27.2 Editorial: Turning tables and challenging perceptions

Kay Stables, Goldsmiths, University of London, UK
Lyndon Buck, Aston University, UK

In this issue of the journal we present six articles each of which, in their own way provide a 'pause for thought', challenging a norm, shifting perspective, suggesting an alternative approach. In preparing this editorial, each article provided something slightly unsettling, but in a good way. How much do we really understand about all aspects of value when young children are drawing? Is taking a subtle approach to research more revealing than a more direct one? What happens if as a researcher your research focuses on researching the research that your students have undertaken? What is revealed when researchers shift the cultural lens through which the research is explored? If design is interdisciplinary why is there not more research exploring liminal spaces opened up by design thinking?

So, this short introduction is in the form of a quiz. Enjoy exploring the articles!

In the first article, *From 3D to 2D: Drawing as documentation and reflection processes by young children*, Asi Kuperman, Ruti Aladjem, David Mioduser, Tel Aviv University Israel and Osnat Dagan, Beit Berl College Israel, provide insights into the ways in which young children make drawings of constructions that they have first built. Much previous research looking at children's drawing has been based on spontaneous, imaginative drawing, or drawing in advance of making. In this fascinating study the authors have turned this approach upside down wherein the making has come first and the purpose of the drawing is reflection and documentation of the constructing, making visible the ability of five and six year olds' to observe detail and provide insight into their understandings of how artefacts work. The researchers conclude that drawing after making can be used as a tool for documentation and refection by your children and that this has the potential to support the development of technological thinking.

The following two articles provide insights into aspects of STEM. The first of these focuses on research to establish the development of a checklist to assist teachers in exploring their own potential gender bias in teaching science and technology, particularly focusing on covert, subtle and unintentional forms of gender bias. In *Are my technology lessons for girls? The Gender Sensitive Education Checklist (GSEC) for teaching Science and Technology* Eva Dierickxa, Kato Luyckx and Jan Ardies, AP University of Applied Sciences and Arts, Belgium used an educational design research method involving both background research and development and a series of development workshops to create the checklist. This involved working with student teachers, practicing teachers, counsellors, teacher educators and technology-experts. The research took account of those working with age ranges from six to sixteen year olds. The aim was to create a tool for educators that would help them discover their own strengths and potential biases and the resulting tool formed a checklist built around four pillars: fundamental critical attitude, the image of technology, guidance & interaction in the lessons and didactical methods. The research presented in this article focuses more on the development of the tool than on the effectiveness of the tool – this aspect is still to be addressed. But from the depth and extent of

the iterative design research methods underpinning the research, the checklist looks to be a powerful tool in supporting teachers to reflect on and develop their teaching.

In the second STEM focused article Susanne Engström of KTH Royal Institute of Technology, Sweden *From a teacher student's view – how STEM-actors have impact on teacher education and teaching in STEM* reports on a study in which eighty five student teachers preparing to become lower or upper secondary teachers in Swedish schools became researchers. Their task was investigating STEM activities taking place outside of a formal education system, led by 'STEM-actors', for example in maker spaces or science centres. For the student teachers this was an assignment where they were required to read research related to STEM teaching in informal education settings and then observe and interview four different STEM-actors and prepare written reflections, a presentation and conclusions. The work undertaken by the students then became a set of case studies analysed by the author. The analysis provides a wealth of insight both into the approach taken and to the perceptions of the students evident in the case studies. At an overarching level the analysis indicated that the student teachers were generally enthused by what they saw and that pre-conceived notions of shortcomings in formal schooling (although not that of the student teachers themselves) required more external STEM-actors to be involved. They identified the importance of teaching being engaging, fun and interesting but were not convinced that practical work was more important than the theoretical foundations that were missing. The article has considerable value both in the sharing of the pedagogic approach to a student teacher research project and also to the research analysis made by the teacher educator of the outcomes of student teachers' learning through undertaking a research project.

The next article focuses on teacher attitudes to curriculum change. Anriet Van Deventer, University of Pretoria, South Africa draws from PhD research on *Teachers' attitudes towards the amendments in the Design curriculum: a critical overview of the approach and findings of the study*. Teachers world-wide are routinely subjected to changes in the curriculum that they teach and, whether reactions to changes are positive or negative, the value of consultation with teachers in advance of changes is often not recognised. The research presented in this article looks at this issue from the teacher's perspective and, of particular significance, from a culturally relevant philosophy. The research focuses on changes to the formal Design Education curriculum of Grade 10 and 11 in South Africa and is viewed through the ideological lens of Ubuntu – an African democratic philosophy underpinned by collective identity and values such as kindness, compassion respect for others and benevolence. In the words of the author "we used the *Ubuntu* ideology as the main ethical criterion to understand and assess the humanity of the Design teachers in terms of their actual teaching, their theoretical frameworks, personal concepts, beliefs, and emotions." The article provides detailed information on the South African curriculum requirements for normal assessment in design education and changes that have been introduced in a somewhat abrupt fashion. Eight teachers, varying in age, qualification and experience, from seven schools completed a questionnaire focusing on attitudes to change both generally and in relation to the curriculum change and were then interviewed to gain more detailed insight. Although the overall responses to the changes were positive, further detail indicates their views were more mixed including, for example, that half of the teachers considered change to be good, but that more review was needed and teachers should be consulted in advance of change being implemented. Within the recommendations teachers are

seen as the primary stakeholders and the research highlights the need for greater recognition of teacher voice within the philosophy of Ubuntu when change is being discussed.

Continuing with a theme of curriculum change, a different lens is presented by William J. Gibbs, Duquesne University, USA. In *Design Thinking, An Examination of Epistemological Frameworks in an Area of Academic Study*, Design Thinking is explored as a framework to aid curriculum design in the context of digital media programmes in Higher Education. Taking a case study approach within a single university setting, Design Thinking was utilised as a framework to structure evaluation of a programme and curriculum in advance of re-designing the curriculum. This detailed case study highlights the potential of drawing on the views of multiple stakeholders who may not be designers but can engage in a Design Thinking approach. The article provides considerable detail on background research and the aspect undertaken, but at the centre is the use of Design Thinking in iterating between defining an aspect to be assessed and then ideating in response to that which is being defined. Researching the approach whilst enacting the approach also highlighted areas for developing a Design Thinking approach that was not being utilised for developing a solution for an external client but for an internal team who were both designer and client. This highly detailed case study did produce insights into challenges that the process presented, not least the time that needed to be committed to the project. But it also provides valuable insight into using the affordances of a process of Design Thinking and the possibility to customise as and when needed.

The final article in this issue is a second article with a base in Design Thinking, *Mapping current research and future directions of Design Literacy with systematic quantitative literature review (SQLR)* comes from Julius Cesar Bolinas, Griffith University, Australia. The article has two distinct dimensions. First the article is constituted as a Systematic, Quantitative Literature Review (SQLR). Second is the topic under review – Design Literacy. The particular methodology for conducting the literature review is aimed at defining the characteristics of Design Literacy and mapping the direction this research. In undertaking this approach he provides insights into his perception of the advantages of SQLR over a narrative approach. The author also focuses on the universal educational value of design literacy for developing modes of cognition as well as its specific role in the context of design, for example in supporting solving real-world, wicked problems. In exploring definitions a range of authors and approaches are presented that broaden the area in terms of phases of education where definitions appear and differences in terminology, for example between design thinking, designerly thinking, designerly ways of knowing and designerly stance. The article provides a clear account of using the methodology, including the ways in which he adapted aspects of his approach as his research progressed and a justification for how and why literature was included or not. The methodology provides insights into ways of analysing and quantifying literature that was found, enabling an overview of how much, or how little, literature was apparent and in what sectors of education.