

Guest Editorial: Building Research Capacity and Engagement in Design and Technology Education (BRACE), Special Issue

Marion Rutland, University of Roehampton London, UK

Bhavna Prajapat, University of Brighton, UK

Welcome to this Special Issue. It contains articles developed from papers presented by members of the Building Research Capacity and Engaging in Design and Technology Education (BRACE) community at the Pupils' Attitudes Towards Technology Conference (PATT39). This was held in St John's Newfoundland & Labrador, Canada from June 21-24, 2022.

BRACE was developed due to the initiative *The Knowledge Exchange* (KE) community, established by Dr Alison Hardy (Founder member and Principal Lead) and Dr Sarah Davies (Co-Lead) from Nottingham Trent University UK. KE is supported by the Design and Technology (D&T) Research Strategy Group, founded by Alison and hosted by the Design and Technology Association (D&TA), a national membership charity that promotes and supports D&T education in the UK. KE had observed a growing interest in the Design and Technology community for new research of relevance to, and applicable to D&T teachers' practice.

The overall aims of KE are to:

- Contribute to planned discussions where they can share ideas and the challenges involved when researching D&T education.
- Hear from national leaders, who will provide short thought-provoking talks about potential national research.
- Take part in workshops to develop conference papers into full journal articles.
- Present their research at a conference using 'live stream'.
- Contribute to the podcast series 'Researching D&T Education'.
- Produce summaries of their research to share with other relevant organisations.

The intention of this BRACE Special Issue is to bring together the research activities of a group of research-curious, aspiring and active D&T teachers interested in building their research capacity directly related to D&T education in schools. They were working alongside fellow academics, acting as mentors to research D&T issues that will improve pupils' learning and impacts on educational practice in schools and teacher education settings. Overall, the aim has been to identify and enable teachers and academics to work together to share ideas and identify and present research that is of interest to, and important to the D&T community in schools.

Articles

We hope that you will enjoy reading these articles. They are examples of the BRACE community of teachers and their mentors working together to develop and present their research

interests. They are directly related to current developments in primary and secondary D&T teaching in England.

The first article of this issue '*Teacher perceptions of critical thinking skills within English primary design and technology*' by Richard Brown, uses the phenomenological approach to explore English school teachers' viewpoints on critical thinking in primary design and technology practice. The supporting literature for this research takes a broad approach and identifies some of the issues and anxiety around teaching design and technology in the primary sector. The phenomenon of critical thinking is well explored, leading to a summation of why critical thinking is seen as a valuable educational activity for cognitive development, academic work and skills for employability, as well as, for individual wellbeing. The issue of critical thinking in design and technology education as a challenging area to fully implement in many classrooms is probed and discussed. Critical thinking can appear in many guises within the content of various design and technology activities, and it is discussed alongside cognitive development and creativity.

These issues are explored within the interviews, that are carried out as part of this research. An interesting methodology approach using 'Jamboard' is utilised to gather data from teachers in addition to the interviews. A 'word cloud' is created, based on a hierarchy of ways of learning to analyse the findings and teacher comments are used to clarify and support the discussion and analysis. As with any good research, the conclusions raise additional questions and identifies further important research areas concerning critical thinking that will enable the development of a more in-depth understanding of English primary design and technology practice in the classroom.

In the second article, '*Weaving the specialist material strands of design and technology together*', Dr Sarah Davis, is focusing the 2014 revision to the National Curriculum for Design and Technology in England. These Orders introduced a recalibrated of the design and technology curriculum from the previous versions that have been developed, since the Education Reform Act (1988) that introduced a National Curriculum within England and Wales. Prior to 1989 subjects such as woodwork, metalwork, technical drawing and graphics known as craft, design and technology (CDT), together with home economics, needlework and electronics were all taught as separate subjects in secondary schools. The first National Curriculum in 1989 introduced design and technology (D&T) with these subjects taught by specialist design and technology teachers with the common requirement to develop skills in designing and making within a specific materials-technology knowledge base.

The directive in 2014 was to move toward a design centred approach, based on the use of mixed materials. Thus, each D&T teacher would be expected to know and be able to teach the full range of materials taught within design and technology. Sarah discusses the implications and challenges this brought for D&T teachers in the classroom. It is small scale research project, exploring two teachers' different views, perspectives and experiences. A range of emerging tensions are identified including 'material specialist teaching' and 'a design centred approach'. It explores how teachers with an often-limited range of specialist expertise will ensure children achieve comprehensive design and technology teaching with this multi-material approach. Sarah recognises that there is still an area of curriculum development for the current design and technology teacher where there is much more research to do.

A third article *Design and Technology Educators' Experiences of Competence, Relatedness and Autonomy with Educational Research'* by Matt McLain, Daniela Schillaci-Rowland, Kay Stables and Alison Hardy reports on the results of a survey of Design and Technology (D&T) educators, predominately based in England. The research looked for evidence of engagement by teachers in schools with educational research generally and more specifically, within Design and Technology Education. The survey was undertaken by the *Design and Technology Research Steering, Group (DTSRG)*, established in 2021 and sponsored by the professional *Association of Design and Technology Education*. Three research questions underpinned the study; to what extent are teachers of D&T currently engaged with educational research, is there interest in the development of support from the Design and Technology Association and where should it prioritise educational research?

This article builds on an initial analysis of the findings from the questionnaire at the Pupils' Attitudes Towards Technology (PATT39) conference, which focused on four survey questions. The views of past, present and future D&T educators engaged in educational research were explored. In the research 62% of the participants were involved in secondary D&T education and 20.2% in primary education. The majority (72.6%) of the international participants consisted of curriculum leaders (56.00%) and qualified teachers (35%). The majority of the responses came from qualified or trainee teachers, with 62.7% trained via the postgraduate route. 69% had not completed a postgraduate qualification with only 14.5% undertaking a full masters or a doctorate. 48.4% had been in service for up to 30 years and participants with more than 5 years' service.

An online questionnaire was used to collect data, the findings were analysed based on evidence of *competence, relatedness and autonomy* and explored to analyse and understand the D&T educator's interest and relationship with research. Most of the participants did not feel that they had access to relevant and high-quality D&T research readily available. The findings highlighted that teachers do want to engage in research, yet there was a general lack of confidence engaging in research and a lack of opportunities to network with other teachers, resulting in a feeling of disconnect between interest and action. It is noted that progress has been made since the survey was conducted, especially in primary schools and the formation of the D&T Research Strategy Group, hosted by the Design and Technology Association.

The final article of this Special BRACE Issue provides insight into secondary teachers' views of the recent development in D&T education in schools in England. The article, *How can teacher preparation in England within D&T minimise further decline of the subject?* by Claire Vickery, a secondary D&T teacher and Alison Hardy from the Nottingham Trent University UK discusses one part of data from a larger research project in England. The focus of the research is to identify factors that secondary school teachers of design and technology (D&T) in England consider may have contributed to the decline in entries at the General Certificate of Secondary Education (GCSE) examination for pupils aged 16 years. Essentially, the study was devised to ensure that the teachers' voices are heard and taken note of.

The study was conducted in two parts and included interviews, focus groups and an online survey. Part 1 of the research provided qualitative data from an online study, which informed the findings collated in Part 1. This article focuses on this data and the findings from an online survey in Part 2 of the research. The Research Question addressed was:

- How has the decline in D&T been impacted by decisions made at a national, classroom and individual level?

The teachers' responses from the participants were organised into 3 categories. They were the macro level or national government level, the meso or school level and the micro-classroom influences. Recruitment was largely undertaken through social media and the data collection was conducted virtually; it was acknowledged that this potentially limited the types of teachers that were participating with the project. The participants were qualified teachers with a teaching career of at least one full academic year on either a part- or full-time basis.

Overall, 26 factors findings were analysed against the 3 categories, and it was interesting to note that most of these were categorised as being outside the teacher's direct control. The most noteworthy factors were the impact of the English Baccalaureate (EBacc), a government-imposed performance and influences from the parents. It was noted by the teachers that there had been too many changes or unsupported changes to the subject, a disparity between teachers in the perception of what D&T is or should be, a lack of skilled teachers and a discrepancy between teachers in the way D&T is delivered within different settings. Also, there was the believe that there is little or no direction from national bodies about how to adapt current practices to the new curriculum content. It was considered that these issues can lead to differences in classrooms and departments, causing confusion for pupils and conflict amongst the staff. Both classroom teachers and heads of department agreed about the impact of the EBacc, and the parents influence but the teachers also thought that a lack of funding was having a negative impact on D&T.

The article recommended that further research was needed, especially at the nano level and parents and pupils' perceptions. This research was designed to acknowledge and emphasise the importance of the 'teacher' and reinforce the need for their voice to be listened to and considered. Although, the research is centred specifically on D&T education within England, it is hoped that it will prompt professional dialogue internationally.

Finally, this issue has a Book Review that has also been prepared as part of the BRACE project. The review has been conducted by Drew Wicken of the Co-op Academies Trust and Kay Stables, from Goldsmiths, University of London. The book, *Applications of Research in Technology Education: Helping teachers develop research-informed practice* is edited by P. John Williams and Belinda von Mengerson and is a collection of chapters prepared by recent doctoral graduates based on their PhDs. Each chapter provides an overview of the PhD and then focuses on the contributions their research makes to help teachers develop research-informed practice.