 years of data and finding evidence of links with social class, income and geographic location and choice of educational pathway. They also found gender bias in the design briefs used in programmes but also in societal conventions and curricular expenditure. While the work is focused in one city in North India the authors suggest that there may be benefits from extending this work to other regions, and there is plenty of food for thought for

those of us interested in studying gendered pathways in design education. The suggestion that exposing students to 'hard' design subjects, with their more technical and systemic terms and their greater focus on technology, at an early foundational stage of their learning may help to lessen gendered pathways in design education is of particular relevance to those engaged in primary and secondary education. This 'hard' and 'soft' design dichotomy is global, with women under-represented in 'hard' design areas such as product, automotive and furniture design and over-represented in 'soft' design areas such as fashion, jewellery, graphic and service design.

The fourth research article is *Landing your first job in Creative Technologies: Soft skills as Core skills* by Ricardo Sosa, Rajiv Rajusha and Amabel Hunting from Aukland University of Technology, Aotearoa New Zealand. It explores the demand for employability skills and the need for greater student-industry understanding and relations through ongoing dialogue between industry and academia. The authors note that Industry 4.0 will require a transdisciplinary skillset to prepare graduates for jobs that don't currently exist, and this research stems from a desire to develop these skills in design students and graduates with the support of relevant external stakeholders. It is evident that the types of roles and size and structure of companies play a key role in the development of a transdisciplinary skillset, with a smaller startup company perhaps providing more opportunities in this regard, offset perhaps by a lack of mentoring opportunities. Upskilling in employability skills is a key benefit identified from internships or company placements, with some discussion on how students can be encouraged to develop the set of core skills necessary to make the most of these opportunites. Reframing 'soft' skills as 'core' or 'industry' skills, and utilising and integrating more employability input from industry are two of the key takeaways. The authors note that ongoing disruption to the creative industries in New Zealand, and the related moves towards more isolated working and automation of creative tasks, will require a more longitudinal view of this area, but there are many useful insights into how academia can further engage further with the creative industries here.

An Exploration of the cognitive processes of design teams to inform design education and practice by Louise Kiernan, Ann Ledwith, and Raymond Lynch from University of Limerick, Ireland aims to map and understand the cognitive processes employed during multidisciplinary team interactions. While much emphasis is traditionally placed on the role of creativity in design thinking, the authors suggest that other cognitive modes such as knowledge processing, critical thinking, and metacognition are engaged in more frequently in creative design teams. They point out that while creative collaboration is key to design studies, there is no agreed approach to how interdisciplinary teamwork should be implemented, either in or out of a studio environment. Through the development of 4 case studies the cognitive processes of a range of participants are analysed and mapped across the design process, showing the variation in knowledge process distribution across the design phases. Findings show that creative thinking only accounts for 7% of overall cognitive activity in the design process, suggesting that more focus could be placed on the other aspects of design thinking among educators. The authors make recommendations for those leading student design teams, especially around promoting focus through careful facilitation of the team interactions, and through development of productive dialogue with tutors matching the thinking processes to the project phase to reinforce and scaffold the

resulting creative conversations. This may help to move focus from the final project output to the design process, helping to promote a greater emphasis on a team's creative journey.

The research article from Luis Alfonso Mejia-Puig, University of Florida, USA, Hugo Dario Arango, Universidad Icesi, Columbia, and Tilanka Chandrasekera Oklahoma State University, USA, *Perception over the use of traditional and digital mediums within the design process: A questionnaire study on design students* explores student's perceptions of traditional (non-digital) and digital mediums in the design process in Latin America and North America. A questionnaire was used to collect data from second year design undergraduates in order to better understand their preferences in design mediums at different stages of the design process. While traditional techniques such as sketching and low fidelity models are used in the early stages, digital tools typically take over in the later stages of the design process, but new digital tools are now allowing a purely digital design process, although there are benefits and challenges associated with both. While there are clearly benefits from mixing traditional and digital methods, the students demonstrate clear preferences for digital methods even when they can be less intuitive as they are more time efficient and can give increased group interaction, especially when delivering in a blended learning environment. The future directions suggested by the authors raises the issue of engaging and maintaining student interest and satisfying their needs, and this is certainly a key driver for the move to a more digital design curriculum, but it is clear that current digital tools are often not as intuitive, immediate or engaging as the traditional methods that they are rapidly replacing.

Our seventh article *Audio feedback in distance design education* by Derek Jones and Clive Hilton from The Open University, UK, discusses the use of a blended feedback model using a mix of audio and summary text in place of the usual written-only feedback in a distance design education setting. The motivation behind the study was a concern that students were neither attending to feedback or acting upon it, a particular issue with distance learning when there may be less personal connection between tutor and student. The greater emotional connection with audio feedback is discussed, along with the timing and quality of the feedback itself. While the students clearly gained a great deal from both written and blended feedback, the audio feedback seemed better suited to critical design feedback, with students feeling that it was more direct, honest and personal. One of the key issues was that of motivation, with a tutor enthusiasm being more evident in the audio rather than written form. A blended approach was found to be the preferred option, with a critical but supportive balance helping to replicate the student experience hopefully found in a well-run traditional studio-based critique, but with the added benefit of being recorded in a summary written as well as audio form for later actioning and feed forward.

The final research article in this issue shifts our focus back to the DATE 26.3 E&PDE Special Issue from late last year with an article that first appeared in abridged form in the Engineering and Product Design Education (E&PDE) conference, 2020. *Exploratory study on the role of institutional frameworks on engineering curricula evolution: A case study on transition towards sustainability* by Lou Grimal, Jules Baudry, Pelgrim Charraud, Rémi Céret, Nadège Troussier from Université de Technologie de Troyes, France, explores the challenges of

developing new courses within an existing institutional framework, especially those dealing with rapidly changing phenomena such as socio-ecological issues, in a French higher education context. While the authors acknowledge that the integration of sustainability into engineering studies is not new, they suggest that a better approach would be to move from a more material and environment focused approach to a more multi-dimensional systems level model. Through a one day student-led workshop the authors show how many participants had difficulty in positioning themselves and their work within the French national accreditation process for engineering curricula, and that the framework was too rigid to allow them to fully explore their sustainability agendas. Although the number of participants was low, the article raises many relevant issues with regard to the implementation of systems level thinking in curricula, in particular the complexity of the issues and the discipline specific language and framing of many of the issues. It also raises the issue of whether rigid internal or external frameworks for accreditation of education programmes stifle innovation within individual courses and modules, and whether they constrain new ways of thinking and dealing with the emerging socio-economic and environmental challenges of the future.

Finally, in addition to the research articles, we have a book review from Ritesh Khunyakari from the Tata Institute of Social Sciences, Hyderabad, India of the recently published *Design-Based Concept Learning in Science and Technology Education* edited by Ineke Henze & Marc J de Vries, published by Brill and part of the *International Technology Education Studies* series.