

## **Distributed creativity: collaborative digital textile design practice**

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This paper draws on the findings from phenomenological research at the University of Wales Institute Cardiff, which has investigated the impact of digital imaging technology on creative printed textile design practice. It suggests that a new paradigm exists for printed textile design, in which digital imaging and electronic communications technologies are able to support a collaborative creative process. Recent research in human computer interaction suggests that an understanding of cognitive processes used in the generation of creative ideas is necessary before any assessment of digital tool use can be made (Hewett, Czerwinski et al. 2005). Studies of creativity in psychology research by Amabile (1996), Csikszentmihalyi (1996), Gardner (1985,1993), Smith (1995) and Sternberg (1988), have informed this particular enquiry and data has been gathered using ethnographic qualitative methods including case study and practical investigations. The paper focuses specifically on one part of this research, describing a collaborative practical investigation with a commercial textile designer; data from the project as a whole, has been used to inform the findings that are presented.

### **Textile Printing Processes**

Printed textile design is affected and constrained by the manufacturing process. Recent developments in textile digital ink-jet printing are providing alternative methods of translating pattern and image onto cloth (Campbell 2005). Although computers have been used in industry for several decades to prepare artwork for printed textile manufacture, it has not been possible to print digital images directly onto fabric without substantial modification to accommodate the analogue process. This entails the reduction in number of colours and generation of separations for each one, comprising repeating units to fit the sizes of rollers used in manufacture (Bunce 1999). None of these production constraints are required in the digital ink-jet print process: the full width of the cloth can be printed in millions of colours; there is no imperative for repeat (Briggs and Bunce 1995). Digital ink-jet printing is now able to compete with analogue printed textile manufacturing on speed, flexibility, and economy, and is thought likely to supersede it in the near future (Dehghani 2004).

Digital production methods impact the creative practice of designing textiles: apparel designers can visualise the placement of pattern within the garment shape, craft practitioners can produce one of a kind artefacts (Campbell 2005). The accurate rendition of digital image onto cloth is opening up new methods of enquiry for textile artists, encouraging original forms of image making and stimulating innovative approaches to generating ideas. Digital cameras, video, and scanners allow visual material to be gathered from many sources to stimulate creative concepts. Software enables imagery to be manipulated, transformed and merged: colour and scale can be rapidly changed, digital layers used to produce novel visual effects, diverse images can be blended together, copied, cut, pasted and transformed. Digital communication

facilitates transfer of this visual data between practitioners, enabling collaborative concepts to be developed (Polvinen 2005).

In an industrial context, collaboration is integral to product development. Economic factors have led to the growth of outsourcing and manufacturing strategies in which designs for printed textiles maybe communicated via the Internet, across geographic locations and time zones to print production sites (Crawford 2003). Companies communicate design data *in-house*, between departments to coordinate the process of product development, marketing and sales, and outside the company to dye houses, manufacturing sites and retail outlets. Collaboration at the generative stage in textile design evolution is however, rarely a shared experience.

## **Research methodology**

The research that has informed this paper investigated the ways in which digital technology impacts upon creative textile practice and in particular, the generative stage of concept development. Mental processes, resulting from human centred action, are difficult to interrogate and require a methodology that can have validity when complex variables are inherent. A qualitative phenomenological model is required, in which an analytical description can be made of conscious experience. Mason (2002) contends that through disciplined noticing<sup>1</sup> and recording methods it is possible to build research data that yields useful information concerning the complex multi faceted cognitive structures that ultimately result in human action (Mason 2002). The techniques of disciplined noticing, recording and reflection on practice, have guided the collection of research data in this study. Digital video, audio recording, reflective journals, photography and personal correspondence, resulting from a case study comprising three field studies, and a series of collaborative investigations, were used to generate this data. The practitioners included in the case study and investigations, were selected to reflect the diversity in creative approach and included a textile artist, craft practitioner and commercial designer<sup>2</sup>. This paper describes part of this research, focusing on a collaborative investigation with a commercial textile designer.

Findings from the case study indicated that use of digital imaging technology enhances creative practice, stimulating the development of ideas at the generative stage, through the review, organisation, storage and compositing of visual data. To examine how communication of digital visual data impacts on creative practice, a collaborative *task exercise*<sup>3</sup> was carried out. This involved the development of digital textile design concepts with Debra Bernath, a textile designer based in New York. Email and telephone conversations were used for gaining feed back during the project

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<sup>1</sup> Mason, J. (2002). Researching your own practice : the discipline of noticing. London, Routledge Falmer 2002.

<sup>2</sup> Detailed descriptions of this research can be found in 'The impact of digital imaging technology on creative printed textile practice' PhD Thesis, University of Wales Institute Cardiff (Treadaway 2006).

<sup>3</sup> Mason writes: '*the construction of a task exercise is the most fruitful form of research report, because it enables others to experience something of what the researcher claims to notice and then to test it out in their own experience.*' Mason, J. (2002). Researching your own practice : the discipline of noticing. London, Routledge Falmer 2002.

and the researcher documented stages in the development of her contribution in the design process, using digital video and a reflective journal. Analysis of this recorded data, feedback from the designer and the work created, have provided information concerning the ways in which digital imaging is able to support the creative process and enhance collaborative design practice.

### **Collaborative Investigation**

Development of the design work was first discussed during the case study field visit, in New York, in May 2004. It was decided that a series of experimental digital images would be created collaboratively, to express a shared memory of the visit. In addition, development of a small collection of commercial textile designs was also discussed. The proposal for this work was finalised during a meeting with the designer, in Wales, three months later. Visual data, recorded during the visit, became the stimulus for imagery used in the design collection. The practitioners agreed a framework for the project; this included development of visual ideas using Photoshop® software which would be exchanged, modified and added to, in an iterative process, using the Internet to communicate files. It was also decided that the final output would be digitally ink-jet printed onto a textile substrate suitable for apparel, and would express the shared memory theme.

Recent findings from experimental neuroscience research have revealed the importance of memory in the human ability to make sense of lived experience, and in the development of thought processes (Rose 2003). Ward (1995) describes the value of prior knowledge in creative thinking and states that '*we must always rely on some type of stored information when we develop any new idea*<sup>4</sup>' (Ward, B. in Smith, 1995). Memory of shared experience was considered to be a useful source of visual stimulation for the collaborative work; it also provided an opportunity to study the affect of memory within the creative process. Both visits visually informed the developing design work, and digital photographs, video and on-site sketches were made at the outset of the project for this purpose. Two experimental textile artworks were created from visual concepts based on New York: a series of three digital ink-jet printed cotton velvet panels called '*New York Skyline*' (Fig. 1) and a second work, also printed onto cotton velvet, called '*Empire State*' (Fig 2). These images were developed as artworks, without consideration of commercial constraints.

In the second body of work, six co-ordinating commercial designs were produced based on visual memories of the designer's visit to Wales in August 2004 (Fig 3). A selection of digital photographs, taken during the visit, were posted on the website to initiate the design process. These were responded to by the designer and the images uploaded to her website. The researcher downloaded the images, modified and added to the imagery before transferring back the emerging visual concepts via her own website. This iterative cycle continued until the designs were ready to prototype. Test samples were made using a Mimaki TX2 textile digital ink-jet printer, using reactive dyes onto cotton lawn, silk crepe de chine and chiffon. Some adjustments were made to colour balance, scale and composition before final printing onto silk crepe de chine and silk chiffon (Figs. 4 and 5).

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<sup>4</sup> Ward, T. 'What's old about new ideas?' Smith, S. e., W. Ward, et al., Eds. (1995). The Creative Cognition Approach. Bradford Book. Cambridge, Massachusetts, The MIT Press.

The apparel textile designs that were developed were based on scanned and photographed Welsh flora collected during the designer's visit. Two of the designs were created to exploit the potential of the digital process to print imagery across the full width of the fabric, without repeat, and all of the designs were printed in millions of colours. Those designs, which were developed into repeating units, exploited the digital facility to replicate imagery exactly, in great detail and with ease. Digital colour tools provided opportunity to adjust tone, hue and saturation precisely and facilitated coordination between the design concepts.

The practitioners' tacit knowledge of designing for analogue printing process, garment pattern cutting, market sector and cultural factors were influential in the development of the design concepts. Production constraints limited the creative exploration of generative ideas and framed the structuring of the visual images. The approach contrasted with the experimental method used to create the New York textile art, which was developed sequentially, with the collaborators constructing and responding to previous layers of imagery. In the Wales design project, most of the concepts were developed in parallel, with changes in digital layers providing alternative design options. The collaborative nature of the process provided time to reflect on ideas and forced appraisal of the work in progress, at each point of communication via the website. The result of this reflective process was the rapid development of non-sequential concepts, in which layers were interchanged, stimulating new insights and additional ideas. Designs were developed and refined in numerous stages, without the need for the substantial investment in time that is usually required in hand rendered work. It was possible to create design concepts freely, considering co-ordination of the collection as a whole, only as the project reached a climax. Use of layers and rapid manipulation of colours, backgrounds and motifs, made the co-ordination of designs simple, resulting in numerous design options. The reflection and selection processes became key elements, within the creative practice, requiring constant re-evaluation and decision-making.

## **Communication**

Transfer of design data between designer and researcher, using websites and high-speed Internet connections, provided an enhanced environment for collaboration. This was particularly evident in the development of the design collection, providing rapid feedback on ideas and the opportunity to continually modify layers of each design. Bernath's non-secure Mac website provided an easy method of viewing and sharing work in progress. The disadvantage of this site was the limitation on file size, which resulted in designs being posted either at a lower resolution, smaller size or in separate layers. The secure website, used by the researcher, lacked the simple interface and viewing facility but enabled huge files to be successfully up and downloaded. Access via broadband provided download times in a matter of minutes from Bernath's site and uploads of very large files in several hours. The same day delivery of design data kept ideas fresh and interest sustained in the project. Email communication and telephone conversations enabled discussion and reflection on the process to take place as the work progressed.

Some difficulties were experienced during the latter stages of design development. File sizes became almost unworkable on some of the non-repeating designs, due to the

amount of RAM<sup>5</sup> required by the software for image manipulation. This caused frustration at the final design development stage however, it was also noted that computer memory capacity was insatiable: as soon as more was available, increasingly complex tasks were attempted. Storage of large files also became a problem and additional hard drive capacity was required with back up of files onto DVD rather than CD. Images were kept as layers and communicated at 300dpi to ensure consistency in design development and no loss of detail.

## Findings

Findings from analysis of the research data, arising from the investigation, suggest that digital technology, and the facility to communicate images electronically via the Internet, enhanced the creative process. The use of digital tools: video, scanner and photographs, provided efficient and rapid review of visual material at the generative stage, prior to design development. Electronic drawing tools, including Wacom® graphics tablet and tablet PC, were used to create hand rendered electronic marks, the mouse being used predominantly for selection from menus and tools. The inclusion of a large amount of photographic and scanned imagery posed difficulties when integrating *electronic* line work, which appeared clumsy and crude by comparison. Colour complexity and tonal variations in the photographic motifs, resulted in the need for comparable visual qualities in the electronic line work; this was achieved using the *clone* tool in Photoshop®, to emulate the detail in adjacent areas of the design.

Rapid communication of visual data stimulated associative thought in the collaborative practice. Visual material from a variety of sources was introduced unilaterally; the recipient's response generating further associated visual ideas to develop the image. The practitioners noted that this generated spontaneity and surprise within the process. Bernath commented on the excitement engendered by the exchange of files, comparing the experience with receiving gifts<sup>6</sup>. There was consensus that the process was felt to be *playful, adventurous* and *stimulating*; judgement was suspended and the sense of responsibility reduced. These are attributes widely considered by psychologists as enhancing creative motivation (Amabile 1996).

The punctuated flow of ideas, generated by the iterative process of collaboration, provided mandatory periods of reflection in which the practitioners were forced to refocus on the task, appraise the development of the work and make decisions concerning future progress. In the development of commercial design ideas with Bernath, this process encouraged design intentions and production constraints, to be examined. The creative framework, agreed at the outset of the investigation, enabled visual ideas to be managed and deployed purposefully; the sense of united intention, resulting from shared experience during the visits, was particularly useful in this respect. When difficulties were encountered, the digital facility to step backwards and return to an earlier rendition of the developing image was useful. In the commercial design work the constant playful exploitation of layers, and their transfer between images, stimulated a variety of new directions in the work.

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<sup>5</sup> A machine with 1Gigabytes (Gb) of RAM was used during the project. Designs were created at 300dpi and 9000 x 9000 pixels.

<sup>6</sup> Bernath states that she felt like she was '*getting presents all the time*'

File transfer, via the Internet, facilitated the accelerated sharing of imagery and the rapid development of visual concepts. Electronic communication made possible frequent feedback on the developing ideas, providing enhanced motivation and maintaining momentum in the creative process. Work with Bernath indicates that the collaborative origination and development of commercial design concepts, in different geographic locations and across time zones, is feasible via the use of websites. The shared process enabled a mix of cultural and personal, knowledge and experience, to be combined.

## Conclusion

Following the investigation, Bernath was asked to reflect on the collaborative process. Her evaluation indicated that she considered her creative practice had been enhanced and viewed the possibility of future collaboration favourably. All three practitioners, who contributed to the research project as a whole, supported this view. There was consensus amongst them however, that the success of creative collaborative practice relies upon human qualities, requires the development of empathic relationships and shared values. The field study visit was helpful in establishing common understanding between the practitioners and provided a mutual experience from which it was possible to derive creative motivation.

Collaborative image creation raises significant issues concerning the authorship of the generated work and highlights the importance of trust in the partnership. Bernath did not consider authorship of the work an issue, preferring to regard the output as the result of a shared experience. Nevertheless, the capacity to integrate responses from more than one individual, via the digital medium, and to communicate and replicate it with accuracy, has considerable implications for the way collaborative work is perceived and its monetary value.

Creative practice is becoming increasingly collaborative<sup>7</sup> in a world which is progressively more *connected* (Malins and Press 2004)<sup>8</sup>. Polvinen (2005) contends that international collaborative work on product development '*is where the technology driven global industry of apparel textiles is rapidly moving today*' (Polvinen 2005). Electronic communication of digital visual data provides the opportunity for design concepts to be co-originated, motivated by experience and knowledge, from multiple sources, practitioners and cultures. Accurate rendition of digital imagery as printed output and use of high-speed Internet connections has increased the potential of this collaborative strategy for the design of ink-jet printed textiles of the future.

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<sup>7</sup> Greenhalgh writes: '*The 1990's could be best characterised as being to do with interdisciplinarity...The key to success has been found in the willingness to collaborate. Facilitated by high technology, co-operatives and companies are changing the way radical material culture is produced.*' Greenhalgh, P., Ed. (2002). The persistence of craft : the applied arts today. London, A. & C. Black.

<sup>8</sup> Press (2004) cites Mulgan (1997) '*growing connectedness is the most significant social and economic development of our age; connectedness makes redundant most of the concepts of thought and action that have dominated our culture*' Malins, J. and M. Press (2004). Craft is an anachronism - discuss... Challenging Craft, Aberdeen.

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