Editorial
Special circumstances, Special issues.

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This current issue of Design and Technology Education: An International Journal arrives as, globally, we continue to live with a pandemic that has certainly inflicted special circumstances on education. From early years education to studying for a doctorate, things have been different, challenging, frustrating. At times there have been surprises, innovations, insights, new ways of working. Capturing experiences, both negative and positive entered our thoughts as editors. Taking note, of what emerged through the special circumstances of educating during a pandemic seemed important. So when we were approached in the initial era of 'lockdowns' to have a special issue providing research insights from learning and teaching in the pandemic, we were happy to say yes. A different special issue was also being prepared at that time – a 'special' being created with articles developed from the Engineering and Product Design Education (E&PDE) conference, 2020. Alongside both, regular articles were being submitted to the journal in the standard fashion. As these three separate strands progressed a zeitgeist situation began to emerge. A call for articles for the special issue commissioned to focus on the pandemic, being guest edited by Derek Jones and Nicole Lotz from the Open University (UK) drew far more interest than imagined and is now in the final stages of being prepared for publication as a stand-alone issue of the journal (Volume 26.4), due to be published next month. The E&PDE conference of 2020, like many other conferences, became a virtual conference, as was the 2021 conference – special circumstances. Despite special circumstances, the E&PDE Special Issue, guest edited by Ross Brisco (University of Strathclyde, UK) and Anne Louise Bang (VIA University College, Denmark) is published as Part Two of this current issue. Meanwhile, the 'regular' articles have been prepared and, zeitgeist being in the air, three of these articles also report on research carried out during the pandemic. So, special circumstances have spawned special issues, capturing special insights, innovations and developments that will inevitably impact on the future of design and technology education. But now to Part One of this issue.

In *Teachers' perceptions of social support in the co-planning of multidisciplinary technology education,* Hanna Emilia Aarnio and Maria Clavert from Aalto University, Finland along with Kaiju Kangas and Auli Toom from the University of Helsinki, Finland explain that in Finland technology education is multidisciplinary but that pre-service teacher education does not fully prepare new teachers for this. There is previous research on multidisciplinary team teaching but the authors focus specifically on their research that explores the social support that can be involved in co-planning multidisciplinary technology education. Through interviews with experienced teachers from across all levels of school education who were involved in a pilot in-service course on multidisciplinary technology education, the value of instrumental, emotional and informational support were identified. It emerged that instrumental support introducing new ideas, tools and methods were valued and of particular importance was a perceived need for social support in joint decision making. The authors highlighted a need for more support for pedagogical leadership to move forward with multidisciplinary technology education. While

there is value for all teachers in insights provided into co-planning and teaching this article will be of additional interest to those introducing or currently teaching in STEM or STEAM teams.

In *Industry 4.0 Competencies as the Core of Online Engineering Laboratories*, Emmanuel Garcia-Moran, Donovan Esqueda, Jose De Jesus Solis-Cordova, Luis Villagomez and Hector Morano from the Tecnológico de Monterrey, México and Rafael Ramirez from Tenneco – Federal-Mogul, México, focus on the increased use of online laboratories in engineering education, particularly highlighted as a result of the Covid-19 pandemic. While identifying that learning techniques such as Problem-Based Learning, Project-Orientated Learning and Research-Based Learning are used online, they highlight a lack of focus on Industry 4.0 competencies. Their article focuses on a pedagogical approach wherein Industry 4.0 competencies are introduced in a way that complements existing learning techniques. The article provides insight into the impact of a series of courses developed and introduced with undergraduate students during 2020. The article presents research on students' self-efficacy, highlighted by the team as being of importance in the context of introducing Industry 4.0 competencies in an online learning situation. There were two major focuses – the students' physiological states (particularly given the situation of the pandemic) and their mastery experiences. Through an exit-survey with 300 students three indicators were measured: students' perceived usefulness, perceived ease of use and perceived efficacy. The article reports on both positive reactions such as how quickly students adapted to the online setting and an importance of remote laboratories and specialised software and also the challenges, both pedagogical and practical. Given the shifts towards more online learning not just in engineering education but also generally in design and technology education, this article provides valuable insight into ways of making pedagogical shifts and impacts on students along with further understanding on student self-efficacy.

The following three articles provide insights into aspects of designing and design processes.

Catarina Lelis from the University of Aveiro, Portugal presents and article that focuses on students' final projects. In *The Impact Plan: anticipating the impact of university students' final projects*, she highlights the significance and potential struggle of students choosing a topic for their final project as they consider its potential value and impact. Her article presents a tool that is specifically designed to assist students as they manage decision making influenced by the potential impact of the project alongside their own personal interests, career ambitions and how they can contribute to a better world. he reports on the use of the developed tool, *The Impact Plan*, with students on a postgraduate programme. Focusing on the principles of 'Why' and 'Value', a prototype was developed, made up of a canvas for students to map notions of value and a deck of cards focusing on different categories of impact. The tool was implemented in 2020 during a period of 'lockdown in the pandemic with 25 students working in small teams, supported by former graduates acting as mentors. The tool enabled students to identify possible projects and then score them against likely impacts. The structure helped remove anxiety from students making decisions about final projects. Whilst the study was small scale, involving 25 students, insights gained were on the value of the tool from both student and lecturer perspective and also on aspects related to student groupwork during a pandemic. It also highlighted possible future development of the tool, particularly its value in group work. Despite being undertaken with postgraduate students, the tool will be of interest at any level of education as a way of supporting design thinking when making choices about project work.

The next article also focuses on the early, conceptual stages of design. In *Inquiry-based learning approach for a systematically structured conceptual design process: Design project for disabled people*, Güçlü Yavuzkan and Figen Beyhan from Gazi University, Turkey and Özden Sevgül from Siirt University, Turkey, present a further small-scale study, also undertaken online during the pandemic. In this project the topic of 'Design for the Disabled' was chosen as a social design project that provided a context for exploring the 'fuzzy front end' of a project. As with Leilis's article, the challenge of this early decision making stage for students was noted. The article reports on a toolkit that focuses on conceptual design, Inquiry Based Learning and developing critical thinking skills in which students are guided through analytic, creative and visualisation stages. Examples of projects illustrate how different students progressed through these phases and an analysis of post-project student questionnaires provides insight into how the students rated their experience of developing critical thinking, professional skills, systematic thinking and personal development. In all aspects the ratings of the students suggested that the approach was more effective than previous less structured approaches. The lecturers' assessments were also generally favourable. The authors suggest that a large scale study is needed, but this small study has indicated the value of the approach. For readers, this article has the value of an in-depth account of different dimensions and interpretations of design processes. Also examples presented through case studies of student projects illustrate the impact of the authors' particular focus on a conceptual design process at the 'fuzzy front end' of a project.

A third article focuses on design process in the context of architecture education. In *An Experimental Framework for Designing a Parametric Design Course* Asli Agirbas from Ozyegin University, Turkey highlights the impact that computer-aided design (CAD) programmes are having on architectural knowledge and form and on design thinking and design process. Noting that architecture programmes vary considerably, he outlines the development of a framework that can be used to design parametric courses in different circumstances. The framework categorises university profile, course profile and student profile and then evaluates an architecture department in three categories: 'open to new design approaches', 'supportive of CAD' and 'reject new design approaches'. A case study using this framework is presented, providing detail of curriculum, choice of CAD programmes and approach, existing student design experience, parametric design tools to be used and so on. Student work is then used to exemplify the approach in practice. The author uses the student work to illustrate how the framework supported students' in building on existing knowledge and experience and moving forward their architectural design knowledge and skills. Acknowledgement is given to the need for a further independent study to fully evaluate the approach, but even at this initial stage the article provides valuable, concrete approaches to introducing CAD in a way that could help a department evolve its curriculum in a supportive and developmental fashion.

The next article shifts attention to a completely different focus – the impact that education policy can have on areas of design and technology curriculum. In *A-Level Food: The gap that remains: A research project on the impact of removing post 16 A-Level examinations for Home Economics and Food Technology in schools in England in 2016,* Louise Davies, Founder: Food Teacher's Centre UK and affiliated with St Angela's College, National University of Ireland, examines what happens at the school level when a curriculum change at a national level is dictated. The article focuses on the removal of a national curriculum and assessment route in post-16 education - Home Economics A-Level (Advanced Level). This broke the chain between a school subject and higher education programmes and career pathways. The research focuses

on teachers' experiences from 2016-2020 and impact on the progression pathways to further study and employment opportunities. Interview participants identified from a large scale study on the topic completed a short, open ended questionnaire and engaged in a semi-structured interview. The article reports the teachers' experience of reductions in numbers on food related courses post-16 and the narrowing of the curriculum and the identification of a need to re-instate an A level in food technology to re-create a progression pathway. The article is a sharp reminder of the impact that policy changes can have on curriculum.

The final article provides insight into an aspect of design and technology education that has seen limited attention – that of the potential impact of different generations of educators on learning and teaching. In *Industrial Design Education: A Research on Generation Theories and Change in Turkey* Çisem Ercömert and Serkan Güneş from Gazi University, Turkey provide fascinating insight into the extent to which educators from different generations differ in their approaches. The authors draw on generational theories identifying five categories of generation, based on exposure to historical and cultural events, shared experiences, similar attitudes etc: the Silent Generation (born 1925-1945), Baby Boomers (born 1946-1964), Generation X (born 1965-1980), Generation Y (born 1981-2000) and Generation Z (born since 2001). The research is focused on changing dynamics in design education in Turkey and was undertaken through in-depth interviews with lecturers from different generations working in a Turkish university industrial design department. Interviews were conducted with 24 participants drawn from across generational groups. They explored educational approaches such as learning environments, technology impact, curriculum and teaching methods; studio lessons such as project topics, critique process, design process and studio culture; and relations between student and lecturer. Generational differences within these areas make interesting reading. No plot stealers, but the largest difference occurs in relation to technology. A key reflection by the authors was the importance of structures within education that are open and support change.

Finally, this issue of the journal contains two reviews of recent books.

The first*, Teacher as Designer: Design thinking for educational change* (edited by David Scott and Jennifer Lock, Springer 2021) brings together a wide collection of chapters in three sections that focus on differing perspectives on educational design, key actors within educational design and new possibilities for design in education. Reviewed by Alison Hardy, a higher education design and technology educator (Nottingham Trent University, UK), and Daniela Schillaci Rowland, a secondary school design and technology teacher (Presdales School, UK), chapters are outlined and evaluated in terms of potential interests at school and university level. The review indicates that the book has much to offer design and technology educators at all levels.

The second book review is of *Food Education and Food Technology in School Curricula International Perspectives* (edited by Marion Rutland and Angela Turner, Springer 2020), reviewed by Julie Messenger (Independent Consultant, UK). The collection provides fascinating insight into food education and food technology from across international settings. Structured by three sections, chapters relate to food teaching in schools in different cultures, the professional identity of food teachers, and current content and contemporary issues. The detail and breadth of food education provided across these chapters provides valuable background and 'food for thought' in relation to the earlier article in this issue by Louise Davies.