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Editorial
2020 Vision

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This first issue of a new decade (who knows what we'll all end up calling the 2020s) gives us a chance to look forward to new and developing pedagogies for the upcoming decade along with some focus on the challenges facing us in design and technology education. It also provides an opportunity to reflect on the past, and to remember some of those who have contributed so much to our profession, and inspired so many of us through their skill, dedication and enthusiasm. Many of us in the UK will have known and fondly remember John Penfold who died last year aged 89. John first taught craft, design and technology in secondary schools before he became a lecturer and senior lecturer at Shoreditch College, later to become Brunel University's Runnymede Campus in Englefield Green. John remained there for over 30 years, sharing his skills with many trainee design technology teachers (such as Kay's husband Tony Lawler) and later with Brunel's first cohorts of industrial design students (including Lyndon from 1987 - 1991).

His family is particularly proud of a conference he helped to organise in 1978 in Englefield Green for 400 girls at which they were encouraged to think of jobs in design technology. Throughout his career he promoted teaching careers in CDT with a particular emphasis on attracting women to STEM teaching. He used his holiday periods to work for UNESCO training future teachers and in Malta and Indonesia. John also founded the History of Design group for the University of the Third Age, which held monthly meetings at his house in Dedworth, Windsor. His house boasted an impressive workshop and he built all of the wooden furniture and flooring as well as many beautiful figurines. His first degree in economics was followed by a master's degree in the role of education in manual subjects, research for which led to the publication of his 1988 book *Craft, Design and Technology: Past, Present and Future*. Kay and Richard Kimbell would later cite this work in their piece *Methodologies: Approaches to Understanding Design Technology* in the 2006 *International Handbook of Design Technology: Reviewing the Past Twenty Years*. One (5 star!) Amazon review of John's book simply reads "Lovely – a blessing to own".

His son Julian said: "He was a modest man but he had so much knowledge. He would amaze you because there was nothing he could not talk about" (*Talented craftsman who inspired generations of future teachers has died*, *The Royal Borough Observer*, Windsor, 5th September 2019). John was a renowned expert on William Morris and lectured widely on him and his work. He took early retirement from Brunel in his 50s to become an educational consultant to many other universities and colleges, including the development of the furniture design and craft degree and industry training courses at Buckinghamshire New University, UK (then BCHE), and was a GCE examiner in schools. John's daughter Sarah Feazey captures him perfectly in her *Guardian Education* obituary of 31 December 2019

when she describes him as “funny and considerate, he was a family man, as well as a genial host, loyal friend and raconteur”. He will be warmly remembered and missed by many.

In this issue’s reflection piece **KEF, TEF, REF and all that: The current state of art & design higher education in the UK** Jake Kaner (Nottingham Trent University, UK) discusses the suite of 3 framework metrics that are intended to measure the totality of impact of UK HE. Vice chancellors from humanities and arts-focused institutions in the UK have long expressed major concerns about the focus of these frameworks and the threats that they pose to arts and humanities education, with few measures to account for non-financial impact across disciplines. The ongoing development of these 3 frameworks and their impact on the sector should certainly be carefully monitored by those of us involved and interested in UK design and technology education. It would be interesting to see how the UK experience of working alongside and within these frameworks reflects what is happening in other countries, and whether this resonates with those working outside of the UK HE sector.

This issue contains six articles which describe new approaches to making students reflect on their developing design skills and their own personal development. The first two articles in this issue explore ways in which students can begin to more fully understand, develop and apply their own creative thinking skills and design processes.

In **Making the design process in design education explicit: two exploratory case studies**, Elise van Dooren, Thijs Asselbergs and Machiel van Dorst (Delft University of Technology, The Netherlands), Els Boshuizen (Open University and University of Turku, Finland) and Jeroen van Merriënboer (Maastricht University, The Netherlands) consider the perceived overreliance of many design courses on the final student outcome or product rather than the design process used to achieve it. By developing a framework and a tool for students and teachers, it is hoped that students will begin to understand and articulate the design processes that they are using, increase their ability to use these processes, and help them to use them more effectively. It is certainly true that art and design students often struggle to articulate what transferable skills and subject knowledge they have gained during their studies, even when their work shows great personal and design development. In an educational environment where outcomes need to be explicit and constantly measurable through an increasingly expanding range of metrics the development of this tool and a commonly shared design education vocabulary is timely. The case studies seem to suggest an increased student willingness to engage with formal design processes, evidence of more experimentation, less stress and more enjoyment, and an increased ability to reflect on their personal development.

In **Critical Thinking in Problem Exploration in Design and Technology Design Project** Wei Leong Loh (Kyushu University, Japan) uses student design journals to study the intellectual standards for reasoning in design problem exploration. The quality and variety of sources used played a key role in the accuracy of the research data used, along with a baseline level of background knowledge necessary to be able to clearly articulate and conceptualise the design problem. But it is shown that the development of intellectual standards for reasoning is a key requirement for students to develop critical thinking skills and be able to apply these in their design work. Dealing with ambiguity, and being able to conceptualise and frame a problem, is a key skill which requires well developed critical thinking skills. By

increasing students' awareness of the intellectual reasoning that they are employing, often without realising it, within their design work, it is hoped that teachers can develop deeper, more objective and more critical thinking throughout the design process.

The next two articles describe new approaches to developing the design student toolkit, introducing new ways of working and new ideas and allowing new ways of seeing and doing.

In **Digital Touch: Towards a Novel User-Experience Design Pedagogy** Val Mitchell and Garrath Wilson (Loughborough University, UK) and Cary Jewitt, Kerstin Leder Mackley, Lili Golmohammadi, Douglas Atkinson and Sara Price (University College London, UK) reflect on the rapid growth of human computer interaction (HCI) and user experience design (UXD), and the merging of many disciplines within these new fields. A collaboration between HCI, industrial design and social science teams has resulted in a novel pedagogy using low fidelity prototypes for digital touch experiences, and the development of a Designing Digital Touch Toolkit to assist in the learning and teaching of user experience and human centred design. The use of sensory-experiential prototyping materials to explore digital touch helps students to understand, contextualise and articulate the user experience and to construct product narratives around these. The resulting toolkit aims to explore the intersection between physical and digital materiality, which may help to produce more meaningful, memorable and insightful user experiences in future digital products.

In **A Biomimetic Design Experience in Informal Interior Architecture Education** Umut Karsli (Istanbul University, Turkey) and Serpil Özker (Isik University, Turkey) explore how biomimetic design techniques and learning from nature can inspire students in spatial design and interior architecture projects. While biomimicry has become widely recognised in design circles as a tool for encouraging creativity and innovation in design, it continues to be a problem for students to find ways of applying it in their work. The authors here compare solution-driven or "biology push" and problem driven or "technology push" approaches and consider which is more appropriate at different stages in student curricula. The also consider the appropriate level of abstraction to enable students to understand and apply the biological processes and processes that they are studying. The development of a *BIOStructure Workshop* allows students to experience biomimetic design in an informal educational setting which encourages collaboration and creativity. It is interesting to note the shift from being inspired through form-oriented solutions to more abstract functional processes of the natural organism or process that they are mimicking as the students progress through their studies. It is hoped to further implement a biomimetic approach in the design studio and to open this out to students from other disciplines such as biology. By helping to demystify nature and demonstrating what biology can teach us, we may be able to inspire designers to use biomimicry more creatively and apply it successfully to a much wider range of design problems, and to create more innovative, sustainable solutions.

The final two articles highlight the importance of delivering new technologies and ways of working into the curriculum in a meaningful way in order to ensure student engagement.

In **Framing craft and performance in hybrid puppetry workshops** Michael Nitsche and Crystal Gillett (Georgia Institute of Technology, USA) describe their *Prototyping Puppets* project mixing craft and performance to engage students in STEM and help to demystify

technology such as electronics. Through basic puppet making and puppet play students showed self perceived increases in their attitudes towards technology and helped them to move away from “black boxing” of technology and engage more fully in the activities, inspiring students to tackle rather than hide the underlying principles. Workshops delivered using teaching materials developed from the project showed increased student engagement and perceived positive attitude changes towards art and craft, and a successful integration of technology with arts and craft activities. The core goal of the activity is to attract and engage diverse student audiences with varying interest in STEM topics. While this appears to be successful, with examples of very effective student engagement, there are allied increases in communication, creativity, co-operation and effective group work.

In **Multistable Technologies and Pedagogy for Resilience: A Postphenomenological Case Study of Learning by 3D Printing** Nenad Pavel, Arild Berg and Birger Brevik (Oslo Metropolitan University, Norway) and Fausto Orsi Medola (Sao Paulo State University, Brazil) describe the disruptive influence of new technologies on the education environment and how we can teach new approaches to resilient learning, as well as nurture learners relations with the new technologies and societal changes which surround them. In the case study design students in Brazil used 3D printing to develop assistive technologies together with patients and therapists for a local rehabilitation centre. While the 3D printing allowed students and teachers much more freedom to prototype without all of the constraints of practical hand skills, and the technology soon became transparent to them, it did not produce a successful design outcome in all cases. The new technology proved disruptive to some, showing how students can struggle to adopt new technologies, while resilience emerged among all of the participants. As the introduction of technological advances accelerates, students will need to become more resilient in dealing with uncertainty and ambiguity, and learn to embrace this change rather than it causing them anxiety and threatening their wellbeing. It is certainly true that as educators we will need to consider ways that we can engender this resilient approach to learning and using new technologies.

Finally, this issue has a review of **Mentoring Design and Technology Teachers in the Secondary School: A practical guide** published by Routledge and reviewed by Stephanie Atkinson, University of Sunderland, UK. While this book has a definite UK focus the subject specific practical guidance should be equally relevant for those not based in the UK and who wish to effectively mentor and support the development of design and technology teachers.

We hope that you enjoy this issue of the journal.