Design and Technology Education: An International Journal
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Editorial
From *flygskam* to *Zoomskam*

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Welcome to issue 25.3 of the DATE journal. The final production and editorial writing of this issue coincides with the end of British Summer Time (BST) here in the UK, and as such it gives us a good excuse to pause and reflect on the last six months since BST began at the end of March. Dealing with change, embracing possibilities and working with ambiguity are things that instil in all of our learners, so we should be good at this too, right? At this September's Engineering and Product Design Education Conference (E&PDE2020), virtually held by VIA Design, VIA University College, Herning, Denmark, it was both exciting and reassuring to see the variety and ingenuity that has been applied by learners and teachers in order to overcome barriers, both real and perceived, to the delivery and participation of educational activities. Many of the papers had been written before or at the early stage of national lockdowns and the 100 or so presentations were delivered remotely across more than 10 time zones, and it was fascinating to see authors reflecting on how their recent experiences had helped to shape their practice. The overwhelming feeling at the conference summary at the end of the second day was one of positivity, optimism, of looking forward with confidence, although we did all miss the conference meal. The lack of social interaction and meetings friends and colleagues in person was partly made up for by the lack of flight shame – *flygskam* – that so often accompanies an overseas conference visit. Perhaps one day we'll all develop Zoom or Skype shame? Whatever our feelings towards the technology, after two very full days in front of a computer screen it's fair to say that we all very much look forward to hopefully visiting Herning in person early next September for E&PDE2021.

Many of the E&PDE delegates suggested how we should and could develop the 21st century learning skills of critical thinking, creativity, collaboration and communication with a generic life skill of confidence or resilience, the ability to embrace change through flexibility, initiative and social skills. Having educational establishments with "invisible walls" is a long held aspiration for many and it may be that the events of this summer with hasten the positive moves towards removing barriers to educational opportunities and level the playing field for many. It was encouraging that in September the UK Engineering Council announced it's 2020 edition of the Accreditation of Higher Education Programmes (AHEP4) document https://www.engc.org.uk/standards-guidance/standards/accreditation-of-higher-education-programmes-ahep/fourth-edition-to-be-implemented-by-31-december-2021/ and while there are many significant changes, the two new learning outcomes are significant. Firstly, graduates of accredited engineering or product design programmes need to consider the security implications of their practice, particularly around information and cyber security. Secondly, graduates must consider the importance of equality, diversity and inclusion (EDI), their personal responsibilities in this regard, and the benefits to individuals, employers and society more broadly. As these changes have to be implemented before the end of 2021 this welcome change should encourage and support new EDI initiatives over the coming year. Author

diversity, or a lack of it, is discussed further in the second book review in this issue by Liam Anderson and Alison Hardy.

Before we turn to the articles in this issue, we would like to pay tribute to Professor Jacques Ginestie of Aix-Marseille University, who sadly passed away in September. Jacques was Director of Ecole Superieure du Professorat et de l ' Education at AMU and one of the leading teachers, academics and researchers, nationally and internationally, of Technology Education. He committed his professional working life to increasing understanding of learning and teaching in science, technology and design in schools and in vocational education and was one of the most respected academics in our field. Kay had the pleasure of visiting him and his group of research students in Marseille on several occasions, presenting and sharing research with them and having the privilege to examine two excellent Doctorate theses of his students. A gentle, generous and kind man, full of French 'bonhomie', always welcoming with a smile, his quiet contributions to discussions with international colleagues always bringing understanding and insight, provoking reflection and thought, even when he might be explaining that to really understand the French philosophers, we must read their words in French! His contribution has been tremendous. He will be very much missed.

And now to this new issue of the journal, its 6 research articles, and 2 book reviews.

The first article is actually part of the primary special collection that was published in Issue 25.2 in June 2020 and that, for unavoidable reasons, was not able to be published in June. We are delighted that we can now publish it and it complements very much the collection of articles focusing on earlier stages of design and technology education. Remke Klapwijk and Niels van den Burg (Delft University of Technology, The Netherlands) present a case study research article *Involving students in sharing and clarifying learning intentions related to 21st century skills in primary design and technology education*. The case study is drawn from their research and development work on formative assessment of design skills: *Make Design Learning Visible*. The project aligns design skills with 21st Century skills and in this case study the focus is on their skill of "think in all directions" – divergent thinking. In a highly detailed study of a teacher working with 11 and 12 year old, the article provides insight into how the teacher used an interactive approach of brainstorming, interlaced with visualizing divergent thinking through making drawings and collective formative reflection, whilst designing. The case study provides valuable insight into the teacher's pedagogic approach and the thoughtfulness and critique this generated in the young learners.

The following five research articles come from different national contexts and phases of education that spread from primary education to postgraduate. Despite these differences the articles have several interesting recurring threads that run through: the importance of creativity, making and materiality, and especially the role of hands on experience in shaping our practice. Taken together they provide a fascinating example of what can be learnt through design and technology education at any educational phase.

In *Development of teacher education students' pedagogical content knowledge (PCK) through reflection and a learning-by-doing approach in craft and technology education* Sonja Niiranen (Tampere University, Finland), Pasi Ikonen, Timo Rissanen and Aki Rasinen (University of Jyväskylä, Finland) highlight the importance of learning by doing and making in Finnish craft and

technology education. The paper describes a study of teacher education students at University of Jyväskylä and their development of pedagogical content knowledge (PCK) through reflective and hands-on problem-solving sessions. Using a reflective questionnaire to further understand the outcomes of the 10 compulsory practical sessions in the syllabus, the authors found a collaborative approach to problem-based learning that in turn facilitates improved knowledge transfer, thinking and designing skills. In conclusion, the study suggests that this type of structured hands-on learning activity encourages teacher and peer interaction and in turn helps teacher education students develop their core PCK in craft and technology education.

In *A Toolkit for Practice-Based Learning of Mechanisms in Industrial Design Education: An Application of a Method Combining Deductive and Inductive Learning*, H. Güçlü Yavuzcan (Gazi University, Turkey) and Barış Gür (Venn Design Ltd, Turkey) explore how students on practice based courses develop their mechanical design skills by using a combination of deductive and inductive approaches. The authors discuss the controversies surrounding the perceived lack of industry ready industrial design graduates with the relevant mechanical engineering skills that employers require, which may be due to a misunderstanding of the core competencies of industrial designers, a subject still mainly taught as a crafts-based discipline. Through a focus on the industrial department at Gazi University, a toolkit has been developed to explore ways that design students can develop and apply their engineering knowledge in a more compelling way by combining a semi-deductive pre-assignment with a semi-inductive assignment. It is hoped that this toolkit will increase the efficacy of the delivery of technical theory and provide a controlled transition to experiential learning. The findings suggest that there has been considerable success in the application of the toolkit and it has allowed and encouraged a smoother transition from theoretical to experiential approaches.

In *Tracing back materialized ideas to embodied and verbal dialogues: Analyzing documents and videofootage of crafts and design lessons*, Verena Huber Nievergelt (Pädagogische Hochschule Bern, Switzerland) discusses the use of video and document analysis of ideation sessions for 9-10 year old primary age school children. Analysing how children interact with materials and their use of verbal and visual signals while engaged with a practical class, the author shows the results of the activity and characterises the design ideas. The use of video allows an analysis of the time spend on each stage and the effect of teacher interaction on these design phases. The research has culminated in the development of an e-portal for teacher education which although complex and challenging to create, could be a very useful resource for others working in primary level design and technology education.

In *Necessity of using Problem Based Learning (PBL) and Structural Physical Models on an Educating Structural Course: Case Study of a Structural Systems Course, Master Degree Architecture Students*, Ladan Vojdanzade and Katayoun Taghizade (University of Tehran, Iran) explore the problems arising from teaching structure and structural behaviour to architecture students. By using Problem Based Learning (BLM) and physical models and changing from theoretical to workshop and applied practical classes where behaviour can be learned without the reliance on complex theoretical mathematics. This approach, while requiring collaborative group work, also encourages reflection and an active learning role. This is seen as particularly important in architecture with it's reliance on the CPD continuous learning model for professional accreditation. In conclusion the authors suggest that making physical models and full size structures to study the fundamentals of structural behaviour is a more effective

solution to understanding the consequences of design decisions than previous course which relied on complex mathematical analysis. The hand-on approach also developed team working, collaboration and communication skills, and an active approach to their learning.

In *The Role of Spatial Ability on Architecture Education*, Saliha Türkmenoğlu Berkan, Saniye Karaman Öztaş, Fatma İlknur Kara and Ayşegül Engin Vardar (Gebze Technical University, Turkey) discuss the importance of spatial ability for architects and engineers, and how this skills can be developed through 2D and 3D representations and models. Through a series of spatial visualisation, spatial perception and spatial orientation tests, they evaluate students before and after a first semester architecture course, highlighting areas of further development that are required. By breaking down the existing elements of the course into the teaching activities, methods of presenting and skills developed, the study suggests the most effective methods of developing spatial skills, as well as discussing how these can and have often been developed in students before they arrive at university. The authors acknowledge that there is some further developmental work needed on the course, and they are hoping to enrol additional first year students from other architectural programmes into the study.

Finally, this issue includes two book reviews. Firstly a review of a recent edited book published by Intellect Books – *Re: Research, Volume 1: Teaching and Learning Design*. One of seven thematic volumes, this curated collection of papers from the proceedings from the 2017 International Association of Societies of Design Research conference, edited by Gjoko Muratovski and Craig Vogel is reviewed by Sri-Kartini Leet (Buckinghamshire New University, UK). In her introduction, Kartini highlights the range and scope of the papers and the commonalities that run through this collection. She provides a descriptive overview of each of the 11 papers, concluding her review with a critique which highlights what she sees as both strengths and weaknesses and an overall conclusion of the books value and contribution to teaching and learning design.

The second book review is of a recent edited book published by Springer Nature – *Pedagogy for Technology Education in Secondary Schools: Research Informed Perspectives for Classroom Teachers*, edited by P. John Williams and David Barlex, and reviewed by Liam Anderson (Trinity School, Newbury, UK) and Alison Hardy (Nottingham Trent University, UK). In their introduction the reviewers discuss their approach to selecting which 3 of the 16 chapters they chose to focus on and what is of particular interest within these for teachers of design and technology and STEM subjects. The review also discusses the high price of the book, which may put it beyond the reach of many potential readers, and also the lack of diversity of the 24 authors featured in the book. To conclude, the reviewers evaluate the overall accessibility of the book to the reader and its contribution to the discussion around accepted practice in the classroom.

We hope that you enjoy this issue.