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DIGITAL AND PAPER SKETCHBOOKS: LEARNING NEW WAYS OF DRAWING AND DESIGNING

Iain Macdonald^a

^a Edinburgh Napier University
i.macdonald@napier.ac.uk

Since the introduction of the portable mobile tablet device in 2010 there has been a surge of interest in how these might enhance technology-based learning. The advantages of mobile tablets extend into all aspects of society and education. But it is the specific uses and impact on art and design practice that this study sets its focus.

This study examines recent literature supported by the sketchbook practice of two product designers who are also educators. Many pedagogic studies herald the transformative powers of digital technology but through the experience of two practitioners this study aims to test some these claims in an educational context. It questions the effect that their experience of the functionality and versatility of new media has had on their sketchbook practice.

Martin Heidegger's theories of praxical knowledge in *The Question Concerning Technology* (1954) inform this study, questioning how we think through the materials that we use, in particular thinking through the act of drawing. As the experience of the world around us becomes increasingly digitally mediated it is important to consider how designers use sketchbooks in digital and analogue forms.

INTRODUCTION

Since the introduction of the portable mobile tablet device in 2010 there has been a surge of interest in how these might enhance technology-based learning. Within art and design practice early adopters quickly recognized the potential for capturing and recording still and moving images with in-built cameras, rapid access to online media through Wi-Fi connection, and image manipulation through a multitude of software applications. Yet recent research (O'Neill 2013) questions why the physical paper-based sketchbook has yet to be superseded by digital tablets.

This study examines recent literature supported by the sketchbook practice of two product designers who are also educators. Many pedagogic studies herald the transformative powers of digital technology (Burden et al 2012; Facer 2011; Erixon 2010; Wells 2004) but through the experience of two practitioners this study aims to test some of these claims in an educational context. Over the last 18 months these designers have used portable mobile tablets and in semi-structured interviews both have reflected on how it has affected their sketchbook practice at work and more broadly, in their life. Sketchbook practice is more than drawing, for the designers involved in this study it is an extension of their body, a way of life. What effect has their experience of the functionality and versatility of new media had on their sketchbook practice, and so perhaps more broadly their lives?

Martin Heidegger's theories of praxical knowledge in *The Question Concerning Technology* (1954) inform this study, questioning how we think through the materials that we use, in particular thinking through the act of drawing. As the experience of the world around us becomes increasingly digitally mediated it is important to consider how designers use sketchbooks in digital and analogue forms.

CONTEXT AND METHODOLOGY

Richard Firth is a product designer who has over twenty years of industry experience and a loft containing several hundred sketchbooks. He is a compulsive drawer (and self-confessed "hoarder"). Only relatively recently diagnosed as dyslexic he has used drawing as a preferred means of expression and communication most of his adult life. Whether it is sketching out different perspective views of a 3-dimensional object or visualizing the coming week's programme of activities his primary tools are a pencil and paper. 18 months ago Firth bought an iPad and his life changed.

Ruth Cochrane is also a product designer and has recently worked as a lecturer, now nearing completion of her PG Certificate in teaching. She has experience in designing high-end audio products for Linn and Tannoy; she is fluent in computer aided design (CAD) processes and manufacturing, and keen to explore innovative digital practices. Surrounded

by and immersed in designing products with digital interfaces the concept of using a paper-based sketchbook may seem an anathema.

This research is based on a longitudinal study of Firth's sketchbook practice through observation and frequent discussion over the last 18 months. Using a qualitative approach, semi-structured interviews of Firth and Cochrane were recorded as a means of capturing their attitudes and reflections on their use of digital and paper sketchbooks. These two case studies offer a comparison of approaches within product design and pedagogical contexts, in a field where communication through drawing is vital and immediate.

LITERATURE

O'Neill (2013) makes a detailed analysis of artist and designers' use of sketchbooks in his review of Brereton (2009). It provides a firm foundation for any software developer looking to design a digital sketchbook. O'Neill (2013) describes four areas of the creative process that sketchbooks play a part:

The provision of an 'always-on' and 'always-at-hand' tool that facilitates the capture of new information or new ideas as and when necessary.

The capacity to store and retrieve a variety of information, such as real-world ephemera, mediated images, observational drawings, personal reflections and contact information which acts as an archive of source material that supports idea generation and memory.

The provision of a safe private space for the playful exploration of ideas, through the generation and manipulation of visual material, which supports the process of ideation and 'incubation' without judgment or criticism.

The editing and repackaging of information into presentable material that supports sharing at different levels of practice, e.g. for the purposes of collaborating or communicating with partners and/or other audiences.

(O'Neill, 2013, p.6)

For those working in education the third claim is perhaps the most problematic. With increasing assessment of every outcome in schools there is plenty of anecdotal evidence to suggest that sketchbooks are far from playful, but studiously planned out and prepared in advance. In the author's own experience of teaching at university, students appear to be

increasingly reticent to use sketchbooks creatively and freely. Perhaps the introduction of digital tablets at school may change student attitudes in later learning?

A recent study of iPad use in Scottish schools by the University of Hull's Faculty of Education found compelling evidence that digital tablets have a significant positive impact to pupil performance (Burden et al 2012).

Even at the level Puentenduera would define as 'enhancement' rather than transformation, the impact of the iPad is considerable and it is clear the device makes the classroom a more efficient pedagogic place. This has had significant impact on the attitudes of the students to learning allowing them to develop in some key skills areas as autonomous learners and self-managers of their own learning. Also the way the device acts as a modifier of classroom behaviour cannot be underestimated...

(Burden et al, 2012, p.95)

It is possible that these findings of improved performance in the school classroom are enhanced by the novelty of a digital intervention more associated with home use, but many of the conclusions in Burden et al (2012) repeat findings from earlier research. Within the art education establishment Long (2001), Ash (2004), Newbury (2004) Allen (2003), Davies and Worrall (2003) and Meecham (2000) all promote the opportunity for ICT to engage and further learning in art. Watson (2001) was concerned at the lack of progress and the pedagogic anxiety with ICT, but by the 2009 OFSTED report on art education in England and Wales it was found that digital media was making a positive impact on pupils' attainment and the exploration of abstract concepts, which was most effective where digital cameras were freely available. Boys particularly improved in art classes when ICT was provided. However, this report was balanced by the finding that the impact was still surprising slow considering the rapid digital development in the creative industries and contemporary culture, which has been echoed previously (Downing and Watson 2004; Long 2001; Wood 2003).

While some contested the assumption that the use and availability of digital media was universal with UK children (Hall in Stanley 2009), it is evident that each year it becomes a reality. "Household take-up of tablet computers has more than doubled over the past year, rising from 11% last year to 24% in 2013" (OFCOM 2013) and "around one in three parents with a tablet (28%) say that their child uses it for school or college work" (OFCOM 2013). The impact of this is that "those children with access to digital technologies outside school, such resources have the potential to intensify the impact and reach of their informal learning" (Facer, 2011, p.19). Within this there will continue to be inequalities. Buckingham alerts us to the uneven experience across different economies and the

existence of “the continuing “digital divide” between the technology rich and the technology poor, both within and between societies” (Buckingham, 2008, p.14). In 2012 there were 20 state schools in Scotland piloting the use of digital tablets (Scottish Government 2012), a miniscule fraction of the total schools in Scotland.

New technologies are constantly being invented, especially in visual media such as photography, and they become incorporated within ‘established relations’ in the mainstream activity “contributing to articulating – but not causing – shifts and changes in such relations and patterns of behaviour” (Wells, 2004, p.13). Newbury (1997) considers there to be positive opportunities with technological developments that are not predetermined but offer “new kinds of photographic and cultural practice, and a rethinking of what it means to teach such subjects” (Newbury, 1997, p.434). Addison (2010) warns that education must be “wary of technological determinism” and that learners in all artistic practices can use their bodies as tools or “in conjunction” with materials as a “fundamental and potentially inexhaustible technological resource” (Addison and Burgess et al, 2010, p.46). Wood (2004) is wary of technology’s “trickery” that can “distract” students from developing their ideas, but while art and design and photography teachers are as excited by digital tools as their students “are they losing touch with the real thing” (Wood, 2004, p.187)? With all the applications on offer is there still any value in drawing on a digital tablet?

DRAWING IN A DIGITAL AGE

There are several reasons for learning to draw in a digital age. Krcma (2010) argues that drawing can be given new visibility and purchase, re-energised as it enters a transformative relation with other visual technologies. Hanna (1998) argues that drawing with pencil and paper has been superseded in design by computer-aided design (CAD) and the digital pen and tablet technology. In architecture “the uniqueness of sketching as a design tool...is an outdated and inaccurate concept...CAD is not a tool; CAD is a medium” (Hanna 1998, p.39). Architects may well be able to visualize 3D space more rapidly with the building blocks and tools CAD offers on screen, but for the motion graphic designer and film director the process of drawing a storyboard offers an immersion into the visualisation of 2D, 3D and 4D space (Wells et al, 2008).

Drawing is considered the most intellectual of the visual art disciplines ...because it is the primary means by which artists and designers initially depict three-dimensional form, conduct inquiry and conceptualise their works.

(Addison & Burgess, 2007, p.204).

Firth's approach to drawing in digital and paper sketchbooks provides an example of how a designer can find new ways of thinking. Both Bolt (2011) and Krcma (2010) use William Kentrige to illustrate a Heideggerian theoretical understanding of creative practice that comes from our "concernful dealings with our materials" (Bolt, 2011, p.94). Similarly Firth exploits opportunities where he finds new ways of thinking through the act of drawing. Firth recognises the difference in the digital and paper materials when it comes to making mistakes. Cochrane similarly reflects that the evidence of these mistakes can sometimes be "painful" in physical sketchbooks. Firth draws directly on a digital screen using an Apple iPad (see figure 1), but finds that the drawing "lacks the scars of the thinking process" (Firth interview) which would normally be evident in a drawing on paper. These scars represent points of learning, and act as reference points of thinking and mark the living experience with the medium. It is "the contingency of circumstance" and the "interference" of material process (Krcma, 2010), which encourage what art historian Barbara Maria Stafford has called "nonformalizable moments of flexible insight" (Stafford, 1999, p.198).



FIGURE 1. DRAWING ON AN IPAD.

In broader theoretical terms, Heidegger (1954) directs us to experience the world, by being-in-the-world as Dasein, in order to understand it. Practical knowledge is not atheoretical, because "handling is not blind, but produces its own kind of sight" (Bolt, 2011, p.96). Our theoretical understanding allows us to use materials, tools and processes with care, "handling as care produces a crucial moment of understanding, and that understanding is a revealing of possibility in its very possibility (Bolt, 2011, p.97). There is a discovery of

Heideggerian praxical knowledge through our skill, in paper sketchbook practice as “material thinking”; materials have “their own intelligence that come into play in interaction with the artist’s creative intelligence” (Bolt, 2011, p.163). Digital pens and tablets have been present in the television industry since the mid-1980s and many artists, such as David Hockney have experimented with drawing on tablets and screens without the surface resistance of paper or pencil. There are now a multitude of effects that can be activated on the tip of a digital pen. However, the use of digital effects still relies on the dexterity of the artist. This has pedagogic relevance in the teaching of students in the creative arts. Students themselves can recognize that they can best learn through actually handling a material or “doing it” (Macdonald 2012). Montgomery-Whicher (2001) also takes a Heideggerian view to explain how drawing can counter an enframing of the world, by expanding and increasing the detail of our vision, and through a focal practice that brings contemplation it can centre our lives.

In 2012 the artist David Hockney, a vocal advocate for drawing, exhibited a series of digital drawings created on his iPad, at the Royal Academy, London (2012). These drawings, made by using the side of his thumb and sent electronically to friends to share, are described as “as delicate as a Turner, luminous as stained glass and as hi-tech as any art being made in the world today” (Gayford 2010). It is over ten years since Raney (2001) wrote of her Palm Pilot study with an artist in school intervention, now that digital hand drawings have been elevated to public display at the Royal Academy, children may not find the experience of drawing on an iPad as levelling and as less self conscious as on the far cruder Palm Pilot. Gombrich (2002) explains how representational drawing depends on schemata that are learnt culturally. With early digital media, such as the Palm Pilot in 2001, there was not an established schema to conform to. A decade later digital devices offer greater sophistication, fine resolution, combinations of photographic and online image databanks that can mimic and supersede traditional schemata. For Cochrane, as a designer she considers a digital tablet, such as an iPad, not as a thinking tool to replace a sketchbook, but as a communication tool replacing her layout pad for rendered visualisations. It may be too early to see if the initial success of the Scottish schools pilot (Burden et al 2012) suggests that iPads and other tablets can liberate and encourage expression rather than inhibit creative thinking. The concern that drawing appears to be “marginalised by new image-making technologies” (Montgomery-Whicher, 2001, p.10) may prove to be unfounded, as the significance of drawing will endure because of its very difference to dominant practices and media.

WORKING ACROSS DIGITAL AND PAPER SKETCHBOOKS

Firth has several hundred sketchbooks that are a record of his life and work. They are full of drawings, notes and reflections of design projects he was working on, but also shopping lists, to do lists and a general memory dump of important notes at the time: “it’s my

external hard drive...an extension of my body...it's a lifestyle" (Firth interview), and it is an approach to sketchbooks that is followed by many artists and designers (O'Neill 2013). Flicking through the pages of Cochrane's sketchbooks there are drawings for her own projects, followed by conversational sketches to explain visual problems or give feedback to students, adjacent to notes and numbers for contractors: "my whole life is in it" (Cochrane interview). Firth frequently flicks through the pages of old sketchbooks, and as he does it transports him back to the minutia of times past, but often it is in the margins that he discovers something revelatory or inspiring for his next project.

For eighteen months Firth has been working with an iPad and has recorded how it has affected his sketchbook activity. As a compulsive drawer he quickly mastered the drawing applications on the iPad favouring Sketchbook Pro because the interface was the most intuitive and the iconography was similar to other professional design software compared to the competition. While we were on a long train journey I watched him doodle and sketch up fantasy designs for futuristic robots (see figure 2). He was enjoying the freedom and elasticity of sampling textures and patterns from photographic media that could be employed as brush textures in his digital drawings. Carried by the novelty of a new toy he persevered with learning the new digital tools and developed his own short cuts and



FIGURE 2. ROBOT DRAWN USING AN IPAD

protocols to suit his methodology. As one would expect, with time he became faster and more fluent. The robots led to an exhibit at the Edinburgh International Science Festival in 2012, and developed further to another in 2013. That then led to a consultancy as an art director for a games company, Blazing Griffin. Why then did he revert back to paper sketchbooks to create designs for digital games?

The robot designs on the iPad were created out of pleasure in downtime, an entertaining meander with no set objective at the outset. Firth then tried the same process on his new commercial work and began with sketching on the iPad. One project for Elgin Cathedral demanded lots of ideas and finished visuals but it quickly began to get too laboured, the quality of the digital resolution was tempting him to add more detail than he would have sketched on paper. The way he was using the technology was not responding fast enough to his speed of thinking and idea creation. So he returned to his paper sketchbook where he could generate ideas quickly and he used the iPad to photograph, then modify and enhance the drawings in his paper sketchbook that he had made in-situ. Immediately the speed of his workflow improved as did the quality of the drawings: “used in a hybrid way digital technology can speed up the time for rendering presentation drawings, allowing more time for designing” (Firth interview). He was creating a hybrid of sketches and architectural illustration. Cochrane agrees that hand drawn sketches have a directness that can capture and communicate an idea simply and immediately. The digital tablet allows the rendering of a more visualised means of communication like a set of magic markers on a layout pad. For a designer and artist perhaps the ideal hybrid approach is to problem solve on paper, digitally capture that drawing and render a visualisation digitally to disseminate immediately online.

There were other benefits to using the iPad: everything was in one place, other media are accessible, documents, diaries, photographs and it can be online linked to social media. CAD drawings can be worked over and distributed. It can quickly be filled with data that one day needs to be filed, organized, archived or trashed. Firth is not alone in working across both digital and paper sketchbooks. Wijnen and van den Hoven (2011) have conceptualised how digital files can be connected to physical pages of a paper sketchbook using file type indicators. For Cochrane, she continues to work on both platforms and regards the iPad as a ‘second window’ that allows her to reference images from her mobile phone or social media sites like Pinterest. Computers are now established ideation tools across design domains (Jonson 2005). The digital tablet augments the physical sketchbook. Despite the Apple iTunes flick through display, both Firth and Cochrane prefer the function of a physical sketchbook that can be flicked through and browsed randomly, exposing the history of their sketches and mistakes.

Sketchbooks come in different sizes that can suit different circumstances and occasions. They work on different ‘resolutions’ simultaneously. An A4 sketchbook can work concurrently with a pocket sized A6, filled with other bits of paper, printed references,

drawings that spread over double pages and small notes in the margins. Firth likes to start his sketchbooks on different pages; excited to see when the middle, end and beginning will finally “collide” in happy coincidence. The density of the sketchbook indicates how much progress has been made, a duration and potential freedom that remains in the timeline of the sketchbook’s working life.

In the middle of the night when inspiration manifests itself Firth will reach for a trusty pencil and paper, reassured that the thought moment will not be lost and that “essence of the idea” the will be communicated directly to paper and recorded faithfully.

With a sketchbook you are not distracted by other choices...with an iPad after finding the right pen etcetera the moment is gone...an iPad can't compete... it's cumbersome...its annoying, you need prep time to be in the mode, but you can always be in a sketchbook mode.

(Firth interview)

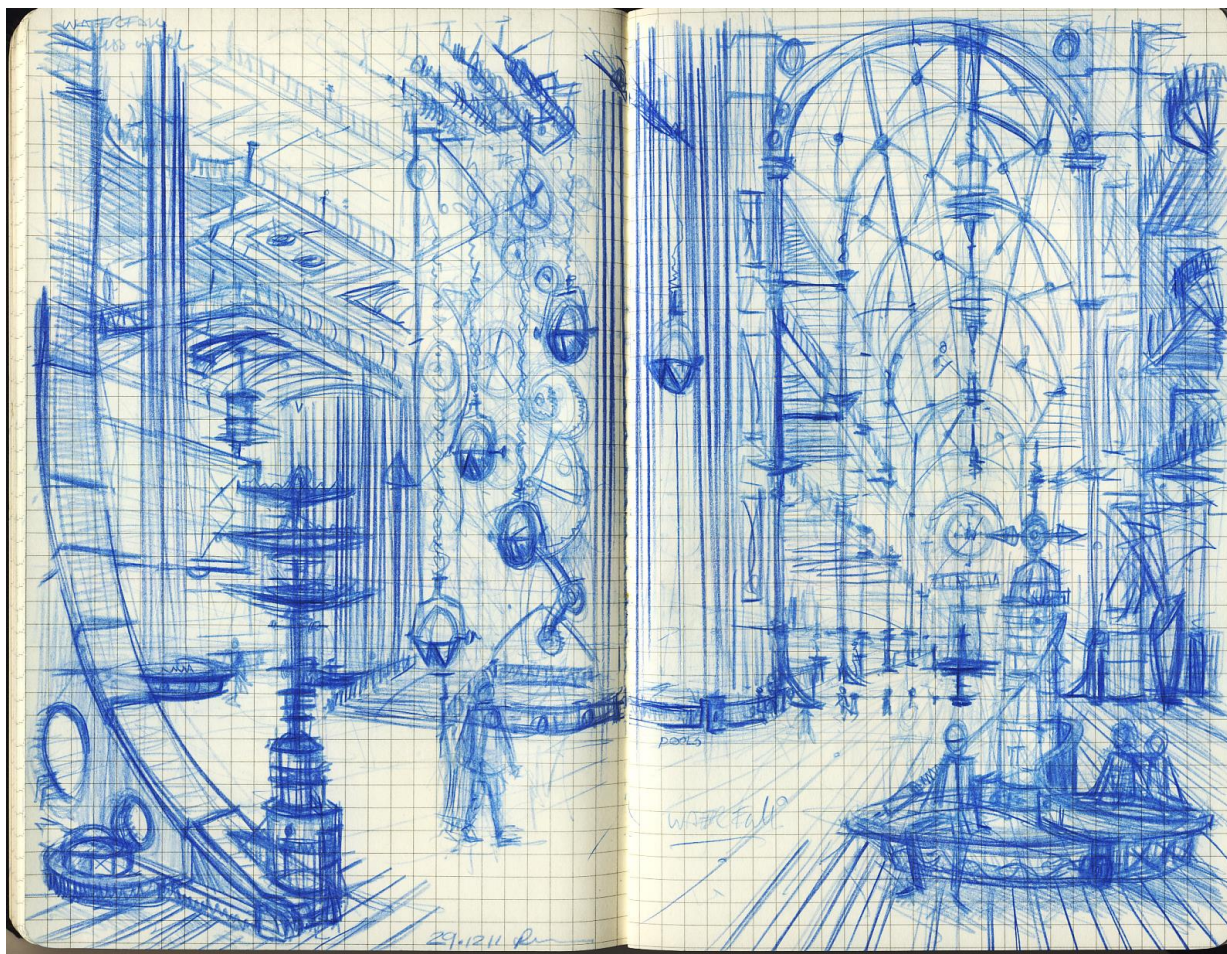


FIGURE 3. SKETCH DESIGNS IN PAPER SKETCHBOOK.



FIGURE 4. WORKED UP SKETCH USING IPAD.

In the last six months his attitude to the iPad has changed. “I haven’t used the drawing application on iPad for awhile, I’ve forgotten half the shortcuts, sequences that made the thing fluid” (Firth interview). Many of his designs for the digital games originated in sketchbooks and then digitally captured to be worked up using Adobe software (see figure 3 and 4). The screen began to represent “work”, and the paper sketchbook was “relaxation”, therapeutic, “time out to reflect, like a roll-up cigarette, a meander”. As a starting point for creative thought the physical sketchbook could always be relied upon. For solving problems visually a sketchbook is direct and immediate, from mind to paper. As a teaching tool the paper sketchbook remains indispensable.

TEACHING WITH SKETCHBOOKS

Firth and Cochrane are both product designers and educators, and their approach to using sketchbooks in a teaching context is similar. They use paper and sketchbooks all the time to communicate and problem solve visually. It is particularly effective in situations when teaching international students where common verbal language is limited. By drawing they teach through demonstration and when the objective is to design something the sketchbook becomes the ‘means’. Working with a sketchbook is not anachronistic, but part of professional practice.

Cain (2010) makes the argument that “drawing is an experiential as well as a visual methodology. It is concerned with discovering what can be known through the experience

of making rather than prescribing the content of what can be known” (Cain, 2010, p.267). We learn through practical application and experimentation and most effectively in a learning environment that allows for mistakes. This develops tacit knowledge, which requires “imitation, practice, repetition and complete immersion: it takes time, what Polanyi calls ‘indwelling’” (Addison and Burgess, 2000, p.36). “Experiential learning is recognised as a reflexive activity, where action and reflection are coexistent, both interdependent and interactive” (Addison and Burgess, 2000, p.31). This approach is also proven to be transformational with digital technology in the classroom where students might not necessarily be such competent drawers, ‘the digital age rewards a different sort of student, not necessarily the one who would have excelled in the past’ (Wood, 2003, p.17). Sketchbook drawing in any medium must be encouraged through demonstration and by example, leaving students empowered to choose their own medium of preference.

Wood says “in art and design, the computer shifts the emphasis from the left hemisphere of the brain to the right” (Wood, 2003, p.17). Does this follow when an iPad is used as a sketchbook? O’Neill (2013) aligns “appropriate technological solutions to particular creative needs in a holistic way” (O’Neill, 2013, p.18) to make the case for the design blueprint of a digital sketchbook:

A digital sketchbook should be an invaluable, omnipresent, research tool that allows its owner to incubate new ideas, through exploration, experimentation and play in a safe and private environment whilst also allowing for the editing and sharing of its content in ways suited to multiple audiences.

(O’Neill, 2013, p.12)

The digital sketchbook is not far from being able to “support memory functions, research activities and the cognitive process of incubation, among others” (O’Neill 2013: 18). Cochrane finds that using digital tablets to demonstrate design solutions and research can improve student engagement.

Computers and digital media are seen to offer exciting new possibilities for creativity in art and design classrooms (Meecham 2000; Wood 2004; Radclyffe-Thomas 2008). Radclyffe-Thomas quotes Jones to say that when ICT is embraced by students “they find its potential for artistic creativity ‘phenomenal’ and ‘astronomical’” (Radclyffe-Thomas, 2008, p.160).

With the embracing of new technologies many like Addison and Burgess (2000), Meecham (2000), Long (2001) and Sefton-Green (1996) are wary of the promise of a bright future that “all too often bears an uncanny resemblance to the past” (Stanley, 1996, p.98). “It is the issue of the dominant order that is at stake in the use of technology in the classroom” (Meecham, 2000, p.222). Technology has a “transformative power...to create a better world’ but not if teachers ‘merely adapt it to old style pedagogical practices” (Delacruz,

2009, p.266). Recent research in Scottish schools (Burden et al 2012) is more optimistic. Software and applications provide a portable platform for many students to coach and teach their peers independently of the class teacher. Teachers “feel” (Burden et al 2012) that the functionality of digital tablets supports a wider diversity of learning ability.

The use of iPads has enabled many more students to express their creativity, to engage in peer assessment and in group critique.

Teachers have seen the emergence of a real learning community that extends beyond the academic to include a partnership between students and teachers who work closely together.

(Burden et al, 2012, p.10)

In their opinion “these emerging technologies are set to challenge existing paradigms or World-views of teaching and learning” (Burden et al, 2012, p.95). In Sweden Erixon (2010) found that relations between teachers and students were changing as the “digital natives” were helping the “digital immigrants” (Prensky 2001). Teachers have “to do away with their prestige... (and) as a consequence of this, the classroom relations are becoming more intimate and hence more positive. The pupils learn more” (Erixon, 2010, p.1218). There is growing evidence across the developed world that digital tablets are having a transformative effect in the classroom. There are applications for every subject taught, but within the context of drawing in art and design there are still uncanny resemblances to physical pencil and paper. The sketchbook, whether physical or digital, has always been portable and had the opportunity to be interactive. Once the novelty and difference of digital devices has gone, and ubiquity and orthodoxy established, where will students seek to express their originality in the future? Perhaps the current trend for hand-lettering in graphic design suggests that in a digital orthodoxy there is space for the unique signature that drawing affords, but that is for further study.

CONCLUSION

Over the last decade research has proved that digital technology, and more recently digital tablets, are transformative and empowering in education. In art and design, digital tablets with the appropriate software application can unlock real creative potency in students. Digital tablets can augment paper-based sketchbooks as a second window into a library of moving and online image databases, but for many artists and designers the directness of drawing on paper has yet to be mirrored digitally. The young ‘digital natives’ may not feel as hindered by deeply ingrained analogue practice, and may work more intuitively with digital tablets as a medium of choice.

Drawing can be energized and given new value through problem solving using digital tablets. Whether this is manifest in digital origination or as a hybrid of captured paper-based drawings and digital manipulation, educators must continue to teach by example and demonstration, utilizing the digital skills of their students if necessary. Students may have the digital know-how but not the intellectual problem solving and design skills or 'material thinking' skills. It is important to retain the experience of learning through the materiality of paper sketchbooks, to continue to explore the interference of the physical and to experiment. There is a real danger in art and design education that the assessment culture will propagate digital tablets for its sanitizing qualities: the ability to undo mistakes and its lure of surface polish.

The mixed advantages of both digital and paper sketchbooks are also evident in storage and curation. Exhibitions of sketchbooks may no longer be frozen moments encased and out of reach, but instead interactive and universally available online as well as in-situ gallery exhibits. Physical paper sketchbooks can be scanned and made available digitally. But the random memory retrieval prompted by the smell of a sketchbook and the happenstance of how other gathered materials can fall out from the pages is unique to the physical form. It might be nostalgic one day to think back to when the loft was filled with a lifetime's work in sketchbooks.

The choice of paper or digital sketchbook may lie with personal preference and whatever lies most readily at hand when inspiration strikes. The choice may also be economic and those on the poorer side of the digital divide can take only a little comfort that a paper sketchbook still has a place and potency in design and creative thinking. Technologies come and go, but we cannot underestimate the longevity of paper and pencil.

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