PLYMOUTH COLLEGE of ART

making FUTURES

Through the Eye of the Needle: Why Teach to make by hand in the Digital Age?

Paula George

There is a remarkable contradiction in the static nature of human activity generated by digital technology and the dynamic nature of human activity motivated, consciously or sub-consciously, by a desire to counter this immobility. One consequence of this is evident on digital media platforms which have birthed a wealth of accounts about the benefits of engaging in craft, written from the perspective of the maker. The craftsman Peter Korn comments, "craft has taken on a new life as a counter-virtual ideology" (Lovelace, 2018). Yet, in stark contrast to this trend, our schools have witnessed a steep decline in the provision of practical craft-type subjects since 2010 and many school workshops have closed altogether.

I began to observe this growing dichotomy whilst teaching in both community and mainstream school workshop settings. On the one hand, I taught practical craft classes for wellbeing, self-improvement or just pure fun, whilst on the other, the secondary school lessons I taught, required students to spend increasing amounts of workshop time writing lengthy descriptions about the process of making. These experiences presented me with a series of eye of the needle moments whereby several competing agendas converged in the narrow time and space of the classes I taught. These manifested as a combination of written documentation, organisational and personal expectations, and student responses.

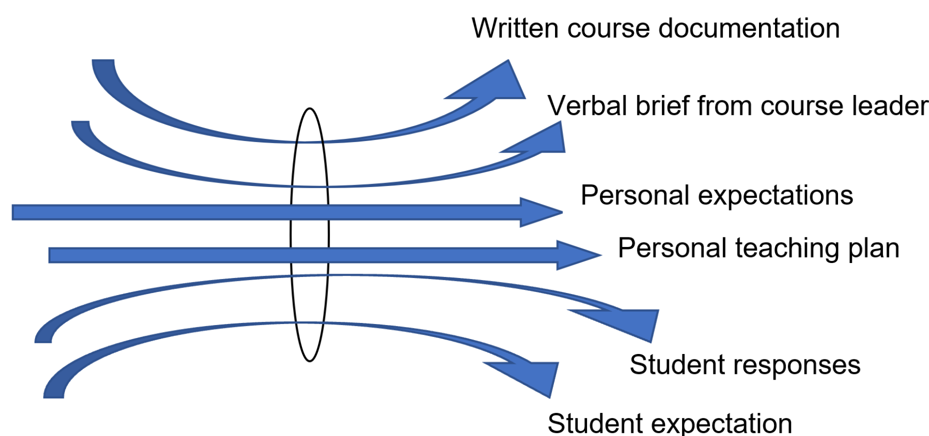

Figure 1: Diagram showing conflicting agendas that converge in a practical craft class

These discordant classroom tensions are not unusual in themselves, however, planning and delivering these classes revealed a deep systemic schism in our establishment understanding of why people learn to make things. This becomes significant when we view the growth of physical craft for wellbeing initiatives (Jeffries, 2019), (Fancourt & Finn, 2019), in relation to the decline in provision of physical making activities in mainstream education. Does this matter? This question led me to a master's program, set up by the Inland Norway University of Applied Sciences, with the aim of investigating the benefits of learning traditional hand-craft skills in the modern-day context. This became the focus of a four-year action research inquiry.

This paper addresses five key questions that emerged during this research process:

- Why is there a schism in establishment success criteria for learning to make by hand?
- How do course providers recognise the value of making activities?
- How do learners describe what they gain from these activities?
- What is the correlation of understanding between these two perspectives?
- What is the problem?

Research Approach: Action Research Teaching Projects

This study sought to include the voices of the diverse group of people who participate in the process of facilitating a learning experience that involves creating something that can be used by others. I used an implementation science approach which acknowledges *"the communication challenges at the disciplinary gateway"* (Nilsen, 2015) that emerges in the context of socially defined learning settings. This necessitated an initial exploration of the language and cultural knowledge systems used by the people and organisations involved.

To gather observational evidence of responses in relation to the physical experiences generated during the learning encounter, I needed to slow the activities down. The most obvious way to do this was by taking written and visual snapshots as the classes progressed. These provided a lens through which to explore correlations of theory and practice.

By comparing policy documents with records of the practical experiences of both teacher and learner in different educational contexts, I set out to distil key characteristics of this subject area that appear to benefit students of all ages and backgrounds who participate in these activities today, and to invite further debate about the value of teaching to make by hand in the digital age.

Why is there a schism in establishment success criteria for learning to make by hand?

Policy and Folklore

'In today's fast moving world where the half-life of knowledge is ever shorter, the old distinctions between know-what and know-how are blurring' (Lucas et al, 2010, p.35)

It is in this context that the semantic problem of communicating between the hand and head traditions in education emerges. How do you describe a process which is

timeless and infinitely individual in application? How to articulate something which, until now has not needed to be explained in words? Even the words 'craft' and 'vocational' are problematic. People no longer engage in designing and making things purely with the aim of making a living. A recent article in the American Craft Magazine raises the question, "'craft' is a curious word. We think we know it, but do we?" (Lovelace, 2018).

When I started to look for documented frameworks to support the teaching and learning of the human act of making things, I found the discourse relating to the practical aspect of this field of education to be fragmented, being generated by separate communities of educators (Penfold, 1987) (Banks, 1994) (Kimbell, Stables, & Green, 1996) (Owen-Jackson, 2013). More tellingly, the language used to describe the nature of these practical activities, is diverse and has changed significantly over time: similar practical activities being variously named as creative, craft, design, or technology. Yet many of the processes the language seeks to describe have changed little in thousands of years of human experience. Our Palaeolithic forbearer probably held a fishbone needle between the finger and thumb in much the same way that I and my students hold a metal needle today. Today, these fundamental hand and body movements used to make things are variously called 'traditional', 'foundational' or 'heritage' skills, depending on the learning context.

The Unsaid.

It could be argued that the practical craft tradition does not use language at all. The only historical written documentation attached to learning these skills are technical manuals related to individual material disciplines. Yet these are, in effect, another tool; they represent a partial and script. The full knowledge of the craftsman is passed on through demonstration which is then practised by the student. The knowledge is disseminated in the way the hand holds a needle or the way you stand while sawing a piece of wood. This is as true today, in school workshops and community halls, as it has been for hundreds of years. As Richard Sennett comments, "What endures, what does not decay, is the technique of focusing on the right angle." (Sennett, 2009, p. 128).

In this way, physical actions generate a visual language which bypasses the need for the spoken or written word. The end result articulates a relationship to the maker and the community it serves through material gestures. This points towards the individual character and complexity of the practical process and reveals why the master craft teacher prefers to leave much of the process unsaid.

Knowledge vs Savvy

In an attempt to locate learning frameworks to support current conceptions of craft for wellbeing, I found that the strategic use of craft activities to stimulate emotional and psychological development is evident in the early European educational models of Froebel (1902), Steiner (Hauck, 1968), and the Sloyd system (Salomon, 1898). However, these disappeared in later models; the influencing factors became too complex to categorise within an evolving system of state education (Bloom et al, 1956) and 'practical' skills became partitioned by notions of hierarchy of intelligence because they carried "pejorative overtones, frequently being construed as the opposite of 'academic'" (Penfold, 1987, p. 35). As a result, teaching theory distinguishes craft as 'creative' expression,

founded in European experiential pedagogy, from craft as social 'utility', shaped by Anglo-American technical education. Here the English language suffers the lack of distinction between connaissance and savoir faire, which we may understand as the difference between cognitive knowledge and being 'savvy' through practical experience.

In the 1990's Richard Kimbell's research attempted to blend these two parallel head (cognitive) and hand (practical) traditions under the banner of Design and Technology. He spent many years observing what students do when they make something and concluded that making "empowers pupils" "through its unique concrete language" (Kimbell et al, 1996). Nevertheless, policy debates about the value of handwork have persisted (Owen-Jackson, 2013), (Banks, 1994) leading to the present dichotomy of the subject inside and outside mainstream education.

This trajectory can be traced back to the Robbins report of 1963 which aimed to establish "co-ordinating principles" and "a general conception of objectives" (Robbins, 1963, p. 5). This resulted in the merger between the two separate branches of higher education that had evolved since the seventeen hundred's, namely the arts & technical colleges with the academic universities. This succeeded in homogenising the mainstream system, whilst creating a distinction from the antecedent systems which have persisted and evolved outside government prescribed curriculums, in the work place, special education and community learning. To understand how this process has shaped this field of learning it is worth reviewing the ensuing struggle to name the subject in schools.

The Language of Consensus - A Cacophony of Experts

Richard Kimbell commented that, "in the early 1960's the subject did not even exist in anything remotely like its present form." and that, "It is because of this newness that it is so unstable, and this instability makes it vulnerable." (Kimbell, Stables, & Green, 1996, p.9-10).

Here Kimble is talking specifically about the mainstream school conception of the subject. Since he wrote this, the corresponding general certificate of secondary education (GCSE) has undergone several further name changes; the National Curriculum iterations are listed in the table below.

- **1950's -1970's:** Separate courses: **Woodwork, Metalwork, Technical Drawing, Needlework and Dressmaking, Home Economics (**previously **Domestic Science)**
- **1987: Craft, Design and Technology** an amalgamation of these pre-vocational courses
- **1989: Design and Technology** defined by the new National Curriculum in England and Wales
- **2007:** The antecedent subjects had persisted and were rebranded
- **GCSE Design and Technology: Electronic Products**
- **GCSE Design and Technology: Food Technology**
- **GCSE Design and Technology: Graphic Products**
- **GCSE Design and Technology: Resistant Materials**
- **GCSE Design and Technology: Systems and Control**
- **GCSE Design and Technology: Textiles Technology**
- **GCSE Design and Technology: Product Design**
- **2017: GCSE Design and Technology** - the different GCSE curriculums above have been remerged into one subject with the exception of Food Technology which reclaimed its function as a separate food preparation and nutrition subject in 2015

Figure 2: List of subject names used to teach traditional and new techniques for making things out of wood, metal, plastic, textiles and food.

A key point here, is the new 2017 Design Technology GCSE represents a re-merging of this long list of separate subjects. This apparent distillation of the subject has occurred because in other aspects the subject content has become increasingly more complex over the same time period. In the book Debates in Design and Technology Education, Owen-Jackson lists all the new skills that were added to the process of learning to make something, from the use of hand tools in the 1960's to 'technology and society' in 2013. Since then, the national curriculum has added new skills such as 'customer research' and new knowledge such as 'sustainability' (Ross, 2017). Clearly the addition of extra skills and knowledge into a finite school timetable creates further opportunities for debate about what has value and what should receive less attention. Owen-Jackson questions: "Are all the skills still necessary? Is all the knowledge still relevant?" (2013, p. 66)

This formulation of the subject may be more effective on a cognitive level; however it disregards the fact that the practical processes are divided by the physical demands of different materials and tools which are integral to the process. Without these the subject becomes purely conceptual and indeed imaginary.

How do course providers recognise the value of making activities?

Words, Words and More Words

To examine how this trajectory of change in the creative-technical group of subjects has impacted the physical reality of what students actually do, I asked some older textile teachers to show me examples of past student coursework. I also sought old GCE practical exam papers from the 1960's and 70's. I present some examples of these below. The differences are striking.

GCSE (or equivalent) Design and Technology- exemplar practical exam work 1972-2017

Figure 3: Images used to reflect the changes in requirements for practical coursework from 1972–2017.

In 1972 students were required to amend a garment pattern in a preparatory session of 30-40 minutes and then to cut out and sew part of the garment in a two-hour practical exam. The 2017 coursework page is used to explain and record the 'practical' controlled assessment work of the student. Guidance recommends as many as twenty similar pages which demands a predominantly written not practical focus on coursework, despite the exam board claims to the contrary. This represents a huge increase in the amount of words a student is required to write and, correspondingly this demands less physical engagement with the process of making. In response to being asked to produce more pages of process description, one dyslexic student said to me, "So I am being judged on my ability to write about the subject, not on my ability to do the subject?!"

Interestingly, teacher concerns about the inequalities exacerbated by the written content of the subject, have been met by further defence of the system from the government (Department for Education, 2015, pp. 8-9).

Measured Value

The community classes I teach present a different set of dilemmas in relation to assessing value in the process of learning to make something. The course objectives and corresponding assessment forms are clear and unambiguous; the level of skill obtained is graded on a scale of 1-5, refer to the learning plan below.

3. & 4. Course Learning Outcomes
This is what you can expect to cover during your course and will match the outcomes on the Course Outline. Please indicate which statement describes where you are at the moment. Where progress has been made, please write where this can be evidenced (e.g. photo)

1 = I cannot do this **2** = I can do this with tutor support **3** = I can sometimes do this
4 = I can do this most of the time **5** = I have achieved this outcome

3. Learning Outcome	Evidence	Start of course	Mid Course	End of course
Use a sewing machine safely to perform basic stitches		3	4	5
Understand fabric types suitable for garment type		3	4	4
Use a shop bought pattern to make a garment that fits		3	4	5
Sew a neck facing or binding		1	3	4
Insert a zip or other relevant fastening		2	2	4
Work to relevant Health & Safety guidelines		4	4	5
4. Personal Learning Outcome	**Evidence**	**Start of course**	**Mid Course**	**End of course**

Figure 4: Extract from an adult education Individual Learning Plan used to record student progress.

These skills are confined to physical technical abilities, yet verbal feedback from students and commissioners often praised the courses for personal capabilities gained, such as self-confidence, self-motivation, social skills and patience.

When I questioned the omission of these outcomes from the local government

courses I taught, I was told that, whilst the course leaders recognised these benefits, they are 'soft outcomes' which means they are difficult to fit into government and charitable funding assessment reports which require learning objectives to be "SMART": Specific, Measurable, Assignable, Realistic and Time-related (Doran, 1981).

One attempt to measure these soft outcomes is the Warwick Edinburgh Mental Wellbeing Score (WEMWBS) (Warwick University, 2015), favoured by courses used as a therapeutic intervention. However, these reveal a deeper gap in understanding surrounding the determinants for success in the practical making classes I taught. The wellbeing questionnaires make no reference to the activities that impact the feelings they seek to measure, while the corresponding mainstream educational models ignore the impact of feelings on outcomes. This becomes a problem when trying to target activities to specific needs or benefits.

The WEMWBS. Below are some statements about your feelings and thoughts. Please tick the box that best describes your experience over the past two weeks.

Statements	None of the time	Rarely	Some of the time	Often	All of the time
I've been feeling optimistic about the future					
I've been feeling useful					
I've been feeling relaxed					
I've been feeling interested in other people					
I've had energy to spare					
I've been dealing with problems well					
I've been thinking clearly					
I've been feeling good about myself					
I've been feeling close to other people					
I've been feeling confident					
I've been able to make up my own mind about things					
I've been feeling loved					
I've been interested in new things					
I've been feeling cheerful					

Your responses will remain anonymous. The following information will be used by Kent Public Health to track the scores as you complete the form at each stage - before the intervention, after the intervention, at 3 months and 6 months.

Figure 5: Example of the WEMWBS used to assess changes in learner feelings Warwick-Edinburgh Mental Well-being Scale (WEMWBS) © NHS Health Scotland, the University of Warwick and University of Edinburgh, 2006, all rights reserved.

How do learners describe what they gain from these activities?

Feedback forms

In view of the limitations of the pre-defined learning assessment scales, I became interested in the variety of alternative feedback forms used by independent community partner organisations, such as housing associations. These are used to stimulate and capture a range of responses including personal outcomes and feelings in relation to the learning experience;

an example of this are the speech bubbles from a participant feedback form shown below.

Will the skills you have learnt on this course make you more employable? If yes, Please explain below::

N/A

What was the best part of this course/activity?

teamwork and socialising

What have you learnt from the challenges of this course?

patience and teamwork and being creative

Figure 6: Part of a community learning end of course evaluation form.

By collaborating with different commissioning bodies, I developed feedback forms which offered more insights into the relationship between the specific circumstances and the corresponding experiences these facilitated. This process emphasised how existing mainstream assessment frameworks only find what they seek and therefore, by omission, they generate a gap in research and understanding about the potential human impact of learning practical craft skills.

Use of digital technology to capture in process data.

A characteristic of informed consent to capture participant data is that it stimulates a positive cyclical feedback loop with students. Students become actively engaged in documenting their own in-process actions and reflections on action. The most readily accessible tool to do this has become the mobile phone and tablet computer. Moreover, the adoption of social media and classroom digital applications to capture data, capitalises on existing community social media networks. Facilitating organisations often encourage students to share their photographs and comments as a means of promoting and celebrating success. From an organisational perspective, this provides opportunities

for evidencing progress and involving participants in research design and evaluation. From an enquiry perspective, this has the added advantage of capturing in process participant observations without the filter of observer bias or participant revision.

In the secondary school I taught, this type of data offered significant insights into the relationship between action and experience which manifest within the context of learning to make something. Students were accustomed to recording their own learning experience through the use of the digital classroom app Showbie (2018). This combines verbal written comment with a contextual visual snapshot, often in response to a teacher question. This method of collecting class feedback is emergent in the context of our evolving relationship to digital technology. As such, it offers new insights into the learner experience of making things, which perhaps have not been so accessible in the past. More importantly, when consciously used to seek understanding of the value of engaging in craft activities, patterns of behaviours and responses emerge which are difficult to locate within establishment frameworks for learning to make by hand today. This raises questions about who defines this value and how this is actively monitored and assessed.

What is the correlation of understanding between these two perspectives?

The difficulty was not so much in finding a correlation of spoken understanding, but in finding a correlation of documented understanding. To seek articulations of the perceived benefits of craft in the curriculum without the filter of mainstream learning models, I looked to educational provisions which have seen little change in approach over time. These exist outside government funding and regulatory systems in special schools, community learning, independent colleges and mainstream extra-curricular initiatives.

Staging the encounter with reality.

As part of the master's course, I spent time at the Ruskin Mill special needs colleges in Stroud and Stourbridge (Ruskin Mill Trust, 2020). While their approaches are founded on Steiner principles, I found that much of their evolved understanding and case studies echoed my own experiences of the transformative impact of engaging in fundamental making activities.

Gert Biesta said that *"any act of creation (including education) is at best a dialogue between one's intentions and the material one works with,"* (Biesta, 2016, Acknowledgements p.5). This is certainly true of human endeavours to make things using the resources at hand. Anyone who has spent time repeatedly attempting to master, or teach others to master a practical skill understands that the learning happens during the process of struggling to adjust your emotional and psychological abilities to the physical demands of the tools and materials. Biesta described learning as a process of creating experiential opportunities for the learner, which he has called "staging the encounter with reality." This demands a live and appropriate response from the subject of the encounter (the student). These opportunities exist every time we try to sew a garment to fit an individual body using basic equipment and materials. A small window into this experience was described by a school student in their record of progress: "I think using the sew machine is hard because there is a needle that can hurt you. Also you need to remember lots of things."

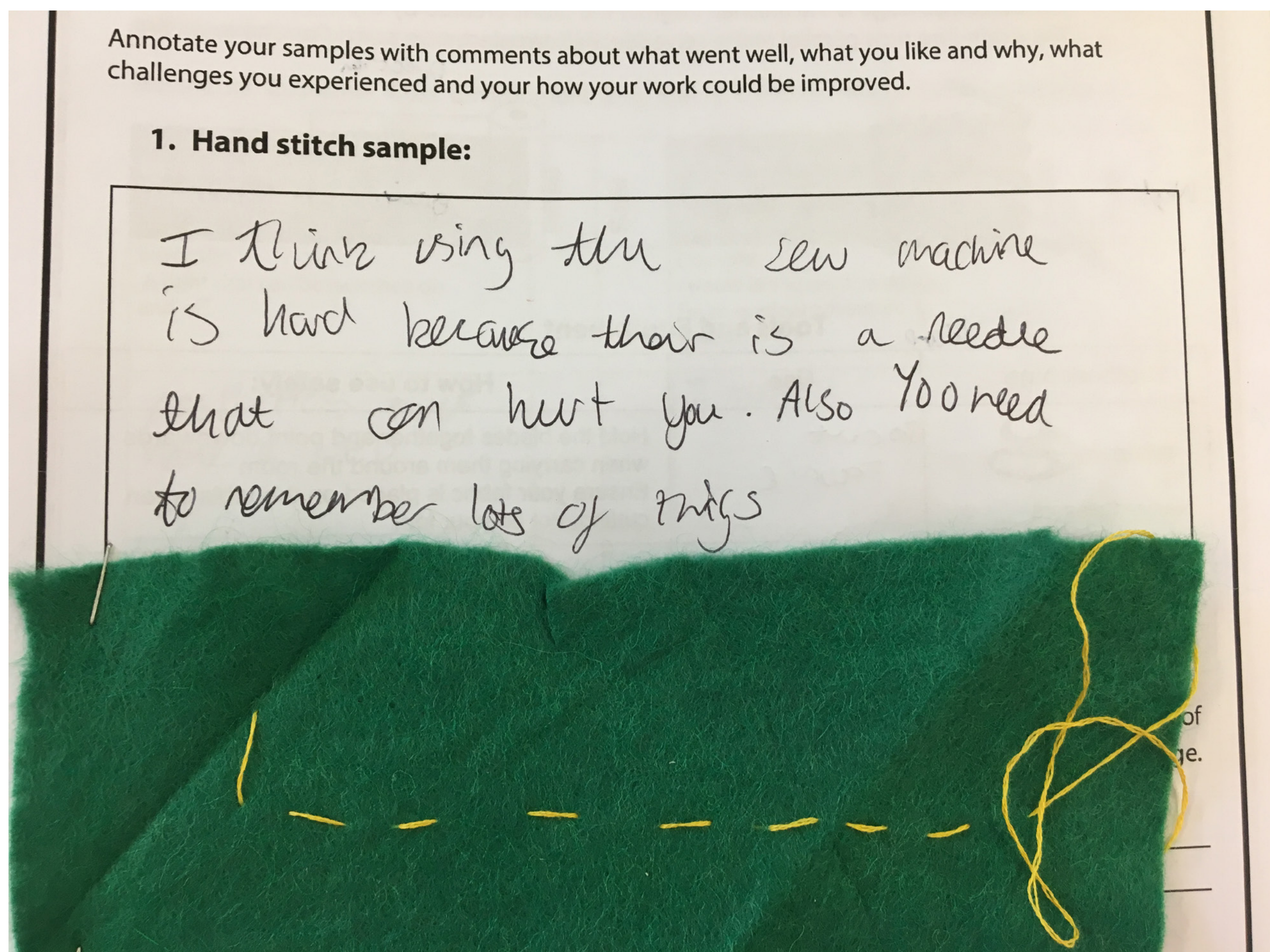

Figure 7: Instagram post reproduced with permission from Dandelion Time charitable trust, Maidstone Kent 2020.

On the surface this experience may appear simple. One textile professor told me these are 'very basic skills.' This is certainly true when viewed in the context of scaffolding creative-technical skills. However, when set alongside notions of scaffolding the development of personal capabilities such as self-confidence or patience, then the inter-relationship between material and personal transformation becomes far more complex and less easily defined. The World Health Organisation report into evidence of the effects of arts programmes on health and wellbeing (Fancourt & Finn, 2019), highlights the lack of understanding surrounding the material categorisation of these types of activities whilst making further broad-brush descriptions of the processes employed.

This is problematic because the challenge to master something has many elements which effect the success of the end result. These demand an integration of a multitude of human sensory systems. The aspiration of action and outcome represented by a teacher role-modelled exemplar or an envisaged design generates challenges that extend far beyond the resistance of the physical material. Holding a thread and attempting to push it through a tiny hole in a needle, or picking up a pair of scissors and taking the decision to cut a piece of fabric to an exact shape, demands the full attention of all our senses. This corresponds with Dewey's description of motivation in the face of an emotional desire or dislike:

"Emotion belongs of a certainty to the self. But it belongs to the self that is concerned

in the movement or events toward an issue that is desired or disliked."
(Dewey, Art as Experience, 1934, p. Chapter 3.)

Repetition Rehab

Mastering the integration of these complex sets of skills requires many attempts; persistence, application and trial and error. This is why students of all ages and abilities demonstrate desires to repeat the process.

Figure 8: Adult student repetitions of a patch pocket to improve the result.

The instinct to improve the physical ability and corresponding result, reveals another dimension of the craft process. The repetitive motion becomes supportive so that we can navigate the tension of possible failure and our natural inclination to desist. This presents a dynamic state where we are able to observe ourselves when irritated, tired or under stress. We can discover what it feels like to strive for consistency and to be supported by the discipline achieved by others. This teaches empathy and appreciation of other's efforts. Then we have the possibility to explore other perspectives and avenues that may help us to pass through the eye of the needle passage between resistance and desire. This facilitates self-observation, and hence self-care, through

doing. This is self-formation through doing: adapting, adjusting, accepting.

Alasdair Gordon, articulates precisely this element of the practical craft process in the Ruskin Mill research journal:

"Learning can be transformative for the student...whereby normally unconscious habits can gradually be revealed and made conscious." And "by reflecting on their activity...the conceptual content of what the students learn becomes conscious." (Gordon, 2015, p. 15)

Hidden in plain sight

The most surprising aspect of this research was the discovery that not only is the traditional model of practical creative education thriving in educational settings that have evolved beyond government regulatory frameworks, but that they exist, often hidden in plain sight within the mainstream education system in the form of after school clubs, off-timetable projects and separately funded courses. And remarkably, much of this knowledge system has been adapted to meet modern needs and is flourishing. I visited several local schools in Kent and the evidence I witnessed supports this comment in the Wolf report into practical education:

"The numerous examples of good quality innovation and success are achieved not with the help of our funding and regulatory system, but in spite of it." (Wolf, 2011, p. 21)

Practical work is taught in schools because this is what the children respond to. This is why, in schools across the country, children make cakes, cushions, key rings and wooden boxes. Children become emotionally engaged with the activity and the end result. The John Wallis Academy in Ashford, has capitalised on this by providing learning experiences that meet the real-life needs of the students. It has developed a system whereby the practical workshop classes form the foundation to stimulate engagement and understanding in more conceptual subjects (2018). Similarly, Valley Park School in Maidstone provides a huge range of challenging and rewarding creative-technical experiences for their students, for example, it trains all pupils to make expressive and durable clay structures which are fired and finished in two large kilns and it runs a sponsored team which designs, builds and races their own eco-friendly 'green power' car. The broader beneficial contribution these activities bring to the school community was recorded in the 2013 outstanding OFSTED report:

"The extensive range of activities organised through the expressive arts specialism contributes very well to building students' self-esteem and confidence. The many performances and extra-curricular activities ensure that the school is a vibrant place." (Ofsted, 2013)

Digital Chat

The comments I derived from course feedback forms and digital classroom records of progress bear a remarkable resemblance to the type of accounts of personal revelation and support expressed by people who share their experiences of making things on digital media platforms such as Instagram or Facebook.

A quick search for hashtags such as #craftforwellbeing, #craftmatters, #doitfortheprocess,

#mindfulmakes, will bring up a rich source of perspectives and accounts from the maker community. Individuals and organisations regularly post evidence to support the link between engaging in craft and human transformational experiences. One example below was recently published by the children's charity Dandelion Time who offer therapeutic support for children dealing with trauma (Dandelion Time, 2020)

Figure 9: Instagram post reproduced with permission from Dandelion Time charitable trust, Maidstone Kent 2020.

In the past, crafts people had neither the need nor the means to express themselves in this way. Today, the proliferation of internet blogs, posts and videos has, in turn, given currency to these types of testimonials. It is now possible to read journals and books written my makers which are decisively not technical manuals; they document detailed descriptions of the practical creative-technical process and what it offers to the individual and society as a whole. At the start of this article I quoted the craftsman Peter Korn. His book Why we make things and Why it Matters (2013) is just one example of this phenomenon.

This amplification of the voice of the maker beyond the constraints of authoritative institutional logic is a direct manifestation of our digitally filtered lives. On the one hand it draws attention to the basic needs of people in spite of technological advances and on the other it facilitates reflection and shared understanding of our enduring relationship to craft work.

What is the problem?

The Dilemma of Certainty

The written content of many practical subjects has proliferated over time, partly as a means to distinguish differences between grade boundaries and partly in response to demands for greater parity between subjects. There are several benefits to this:

- To present unambiguous distinctions between grade and progress levels
- To create clear learning objectives
- To scaffold principles of learning
- To measure and drive up standards

Today, it is hard to imagine an education system that doesn't provide clear learning objectives and the means to evidence and assess progress. The problem here is the word 'unambiguous' and the assumption that the 'principles' and 'objectives' of the separate knowledge systems that had evolved through millennia of practice are directly comparable. In reality, they were not.

The Wolfe Report (2011) was highly critical of this approach in education:

"[T]here have been many calls over the years for greater parity of esteem between academic and vocation qualifications, in practice this has meant making what is practical more academic, to the detriment of both" (Wolf, 2011, p. 6)

The requirement for applying academic principles to a practical creative process generates conflicts because these are founded on the scientific logic that our understanding of what is true and reliable can be tested in a way that is either reproducible or refutable. The process of making, by contrast, embraces our need to navigate a path through our lives which is inevitably unpredictable, uncertain and transient. John Chidgey, a Craft Design Technology teacher comments that "Attempts to equate design with science have been unsuccessful due to the ineffable ingredient of craft knowledge gained through non-scientific experience (A Critique of the Design Process, 1995, p. 91).

Making as a process is a direct form of communication in itself, which is very effective outside the realms of science and academia. The neurologist Frank Wilson observed this phenomenon and questioned the recognition of the communicative value of using our hands:

"But no one has ever seriously suggested that there might be a whole other class of representational movements ... which are meaningful but neither gestures nor signs." (Wilson, 1998, p. Loc.3712)

Those conversant with this language often hesitate to articulate the visual intention or meaning of an image or object using words because this immediately denies the inclusion of the other. The person generating the image or object is the 'I' and this is intended to be viewed by others. "The reciprocal nature of vision is more fundamental than that of spoken dialogue. And often dialogue is an attempt to verbalize this, an attempt to explain how, either metaphorically or literally, 'you see things', and an

attempt to discover how 'he sees things'". (Berger, p. 9). Hence communicating the personal experience to others, "From I to we" (Heatherwick, 2015) is fluid, not fixed in time or meaning. Rather like the semantic meaning of the word 'craft,' the "*The relation between what we see and what we know is never settled."* (Berger, p. 7).

The problem here for the measurable economy of teaching, is that the materials and tools are always evolving, the process is often personal to the maker and the solution is always socially and environmentally defined; the correct result today, was not the correct result yesterday and will not be the correct result tomorrow. The difficulty for framing this within an age of algorithmically modelled certainties, is that it never offers a fixed starting point or a fixed end point. Yet it is this process we need to research, this silent dialogue with ourselves in a language that I understand but you may not, a language that my master may understand but cannot teach me with a manual or a text book. The alternatives I found in mainstream education left me wondering what damage is being done by denying students the time and facilities to engage in the 'basic' skills demanded by craft projects.

Voting with feet

At the end of this enquiry I was faced with more statistics about the decline in participation of workshop-based subjects in schools:

- 67% Drop in students taking Design and Technology GCSE since 2010 (Joint Council for qualifications 2019)
- 45% of schools have closed their workshops altogether (Turner, 2017).

Given the current static exam-based representation of these subjects in schools, reduced curriculum workshop time and a decline in financial support, it is of no surprise that students and teachers are voting with their feet. In view of the fact that traditional craft practices are thriving beyond the National Curriculum exam system, I do not agree with the recent comment from the head of OFSTED, Amanda Spielman, "There need be no conflict between teaching a broad, rich curriculum and achieving success in exams," (Spielman, 2018) unless this is directly linked to an engagement with more holistic funding and assessment criteria this will have little impact on the motivations and behaviours of teachers and schools.

In consideration of the evidence I found for the opportunities for emotional development afforded by heritage craft practices in learning environments outside mainstream education, and the growth of cultural evidence to support the link between craft and wellbeing (Culture Health and Wellbeing Alliance, 2017) (Jeffries, 2019), it is worth postulating a link between the decrease in physical engagement in practical making subjects and an increase in the number of children who display emotional problems over a similar time period.

Figure 10: Statistics showing the decline in provision of school creative technical subjects and the increase in child mental health disorders over a similar time period.

Conclusion: Why teach to make by hand in the digital age?

So, in answer to this question, I came to the conclusion that making becomes a vehicle of formation, not only of things but also of people and of society. This view is supported by others who have studied this question in the past. Richard Kimbell concluded:

"[It] encourages independence and resourcefulness and that combines practical, intellectual and emotional challenge. It builds confidence and self-esteem." (Kimbell, et al., 1996, p. 35)

This echoes the justification given for learning handwork skills, such as woodwork, written by Otto Aaron Salomon nearly a hundred years earlier:

"It's purpose is not to turn out Carpenters, but to develop the mental, moral, and physical powers of children…It cultivates manual dexterity, self-reliance, accuracy, carefulness, patience, perseverance, and especially does it train the faculty of attention and develop the powers of concentration" (Salomon, 1898)

Digital data documenting human experiences similarly reveals correlations of experience and outcomes which exist outside established measures of value and success in this field. This has generated a dynamic arena which challenges our assumptions about the purpose of making things. This not only tests the logic of an education system that still uses hierarchical value judgements to exclude imitative and repetitive practical skills, it also disrupts the traditional economic logic that links practical skills to vocational training. From a pedagogical perspective, it is important to remember that the human body is our primary technical instrument, not machines or digital technologies. This

cannot involve a prescribed or measurable outcome. Many educators have come to similar conclusions, yet establishment understanding of how to shift this balance is fragmented and poorly or poetically defined – depending on where you stand.

Having presented my research findings to a range of craft professionals, both inside and outside education, I realise that, in an effort to improve the effectiveness of the teaching system, we have lost sight of what this system does to those people in the system. Focusing on the conflicts of interest, is also part of the problem. The process of making something actively seeks to negotiate an equilibrium between thought and action relevant to our digitally filtered lives today. Community classes and extracurricular initiatives demonstrate that the simple act of learning to sew a straight line, whether by hand or machine, becomes a vehicle for learning about ourselves and our possible contribution to our community; it generates a result which is always temporal, always individual and always socially defined.

This is the reason we need to teach to make by hand in the digital age, and this is the reason many educational settings flourish as a result of actively embracing this non-verbal knowledge system that has evolved over millennia of human experience. These diverse material disciplines succeed in translating real life problems into a physical task in hand, and in so doing, they help to interrupt our blind reliance on technology and reconnect us with our ability to respond, not only to our own needs, but to those of our community.

This is also the reason we need to continue to celebrate and talk about making - whether that be in a class, at a festival or in an online digital maker community - to do what makers have always done: discuss work to find out how to do things better and to challenge the status quo using our own "unique concrete language" (Kimbell, et al., 1996, p. 35).

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