Digital textile practice: An Investigation into Technology Utilisation, Teaching and Significance of Educator Creative Practice

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ABSTRACT

This paper examines the utilisation of digital design and output technologies from the textile educator perspective. Educator approaches to working with digital technologies in own creative practices are described, as are variations in involvement with teaching digital technologies. Connections between educator approaches to digital technology utilisation in creative and teaching practices are highlighted. The impact of educator engagement in creative practice is discussed, given the continually evolving nature of digital technology and factors existent in the contemporary higher education system, which can be counterproductive to educator creative practice. Conclusions are made with regards to different approaches to digital technology utilisation and significance of educator engagement in creative practice activity. The methodology used to undertake the research disseminated through this paper include self case study, survey and case study methods. The paper focuses on textile design higher education in the United Kingdom, printed textiles and surface pattern design; however, the content is intended to be insightful to others who are operating outside of this context.

Keywords: Digital Technology, Printed Textiles, Creative Practice, Teaching, Higher Education

1. Introduction

In the United Kingdom (UK), the training of designers for the industry was central to the formation of the Government School of Design in 1837 (Frayling, 1999). Education at this institution included ‘…weaving and the application of patterns to ruled paper’, related to using the Jacquard loom (Macdonald, 1970). There were also classes that covered the historical principles and practice of ornamental design which involved the drawing of natural objects or ornamental historic shapes onto ‘…various grids for the repetition of fabric and wall paper patterns’ to create block printing repeats (Macdonald, 1970). The foundations of textile design higher education (HE) in the UK are intrinsically linked to the regional industry; many institutions and courses are able to trace their routes from these origins (Malarcher, 2006). Throughout the development of HE, the prominence of educators who undertook their own creative practice and the employment of artists and designers in a part-time capacity have been widely recognised. The UK Quality Assurance Agency (QAA) identified that the ‘…active engagement of a high proportion of tutors in professional practice makes an important contribution’ to quality teaching and learning in art and design HE (QAA, 2000) Furthermore, ‘(p)ractising artists, designers and designer-makers make valuable contributions as part-time and visiting tutors, and facilitate important links to professional and creative practice’ (QAA, 2008).

In recent years, educators who are working in the UK HE system have witnessed increased student numbers, a more diverse fee paying student population and an emphasis on quality assurance exercises and audits. The professionalisation of teaching has required educators to obtain teaching qualifications. Legislation related to part-time work has meant that employment of staff on an ad hoc basis has become more complex. In addition,
‘…developing a research culture’ has become ‘…a matter of economic survival’ for HE institutions (HEIs) as ‘…funding is available on the grounds of research’ (Olley, 2005). Auditing research outputs via the Research Assessment Exercise (RAE) has led HEIs to compete to achieve research status and placed increasing pressure on staff to produce outputs (Becher & Trowler, 2001). While all of these changes can be seen to have positively influenced the development of art and design HE, the related pressures placed upon educators can be counterproductive to undertaking their own creative practice. Qualitative research has discovered ‘…inherent difficulties in maintaining currency in practice after the design practitioner accepts a full-time lecturing post, due to the varying demands of the pedagogic role’ (Goworek, 2007).

The Art and Design: Enabling Part Time Tutors (ADEPTT) Project (2007) found that issues arise for creative practitioners, employed for their subject expertise, who are subsequently expected to become academics.

The integration of digital design and production technologies into textile design practice has prompted changes in the way that textiles are designed and produced. This is particularly evident in the field of printed textiles and surface pattern design, where the use of peripheral devices, computer aided design (CAD) and digital printing technologies has meant that textiles can now be created with visual qualities previously not possible by using other methods. The digital textile printing process has removed restrictions previously imposed in terms of the virtually limitless number of colours that can be printed, minimum quantities producible, speed at which production is possible and to a certain extent, variations in the size and dimensions of prints on fabric. Compared with traditional textile printing methods, digital textile printing is advantageous due to low equipment costs and space requirements, speed of production, minimal ink wastage, reduced energy and water consumption (Fan et al., 2008). Digital technology continues to evolve, for example with the development of innovative scanning equipment, higher resolution digital cameras, release of new versions of CAD software, improvements with ink and print head technology and ever expanding range of base substrates available for digital printing. Fabric pre-treatment is essential to ink-jet printing, particularly with reactive dyes; following printing, steaming and washing are employed to fix the print onto the fabric (Liao et al., 2009).

The traditions of textile design and manufacture, significance of educator engagement in creative practice, factors existent in the contemporary HE system which can be counterproductive to educator creative practice and continually evolving nature of digital technology, provide the context for the research undertaken. This paper examines educator utilisation of digital technology in creative practice, involvement with teaching technology, and connections between approaches to technology in creative practice and teaching, to establish if educator creative practice remains necessary in the contemporary HE content. Although the focus is on printed textiles and surface pattern design HE in the UK, it is intended that the research presented and conclusions described are insightful to others from alternative disciplines and those who are operating in HE outside of the UK.

2. Methodology

The methodology used to undertake the research presented in this paper involved a self case study into my evolving role as a designer and educator, a UK-wide survey of educators who are working on textile and textile-related courses, and seven case studies with other educators employed at different UK HEIs. The self case study covers a three year period during which my educational employment changed from working as a visiting lecturer on a part-time, ad hoc basis, primarily at the Glasgow School of Art (GSA), but also at the Royal College of Art and Central Saint Martins College of Art and Design, to part-time contracted employment as printed textiles lecturer at the GSA. The case study method was deemed most appropriate to examine my own role, as this offered ‘…a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence’ (Robson, 2001). Several forms of evidence were generated and collected, including photographs, designs/images, sketchbooks, textile samples, products, activity log and maps/charts. The process of reflection was vital throughout the self case study, whether ‘reflection-in-action’ while
carrying out design or teaching practice or retrospectively after an experience or event had taken place, that is, ‘reflection-on-action’ (Schön, 1987). From the self case study, key themes emerged that are related to working with digital technologies, the separate components of my educator and designer roles, and my role in its entirety.

In order to increase the understanding that surrounds the key research themes, it was necessary to gain further insight into the phenomenon at the centre of the investigation from the perspective of others who are operating in comparable positions. As is the nature of real world enquiry ‘…there may be other key individuals…whom you could consult: perhaps thoughtful, experienced or committed individuals who are experts on the context you are investigating…that you will have to seek…out’ (Gillham, 2000). To gain broader insight and increase understanding with regards to the utilisation of digital technology, a primarily quantitative survey was undertaken. Criteria were applied to certain survey responses to select possible case study participants who operated as both educator and designer involved with digital design and printing technologies in their creative and teaching practices. Case study participants included a full-time senior lecturer and research fellow from the Buckingham Chilterns University College and University of Wales Institution Cardiff; part-time senior lecturers and lecturers from the Leeds College of Art, Bath Spa University, Nottingham Trent University and Chelsea College of Art; and a part-time visiting and research lecturer employed by the Robert Gordon University and GSA.

3. Utilisation of Digital Technology in Educator Creative Practice

Analysis of data generated and collected during the self case study and from the case studies with other educators highlighted six areas of digital technology utilisation in creative practice: image capture and generation, image manipulation and design development, testing and sampling, visualisation, digital production, and hand and screen-printing processes.

3.1 Image Capture and Generation

The case study respondents often used a digital camera to capture initial visual inspiration. Respondent 4 described this as a ‘snap tool’, used to quickly record inspiration. In this case, if a photographic image formed the basis of a design, a professional photographer would be used to re-photograph the subject at high-resolution, which is necessary, as Respondent 4 designs wallpapers, some of which contain large-scale digital photographs, making image quality paramount. Throughout the self case study, digital photography was used to capture visual inspiration as a means to record qualities that were personally found interesting, such as combinations of colour, shape, tone, pattern and composition. Photographs were downloaded, edited, selected and printed onto paper, examples of which are shown in Fig. 1.

Fig. 1. Self case study sketchbook extract showing primary research photographs, capturing reflective, gloss and tonal colour, shape and pattern for digital design process inspiration

Imagery for outline and shape were captured via digital scanning of secondary historical references, such as Chinese embroideries, at the beginning of the design process by Respondent 2. In my own design practice, secondary references (i.e. images from books, magazines and exhibitions, postcards, existing graphic material) are captured via scanning, photography and photocopying. These secondary sources were not directly used for the basis of a design, but printed out and combined
with primary visual material in sketchbooks (Fig. 2). By combining primary and secondary visual information in this way, it assisted in visualising certain aesthetic qualities that was hoped would be captured through the creation of designs.

For Respondent 3, initial image generation occurred through the use of two-dimensional artwork and three-dimensional objects, and experimentation with different input devices, such as a video camera, digital camera and scanner as the means to explore the visual qualities achievable and create innovative imagery. By working with scanned secondary imagery and looking at a range of physical historical visual references, Respondent 2 used Adobe Illustrator as a digital drawing tool to recreate aspects of the visual qualities evident. Similarly, during the self case study, the software 3D Studio Max (3DSMax) was used for digital image generation. Beginning with a blank scene, initial trials involved experimenting with tools and functions of the software to try to recreate the visual qualities evident in primary and secondary reference material. Fig. 3 shows a selection of examples of initial imagery created by using 3DSMax.

A number of the case study respondents used self-generated imagery as the basis for design creation. Respondent 6 worked from digital photographs to produce ink and line drawings, which were then digitised through scanning; these drawings were digitally printed onto paper, worked back into with further hand processes, rescanned, printed and worked into again. Own drawings and hand-rendered artwork, digitised through scanning and digital photography, also formed the basis of design creation for Respondents 1 and 7. Respondent 5 scanned self generated imagery, which included elements of sketchbook work, design layouts and photographs. During the self case study, working with colour involved a combination of digital and non-digital processes. By using the colour picker tool in Adobe Photoshop, colour was extracted from primary reference photographs and printed onto paper; this was then used with other media to construct hand collaged colour palettes. Different qualities (i.e. matt, gloss, translucent), combinations and proportions of colour were explored to create colour palettes, which were then used when designing.

In each phase of the self case study, experiments with software deemed to be the most successful in terms of achieving the desired visual qualities, which were adopted and further developed (Fig. 4).
3.2 Image Manipulation and Design Development

All of the case study respondents used Adobe Photoshop for image manipulation. The same software was also utilised for different aspects of design development. For Respondents 5 and 6, this included the creating of compositions, developing of patterns, and exploring of colour and scale. Respondent 7 used Adobe Photoshop to ‘blend’ different design components and also worked with Adobe Illustrator and Corel Draw, depending on the design that was being developed. To create and develop designs, a number of respondents (1, 2, 4 and 7) also used Adobe Illustrator. The use of this software was necessary for Respondent 4 as some of the wallpapers that she produced were laser cut and therefore vector-based files were necessary for production.

Throughout the self case study, after digital imagery was generated in 3DSMax, scenes were rendered and exported as image files to Adobe Photoshop. The development of repeating patterns proved to be problematic when composition was attempted in 3DSMax; more successful results were achieved by using Adobe Photoshop to explore scale and pattern. Fig. 5 shows a selection of examples of separate rendered images in different colours and the components combined to make up the design.

3.3 Testing and Sampling

Respondents 1, 3 and 7 printed designs onto paper as a means to check image quality. This was also part of the design process throughout the self case study; printouts onto paper were used to assess the results of different colour, scale, layout and pattern options. Respondent 2 sampled designs onto fabric by using a small format paper printer which contained dye sublimation inks for transfer onto fabric and a large format digital textile printer which contained acid dyes. The sampling of colour and image on fabric to test print quality on different base substrates was undertaken by Respondents 3 and 6 by using large format digital textile printing with reactive dyes. Utilisation of large format reactive digital textile printing to test visual qualities and match colour took place throughout the self case study.

Respondent 6 experimented with coating fabrics for digital printing beyond those provided by existing suppliers. Similarly, during the first year of the self case study, different base substrates were sourced, pre-treated and tested for receptiveness of digital print by using reactive dyes (Fig. 6).
Whilst successful results were achieved with pre and post treatment experiments, it was not commercially viable to use self sourced and treated base fabrics for commercial products due to the time and cost that additional processes added and the requirements to meet certain quality standards.

3.4 Visualisation

Respondents used digital technology for visualisation purposes as a means to test ideas and for further design exploration. For Respondent 6, a digital projector was used to see imagery on a large scale in order to check image quality prior to production. Respondent 1 used CAD created visualisations to enable clients to view designs in context. During the self case study, digitally created visualisation was used alongside hand produced models and sketches as a means to explore scale, pattern, composition and design coordination in interior contexts.

3.5 Digital Production

The majority of case study respondents and the self case study example used digital textile printing with reactive dyes for final production. In addition, dye sublimation dyes were used by Respondent 1 for printing onto polyester, and acid dyes by Respondent 2 for printing onto silk. Respondent 4 outsourced aspects of wallpaper production to a digital wallpaper printer and laser cutting facility. The digital textile printing facility, the Centre for Advanced Textiles (CAT) at the GSA was used throughout the self case study for sampling and fabric production. Depending on the time available, designs would be either submitted as files on disk, printed and finished by the staff at CAT, or through personally operating the equipment outside of the CAT working hours. Respondent 7 created designs for ceramics; in this instance, digital files were uploaded onto a secure website for client download, with the final printed products being produced by the commissioning manufacturer.

3.6 Hand and Screen-Printing Processes

Respondent 5 opted to use digital textile printing for production when commissioned work was particularly large scale and therefore not feasible to produce by using hand or screen-based processes. In addition to her digitally produced wallpapers, Respondent 4 digitally printed design work onto film for transfer onto screen and screen-printing. The use of digital design and printing technology for screen-printing was also a component of the creative processes by both Respondents 5 and 6. For Respondent 6, designs digitally printed onto fabric were used as a base to work back into with screen and other hand-based processes. At the time of interview, this respondent experimented with combining dyeing, pre-treating and printing digitally; future developments were to involve further manipulation of the digitally printed surface; ‘…my prints are going to be devoréd…to actually etch around the digital print’ (Respondent 6). Respondent 1 found that clients still demanded hand-printed qualities; examples of the textiles produced by this case study participant included the use of both digital and non-digital processes.

4. Teaching Digital Technologies

The analysis of self and case study data provides insight into the variations in educator involvement with teaching digital textile technologies. In each
of the cases, teaching was primarily at the undergraduate level. Differences in educator roles existed between those whose teaching was exclusively towards the use of digital technology, concerned with teaching both digital and non-digital processes or specific to certain groups or projects.

4.1 Exclusively Digital

The teaching of Respondent 2 exclusively focused on digital imaging and printing technologies. This individual taught students different CAD software (Adobe Photoshop, Adobe Illustrator and Adobe In Design) and held digital textile printing demonstrations. At the beginning of the self case study, my educator role at the GSA involved teaching only digital technologies, including a series of Adobe Photoshop workshops and inductions into the digital printing process and facilities at the CAT. As a visiting lecturer at other HEIs, presentations to students and tutorials involved projects specifically engineered to utilise digital design and printing technologies.

4.2 Digital and Non-Digital

The role of Respondent 3 included taking Adobe Photoshop workshops with second year students on ‘mechanical aspects’ of printed textile design i.e. repeat and colour reduction. Another of these technical-based workshops involved digital printing demonstrations. From the understanding gained, students creatively engaged with technology through their own practice (Respondent 3). As a third year tutor, Respondent 3 held tutorials with this cohort, some of which involved working with digital technology. The teaching of Respondent 4 included taking inductions and workshops in both hand (i.e. repeat and screen-printing) and digital processes (i.e. digital cameras, scanners, Adobe Photoshop and large format digital printing). This educator also advised students on a one-to-one tutorial basis; ‘…out will come the laptop and you’ll explain how to do something, tailor made for that student at that moment, on that design’ (Respondent 4). The educator role of Respondent 6 encompassed the teaching of CAD to second year print, knit and surface design students, and print technology to third year print and surface design students. In addition, Respondent 6 occasionally advised on ‘…other areas of the University at (the) MA’ level.

Teaching responsibility at the GSA evolved during the self case study from holding CAD and digital print inductions to teaching printed textiles (hand and digital processes) across the three years of the BA (Hons) Design – Textiles programme, and working with relevant technical staff. The majority of teaching was on a one-to-one and small group basis, relevant to the particular projects of students. CAD and digital printing workshops were still held for undergraduate students and on occasion, postgraduate students and other staff members.

4.3 Group and Project Specific

Respondent 7 taught one day a week, as her position was as a full-time researcher and teaching is ‘…an add-on’. At the time of interview, Respondent 7 was working with final year students, ‘…giving tutorials and talking about general design principles’. The teaching by case study participant also included holding demonstrations on the digital textile printer for final year students who are taking print, and only for those with an interest in digital technology (Respondent 7). Respondent 1 worked with students on a one-to-one and small group basis, and demonstrated and suggested how ideas could be expanded through the use of digital technologies, such as Adobe Photoshop and Adobe Illustrator. Due to the educator positions held by Respondent 5 as researcher and visiting lecturer at different HEIs, teaching was infrequent and tended to be on a one-to-one project specific tutorial basis; suggestions were made to direct students to use digital technology if relevant to the individual.

5. Connecting Practices

The utilisation of digital technology in educator creative practice and the variation in involvement with teaching digital technology have been described. Through insight gained during the self case study and with the data collected from the case studies with other educators, connections in approach and use of technology are evident across educator creative and teaching practices.

5.1 Software Utilisation

Respondent 2 observed students who used CAD as a‘…process to get from design to print’ with some
taking full advantage of the tools and techniques offered by Adobe Photoshop and Adobe Illustrator when designing. In own design practice, Respondent 2 preferred to use Adobe Illustrator as a drawing tool to recreate qualities evident in historical references and explained that students she taught also frequently worked with this software. Respondent 2 highlighted that her own preference for working with Adobe Illustrator influenced her teaching. My own creative practice prior to and during the self case study used Adobe Photoshop, Adobe Illustrator and 3DSMax to create designs with visual qualities unique to each of the software. Understanding gained with regards to particular visual effects that can be created through these different types of software has been communicated to students when relevant to their work and the translation of drawings and visual qualities into designs.

5.2 Hand Created Qualities
As a feature of creative practice, Respondent 6 used hand-created drawings, which were then developed via scanning, printing, drawing and further scanning, digitally printed textiles were also further worked into with hand processes such as screen-printing. The approach taken in this example of creative practice is also evident in the approach by Respondent 6 to teaching as it is stressed to students that the digitally printed fabric ‘...is just a layer and it’s not the finished article’. An aspect of the design practice of Respondent 7 involved the creation of surface pattern designs for ceramics that featured watercolour and other hand-rendered qualities. Part of the research by this individual investigated the idea that physical experience, such as touch, handle and ‘doing’ informs utilisation of digital technology. In relation to teaching, Respondent 7 explained that the ‘...hand rendering skills that...develop through the awareness, the critical skills that come from drawing...are invaluable when using Photoshop or any other graphics package’. Building on this, students taught by Respondent 7 were encouraged to use the digitally printed base as a surface for elaboration with hand processes, such as stitch and painting.

5.3 Appropriate for the Work
Respondent 4 used laser cutting, digital and screen-printing to produce different wallpapers. For this individual, the use of process is dependent ‘...on the design, it depends on the job. It’s all led by the design, it’s not led by preference, it’s still job-based, image-based, whatever’s best to translate that’ (Respondent 4). It was evident that this ethos transferred to the individual’s teaching practice, as students produced final outcomes for projects via digital equipment ‘...but not always and not everything, they’re still expected to do the best by that piece of work’ (Respondent 4).

5.4 From Traditional to Digital
The visual inspiration behind the creative practice undertaken by Respondent 2 included traditional Japanese and Chinese embroideries. This interest in working from traditional sources and techniques with digital technology was also evident in the teaching practice of Respondent 2. At the time of interview, this individual was about to deliver a workshop ‘...to create a cross-stitch in Illustrator’ and other software tutorials given were based on the recreation of traditional textile techniques via digital tools (Respondent 2). When working with digital technology, Respondent 4 made associations with understanding developed through traditional and hand-based processes: ‘...if I’m dealing with a digital fabric printer, and dealing with the way it repeats, the way that it works. I still have the attitude of it travelling down the [print] table, I visualise it going back to screen because that’s my strongest training and my strongest skill’. As expressed by Respondent 7, the association with learning from traditional and hand-based processes to understand and enhance use of digital technology, was also an aspect of student learning at the institution of Respondent 4, particularly when teaching the creation of repeating designs and working with reactive dyes. An aspect of creative practice during the self case study investigated alternative base substrates for digital printing and involved testing pre-treatment and finishing processes by using traditional print and dye equipment. Samples were shown to students and pre-treatment demonstrations given, providing alternatives to working on existing pre-treated base fabrics available for purchase from suppliers.

5.5 Visualising Ideas
The use of visualisations as a means to explore design ideas has been encouraged through my own
teaching practice and written into the requirements of student project briefs. The necessity to use visualisations for exploration, develop individual approaches and present final designs in relevant contexts was found to be important in my own creative practice and therefore influenced the emphasis placed upon this and communicated to students.

6. Significance of Educator Creative Practice Involving Digital Technologies

The case study and self case study examples involve educators who are engaging in forms of own creative practice by utilising digital technology. The fact that educators elect to undertake own creative practice highlights the importance of engagement in this activity for the individual. Case study participants also expressed the need to actively engage in their own creative practice. Respondent 2 described herself as ‘…a very active designer’ and felt that due to demand from her educator role in recent years, her practice as a designer was currently most important. Respondent 4 believed that she could potentially ‘…stop being an educator’ but if she ‘…stopped being a designer, the educator [role] would suffer.’ Respondent 7 viewed her role as more ‘designer’ than ‘educator’. Continued growth in approaches to addressing issues and problems, were found to be advantageous in the continuation of the creative practice of Respondent 5. To Respondent 3, practicing as both designer and educator was described as ‘absolutely vital’, and continuing creative practice was seen to enhance, challenge and develop skills. As designer and recent design graduate, at the beginning of the self case study, reflection on previous learning experiences and my past and present creative practice informed the approaches taken to teaching. Throughout the development of my teaching role, continuing own design practice informed and enhanced teaching related to the use of methods and processes, the discipline, related fields, industry and professional practice. However, maintenance of my own creative practice became more difficult as my educator role developed due to increased responsibilities and lack of time.

In specifically referring to teaching digital technologies, Respondent 6 believed that her own use of CAD software gave her confidence when she came to teach and assisted in keeping ‘…one step ahead of students’. For this educator, continued personal use of CAD software is required as ‘…every time they bring out a new version it changes, something that you have got really used to disappears and moves somewhere else’ (Respondent 6). Similarly, Respondent 2 found that it is highly important to continue to develop her use of CAD software as it ‘…keeps you on top of what you are showing to students…your skills…when you are teaching CAD you do need to keep those skills up’. The insight gained by Respondent 2 through her own use of CAD software informed tutorials that she had written which were regularly used as a teaching and learning method. The discovery of a new technique through own creative practice would prompt the creation of a new tutorial (Respondent 2). With the self case study example, practising by using different CAD programmes due to necessity for own practice assisted when teaching the same software. Continued development of own utilisation of digital peripheral and output technologies also informed teaching and curriculum content.

7. Conclusion

Analysis of the self and case study examples highlights differing approaches to the utilisation of digital technology. An approach is evident in which digital technologies are used as tools for innovation, as demonstrated in the creative practice of Respondent 3, which investigated the visual qualities achievable by using different input devices. Another approach used digital technologies as tools to undertake specific tasks for design and production, for example, to formulate compositions and patterns, as in the practice of Respondent 5. The creative practice undertaken throughout the self case study demonstrates a combination of these approaches to digital technology utilisation. Each phase of practice included periods of investigation and exploration, for example, when using 3D software for image creation or testing base substrates that had not previously been digitally printed. The most successful developments from the investigative and exploratory phases were then developed to produce more resolved outcomes and digital technology used to complete specific tasks i.e. to develop repeating patterns or resize designs. Approaches that use or combine hand and digital
processes are also evident as a means to maintain a hand created aesthetic quality or manipulate the substrate surface. Variation exists in the type and level of involvement educators have with teaching digital technology. Connections are evident between approaches to and utilisation of digital technology in creative and teaching practices. Educators consider engagement in own creative practice to be important to their teaching and role in education; this appears even more paramount due to the evolving nature of technology. Educator creative practice provides a platform to update skills and understanding, which can then be used to enhance teaching and curriculum content. Therefore, educators require opportunities to undertake creative practice and support for engagement in creative practice activity.

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REFERENCES