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RESEARCH PERSPECTIVES ON CREATIVE INTERSECTIONS

Where have all the ideas gone? An anatomy of sketch inhibition among student designers.

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The reluctance of student designers to engage in sketching during the early stages of their processes is an increasing phenomenon, observed on a continual basis within higher education, and one with marked effects on design quality. An investigation into the causes and symptoms of sketch inhibition identifies social, personal and skill-set shortfalls among students together with a favouring of digital tools. A lack of understanding of the functions and benefits of sketching together with an assumption that design sketching is intuitive and requires no tuition have led to its neglect. An anatomy of sketching and its particular qualities is presented, concluding with the issues that higher education needs to address. These include a greater awareness of digital and manual tools and design-specific research types, together with the need for a revised pedagogy for design sketching.

keywords: Sketch inhibition, design development, design education, higher education

Introduction

During a studio teaching session, a group of thirteen post graduate students studying fashion and textiles were asked if they felt they could draw. Only two raised their hands. The same group, when asked to imagine and sketch simple forms struggled to produce anything. Some wildly scrubbed away with erasers to remove traces of their perceived ineptitude as they attempted to put their thoughts on paper. Others sat, almost in tears, clearly panic-stricken, unable to pick up a pencil. Many of their sketch-books intended to convey their design development contained little more than collections of pictures cut

from magazines and printed from the internet. These *were* their design ideas. This is how they would create their collections: to them, this *was* creativity.

In another session, a group of twenty interior design undergraduates were asked to generate sketch ideas for a living space in a six metre cube. One scribbled images of foliage, later explaining that he didn't want to concentrate on designing the space itself, but rather the surroundings it would sit in. Another took out a small set square and repeatedly drew lines, desperately trying to construct a space in which to map his ideas. An hour later, he was still struggling to visualise a 6m cube. Others complained that they couldn't think on paper; they sat motionless, complaining they could only develop their ideas on computer.

The truth was they struggled to think at all. As soon as they were permitted to do so, they dashed towards the available Macs to develop their concepts. These ranged from 6 metre cubes containing naïve repeated elements, all straight-line-based, to those containing nothing more than CAD blocks found online. Some looked impressive, utilising the benefits that computers offer the designer: scanned images had been imported to create backdrops to the cube and ultimately convincing presentations, but the results were depressingly and frighteningly similar – an inability to develop complex ideas combined with a CAD aesthetic.

Sadly, this is not the exception; it is becoming increasingly the rule. During eighteen years of my own teaching of design-based subjects in higher education, students are rarely witnessed arriving for tutorials with bulging sketchbooks, with their heads so full of ideas that they have to sit and scribble them down before they evaporate into thin air. Attending tutorials with nothing more than a single thought about what might (or, more accurately, might not), be produced in answer to a problem-based learning activity is the norm. The norm is also to vanish, to spend week after week explaining good intentions without actually putting pencil to paper, to repeatedly apologise for accidentally leaving sketches at home, or to develop a chronic illness that precludes the ability to sketch. Students avoid putting pen or pencil to paper for as many weeks as they can, offering their, 'great ideas' in the form of elaborate explanations of ill-developed notions, often based on only a tiny snapshot of a personal observation. They then submit something rendered by computer – something that looks smart and shiny, but actually reflects their limited ability both as designers and as visualisers. The reality is they are suffering a skills shortfall that affects their ability to become effective, creative designers.

Why do so many design students actively avoid putting their thoughts down on paper? What are they missing in not doing so, and it is possible for higher education serve them better? These issues are constantly mooted within higher education and widely bemoaned in industry where the possibility of recruiting design graduates with meaningful drawing skills is becoming increasingly rare. Curiously, these issues have garnered little attention from the very academics that develop the learning experiences that designers will engage in during their journey through higher education.

The content of this paper is based upon doctoral research conducted over the past year. The methodology includes a review of current and historical literature relevant to the nature and purpose of design sketching and the cognitive processes it supports. Observation and teaching practice within several higher education environments together

with semi-structured interviews with educators, industry experts and students of various design disciplines have been employed at this albeit initial stage of the project.

It seems to start with the student's understanding of, and relationship with research. Bruce Archer's seminal paper published back in 1995, (Archer, 1995), conveys the importance of practice-based research for the designer, but somehow this still eludes so many students of the disciplines. At ground level, students' understanding of what research actually is appears desperately limited. During tutorials, they readily convey their belief that research for design is spent trawling what they perceive as the dry stacks and journal databases of their university library – that or Google will supply all the answers.

Based on my own observations and those of colleagues, Google is where most visual research is initially tapped into, often comprising collections of pictures stuck into a sketch book with little or no analysis. Students are increasingly demonstrating a lack of awareness of and appreciation for the richness and value of practice-based research; the hours spent sketching, drawing, model-making and prototyping that underpin their developmental thinking and decision-making processes towards a final solution. They tell me this is not *proper* research: they believe research can't possibly be a creative or enjoyable process. The sketching of ideas is becoming an increasingly rare sight in many university design studios. The most personal, immediate and reflective of tools available to the designer is the very one that appears to be struggling for existence.

Akin & Akin's research, (1996), into the design problem-solving process suggests that in order to create new concepts the designer's frame of reference needs to be broken. Shifts in mode between drawing, examining and thinking enable design discoveries to be made and the gathering of information, drawing and reflection in combination with quick switches between these activities are deemed to be vital to successful progress during design development. So why is this often such a problem for students?

Why designers don't sketch

Pamela Schenk is one of only a tiny handful of educators who has voiced concerns over many years about the demise of the use and importance of sketching in design higher education. She suggests that secondary education fails to equip prospective students with drawing skills required for their studies and that consequently, industry's needs are not being met by the drawing skills of graduating designers. She has observed the standards of drawing among newly graduated and early career designers dropping over the past few decades and as a result, impeding the activities of commercial design studios, (2005a).

Mis-conceptions among students about the purpose and nature of sketching appear to affect their relationship with it, and could suggest an issue within higher education at a fundamental level. This, from an interior design course leader:

> *It's their perception of what is a good sketch…they think it has to be the most amazing Leonardo da Vinci-type sketch, instead of a working idea, a methodology to discuss your ideas from your head, and it doesn't have to be perfect, (Fitton, 2016).*

Interviews with educators suggest a generalised mystique around sketching, for example:

> *People are terrified that it's a very personal activity and I think there's a lot of mythology around the ability, where that ability comes from, you know is it a learnable skill or is it a dark craft? (McNicoll, 2016).*

Changes in society have also affected the attitudes of individuals towards any relationship they may have with sketching, with technology replacing the manual processes that previously existed. McNicoll states,

> *People don't necessarily use the word 'draw,' or what we would think of as drawing activity any more in their lives, (McNicoll, 2016),*

and this is having wider effect on industry, one design director complaining,

> *Over the last 15 years… reliance (is) on software to provide the answers rather than a deep thinking process, (Mawford, 2016).*

Issues affecting design undergraduates as they engage with their higher education experience act as a barometer of attitudes affecting wider society, including the belief that digital products are more attractive than anything manual. Instant gratification has become an intrinsic part of our existence and immediacy of results has become deeply embedded within our culture. This and the constantly media-driven belief that success happens without effort may be affecting the potential relationships of students with the idea of sketching, with lecturers bemoaning their students' attitudes:

> *A lot of people sort of say, "oh, I'd love to be able to sketch," and I say, "well, you can if you try hard enough," but there seems to be an unwillingness to spend the time sketching, (Mawford, 2016).*

There is definite acknowledgement of sketch inhibition within higher education often manifesting in avoidance behaviour as observed by Fitton:

> *If it's a session with an activity, they just pretend they're doing it, don't do it, or do just a part of it…sometimes they stop coming to their sessions."* Additionally students*, "will go to the extent of not having produced any sketching and not coming into tutorials because they're embarrassed because they haven't got the work…then they present their sketchbooks and we can have students who have as few as four pages of drawings, (Fitton, 2016).*

Booth, Taborda, Ramani, & Reid, (2016), identify several types of sketch inhibition during the design process and these fall into three distinct areas. Firstly, the issues of the individual, including intellectual inhibition, or a lack of awareness of the relevance of sketching to the design process. Skill-set inhibition; the lack of expertise needed to actually use sketching to an effective level. Personal inhibition; the ego-driven issues of perfectionism that impair the creative flow, and situational inhibition, when a designer does not feel in the right state of mind to sketch, i.e., not in the zone. Secondly, social issues are observed to create inhibition towards sketching. These include social and comparative inhibition, or the fear of being judged unfavourably by others during the process of creating sketch material. Social loafing applies to situations including sketch generation and involves a lack of input in a group situation, either through fear of judgement or laziness. The third area is that of technological inhibition caused by a prevalence of digital tools available in the designer's environment which then leads to a disinterest in manual sketching. All of these types of inhibition are evident among students during design-based activities within the studio.

Inhibition based on fear of failure is also identified by Leblanc, (2015), suggesting this has resulted in a common belief that experimentation and failure, which are a normal part of the design process, are unacceptable. Because of this fear, students rush into visualisation as soon as they have the mere suggestion of a concept. This results in omitting stages of evaluation and refinement that are essential for a fully developed design, demonstrating that, "the development process is widely misunderstood or inaccessible," (p2).

Leblanc's, (2015), research with industrial design students at Montreal University elaborates on the wider issues of sketch inhibition within higher education. She says,

> *We continually observe students struggle with the creative process, especially with sketching, exploring and developing ideas into mature designs. Many see sketching only as a means of visualization and rarely know how to use it as a creative thinking tool, (p1).*

Student attitudes are important to the management of their own sketch inhibition; Leblanc observing that,

> *Those with high ambitions and strong self-motivation manage to overcome the deficit; others learn to mask their lack of skills in one area by developing others, (p2).*

Belief that the computer will do one's creating, eradicating the need for paper and pen anywhere in the design process could be dangerous and the fear among design students to put pen to paper is a concerning trend. Ironically, industry requirements for graduates who can draw is increasing, (Mawford, 2016). To be able to sit with a client and sketch out loose, nebulous ideas at the briefing stage of a project is a USP that many designers need when entering the job market. Indeed, there are companies that require recruits to demonstrate a portfolio of drawn work above anything created using digital methods. However, many students within higher education are under the impression that, as has been the case for the past twenty five years or so, their future success lies more in their ability to use a piece of software to a reasonable standard.

Leblanc, (2015), acknowledges the value of digital tools, but laments their ubiquity in design education,

> *Students are judged by their skills with these tools rather than their creativity or problem-solving ability. This unfortunately nurtures the misconception of design as an aesthetic gesture rather than an intellectual, creative thought process that helps solve problems and drive innovation, (p5).*

The essential processes of design embodied by its practical activities have been replaced with what she perceives as, "more gratifying digital tools," (p2).

One of several problems appears to be the belief among undergraduate designers that the presentation visual is the design – the shiny surfaces and organic shapes that software can offer, accurately positioned and beautifully lit, are testament to both the developer, and to their user. A few sessions of instruction can produce passable images that look enticing to the lay person and fulfil the student's need for progress. The same few sessions' instruction cannot develop creative thinking, evaluation, self-awareness and an understanding of how ideas grow into solutions that answer the needs of the user. This takes much longer – and it is where even educators appear to get confused. They sometimes mistake the teaching of thinking with the teaching of visualisation: but,

remember, the *D* in *CAD* stands for *Draughting*, not *Design*. Institutions invest many thousands on systems and software to produce the discipline-specific types of visualisation and manufacturing drawings that the designer needs to produce. They often do this at the expense of teaching the conceptual tools that designers need to generate and develop design thinking. This is supported by Stacey, (2016), who suggests that result, as opposed to process-oriented assessment of pupils' work in primary and secondary education leads ultimately to a fear-based mentality among students within higher education who are afraid to experiment in case of failure. Fitton also bemoans the system within schools:

> *They spend so long at school working through a process to get to the final element…and the whole emphasis and the grades are based on the end product. Because there is no weighting…given to the process and the quality of the sketching, (Fitton, 2016).*

This lack of ideas is clearly apparent in the way that designers increasingly choose to work. Fine artists create mess. Their thinking and research surrounds them and is always a tangible part of their activity. A fine artist's studio is not a tidy space. It is full of research in the form of materials, sketches, found objects and continual experimentation. It is where 2 and 3 dimensions meet in an individualistic, glorious amalgam of creativity. Without their space, artists cannot create. Design students still have the option of studio space to experiment with their ideas, to make mess, to create, refine and develop their thoughts, but an increasing number of them prefer the paperless approach – when you start with no sketchbook and have no ideas, the only place to go is the CAD lab. It's a safe place to hide – it's where you can create something that looks convincing, (as long as you can use enough of the functions).

The shame of this situation is that students should be working the other way round. They should be bursting with ideas and seeds of inspiration – generating concept sketches, models, prototypes, colour palettes, and *then* asking, 'What should I use to develop my ideas?'

The benefits of computers to design are not in question – they handle with ease things that the mere mortal struggles with: speed of processing and the ability to store and manipulate vast quantities of data at the click of a mouse are their gift to designers. They would otherwise struggle to animate a walkthrough of a building concept before it's even built, lay out components, revise concepts, and cost-effectively amend manufacturing drawings. However, computers do not handle well the vagueness and interpretative opportunities that sketching offers.

The benefits of sketching

Sketching is not a singular, homogenous activity – it is made of many smaller processes with their own distinct purpose and benefit to the design process. It also serves more than a singular purpose. However, even those who engage with it struggle to identify the many functions it fulfils.

Ferguson, (1992), offers an early taxonomy for sketching, including the, "thinking sketch", referring to Leonardo's sketches and those of contemporary engineers as a tool for visual

thinking, the, “prescriptive sketch,” used for specification of a final solution and the, “talking sketch,” (p96-97), used to communicate with others during the design process.

Pei, Campbell & Evans, (2011), offer a more developed and hierarchical taxonomy involving sketches, models, drawings and prototypes. Personal, shared, persuasive and handover sketches are further classified. They deconstruct personal sketches into idea sketches, study sketches, referential sketches and memory sketches. The idea sketch is to, “allow the developer to externalise his thoughts quickly,” (p12), and is most relevant to this research, as is the study sketch which investigates scale, structure and layout based on the initial idea sketch.

Gabriela Goldschmidt’s extensive and widely cited work has proven one of the most critical contributions to the theory of design sketching for this research. She presents experiments conducted at MIT, (1989), where she reiterates her earlier observations of, “moves,” and, “arguments,” as two distinct types of reasoning embodied by sketching: the, “move,” being a tangible proposition within the process, and the, “argument,” (p35-6), being a conceptual micro-activity on the part of the designer within that process; that of the individual thought.

Goldschmidt classifies sketch activity into three distinct areas:

> *Moves made while actively sketching, moves made while contemplating sketches and reading off them and moves with no graphic input,” (1989, p127).*

She proposes that sketching can be a representation of either linear or diverse thought, acts as a means to test and develop ideas and ends once the hard-line activity, e.g.; draughting, takes place. She coins the term, ‘interactive Imagery’, the process of imaging, sketching and resketching images until useful information can be extracted from them:

> *Sketching is not merely an act of representation of a preformulated image…it is more often than not, a search for such an image, (1989, p131).*

On the purpose of sketch function during the design process, she devises a, “seeing as,” and, “seeing that,” (p131), structure. “Seeing as,” utilises a Gestalt approach during sketch thinking, using the mind’s eye to develop ideas. “Seeing that,” relates to the entity being designed and applying a non-figural approach to considering it - using the tangible output of the sketch process as a platform for further thinking.

Goldschmidt further anatomises sketch activities within the creative process, (1992), referring to leaps, or sudden insights within the mind of the designer “one in which the distance in time or place among relevant moves is too great to track,” (p200). Serial processes are identified where sketches are produced one after another, but not necessarily relying on sequential thought within a linear process and sequential sketch activity that is likened to machine processes where a set of information is developed based upon the previous set of information.

She considers the economy of sketching, (2003), where no cognitive energy is used in converting marks into readable information – marks on the page just *are*. Access to the history of the creative process is also made possible through sketching being, by default, serial information whereby complete sets of developmental information can easily be kept. Her work also observes the importance of expertise for the effective handling of the sketching process: novices often find themselves unable to detach from an image they have created that they are unhappy with, thus forming a negative development within the

process. This is less the case with more experienced designers who have a broader range of experiences to draw upon, (1992).

On the development of digital tools to replace traditional sketching methods, she argues,

> *Persistent attempts to replace sketching with algorithmic, computational techniques, (largely computer-based), have so far failed to contribute to design reasoning in any way…the cause lies not in insufficient development of these new methods but in the inherent potency of the sketching tool, (1992, p215).*

And although over twenty five years old, this statement is still relevant to the intrinsic ability of sketching to support the designer's creative and cognitive processes.

Goel's, (1995), work on the nature of ill-structured problems addressed by designers considers the inadequacy of cognitive science and its reliance on structured symbolism to address the complexities of language used by designers during the early stages of the design process. His experiments with graphic designers observe that freehand sketches convey dense ambiguous information which offers the designer new possibilities for interpretation – something that a digital alternative struggles to replicate. He also presents a coding system for sketches based on his experiments: lateral transformations occurring within a solution space during the creative shift to alternative concepts:

> *…when a new idea is generated, a number of variations of it quickly follow. The variations expand on the problem space…One actually gets the sense that the exploration and transformation of ideas is happening on the paper in front of one's eyes as the subject moves from sketch to sketch, (p200).*

By contrast, and similar to Goldschmidt's concept, vertical transformations occur during the sequential development of a concept towards a solution. Goel also identifies reinterpretation as a vital function of sketches, allowing the observer to apply new meaning to an existing set of information – a vital part of the designer's activity during the early stages of design.

Donald Schon considers problem-solving activities across multiple disciplines including design for which the importance of sketching is emphasised. Designers are involved in a, 'transactional,' relationship with the design and are in a "reflective conversation with the situation," (1991, p4), for which,

> *…the act of drawing can be rapid and spontaneous, but the residual traces are stable…the graphic world of the sketchpad is the medium of reflection-in-action, (1983, p153).*

Design situations involve material situations and analysis though sensory appreciation. Schon, (1991), proposes that the designer constructs a conceptual world comprising objects and their relationships through which he addresses the design problem. A design world is personal to the designer – it is created according to his perceptions. He believes the more innovative a design episode, the more likely it is to be unique to the designer: 'The designer designs not only with the mind, but with the body and the senses,' (p7). Similar to Goldschmidt's proposition of Seeing As and Seeing That, he refers to the process of 'Seeing-drawing-seeing…a designer sees, moves and sees again,' (p7). His notion of

seeing embraces the use of faculties other than sight; his terms, "recognise, detect, discover and appreciate," (p7), are proposed to reinforce the concept of design being a bodily and sensory process.

Schon & Wiggins, (1992), consider experience as being vital to effective problem-solving. The more experienced a designer, the more domains he can work in at once; the designer's move to address a single term being effective in many domains at once. A lack of experience and its effects on working memory limitations is also noted; addressing a single domain can overcome the issues of such limitations, especially in a less experienced designer where the act of seeing-moving-seeing assists in the management of complexity in a design problem. George Miller's infamous paper, 'The Magical Number Seven,' (1956), proposes that the human memory can only process seven pieces of information at one time. It is clear that the short term memory utilised by the designer can only handle a relatively small number of issues at once, thereby demonstrating the need for recording the process of design thinking in order to effectively manage and avoid loss of data.

Bilda & Gero, (2005), also identify issues of working memory limitation among non-sketchers and the ability of sketching to offload it. Bilda, Gero & Purcell's, (2006), protocol analysis experiments establish the importance of sketching during design development: it imparts a dialogue whereby visual messages from the page constantly flow back into the mind. They noted that sketches enable the ability to see the developing concept in both whole and partial form,

> *…seeing it in parts and seeing it as a whole…the whole emerges from and cannot exist without the parts but depends on the relationship between the parts, (p12).*

Re-representation is identified, enabling the designer to detect new elements that could be developed further:

> *Half the process is drawing it, and drawing it….and eventually…something sort of creeps out at you, (ibid).*

Externalisation of mental imagery is noted, supporting the benefit of offloading working memory. Sketches also form a language of immediacy and intuition, "…as you think you speak…If you think first and then speak, it would all come out differently,' (Bilda at al, 2006, p12).

The themes of Fish & Scrivener's eminent paper (1990), are still valid, especially those relating to the cognitive aspects of visual imagery. They discuss the indeterminacy of manual sketching that enables perception of more than one option at once, comparing this process to that of the computer where the designer can be forced down the route of developmental detail too early, potentially harming the design process. They also lament the inability of the computer to offer the same serendipity of manual sketching and consider the difference between descriptive and depictive information and the function of sketches in the relationship between them. The language they use enables the designer to create their own mental images based upon what they see on the page; marks seen on the page may influence the image within the designer's mind. This ambiguity can initiate recognition and further mental imagery – essential tools for the successful designer.

Education issues

The symptoms of sketch inhibition evident to educators, (including avoidance, non-attendance, losing work, and minimal design development), are not insurmountable, and

by taking an analytical approach to current practice in HE, the following considerations are offered:

Sketching for design is not the same as sketching for fine art practice: it is not an artefact-centric activity but one of process, supporting the cognitive activities engaged in by the designer. Schenk alludes to the teaching of drawing specifically within design education, that it is often inconsistent with the needs of designers and based on fine art practice and as opposed to developing a visual syntax to enhance the mental processes required by the designer, (2005a). Friction also appears to exist between the disciplines of fine art and design drawing which serve different purposes for the designer; those of observation and conceptualisation respectively, (2005b).

Students' belief that they should excel at fine art drawing in order to feel comfortable using sketch methods for design is a common but erroneous assumption and institutions often unwittingly promote this notion. Schenk, (2005b), observed that many drawing tutors are borrowed from a fine art environment to teach observation-based skills that fulfil only part of the needs of the design student rather than developing pedagogy for sketching and drawing that is design-specific. Institutions could be offering, as Schenk believes, teaching contextualised within the specific language of the design discipline being studied.

Management of sketch inhibition using drawing tools has been addressed by Hu, Booth & Reid, (2015), who consider how art-based warm-up exercises among students affect their cognitive states during concept development. They gave a group of engineering students geometric sketching exercises, art-based sketching exercises and as a control, no warm-up exercises prior to a simple design task. They concluded that art-based warm-up exercises were helpful in concept generation; the art-based approach appeared to benefit younger participants most, and unexpectedly, female participants expressed an increase in pride in their sketch output after the exercises. This suggests that management of sketch inhibition through simple studio-based activity is indeed possible and shows further potential for this research.

According to Lambert & Firth, (2006), the growth in numbers of design courses over the past twenty years has created more places than students and consequently, less competition for those places. They state that,

> *Applicants no longer have to compete against each other, and consequently students' drawing skills upon embarking on a design degree are generally much less adept than in the 1980s, (p.5).*

Within such HE design courses issues exist regarding the understanding of differences between designing and visualisation. Stones & Cassidy refer to Black's, (1990), earlier research, confirming that:

Students judged their work using a different set of criteria when designing with the computer and that a finished appearance forms part of that judgement, as if the students were mistaking a high level of finish with design proficiency, (Stones & Cassidy, 2010, p442).

Educators can also become victims of the persuasion techniques that digital rendering can offer, and situations have occurred when a student with poor design skills has achieved a

higher mark for work presented using CAD, rather than the student who has engaged in the design process more fully, but using less persuasive visual methods.

Engendering student understanding of the importance of practice-based research, and the position of sketching during design concept development is fundamental. Only by reinforcing the importance of "research through practitioner action," (Archer, 1995), alongside what is considered traditional research, will student designers come to understand that their hands-on activities during the design process are valuable pieces of research in their own right. Accordingly, sketching as the language to record and analyse such activity is crucial within this process.

Flawed assumptions evident in design HE include the belief that students automatically know how to design. Leblanc, (2015), suggests that, "Students use sketching to visualise ideas, yet many do not know how to use it as a thinking tool." Some simply do not know what to do with ideas, or often, how to generate them in the first instance. An observed example of post graduate fashion students has demonstrated a desperate willingness to learn together with huge motivation, but no design skills of note. They don't draw, never have and have to begin developing a relationship with their thought processes before they can hope to become creative designers. Many refer to their collections of images from the internet - from then on, they are lost, and this is where sketching could clearly support them.

Students appear to believe that the computer will do their thinking rather than having to engage in what they often perceive as the long-winded and dull exercise of sketching. They do not understand the difference in language between the two systems. They are unaware of the immediacy of sketch mark-making versus the function-based process of making prescribed marks on a screen, the inability of the screen to offer the levels of re-representation of the manual sketch and the lateral and vertical processes that are neglected by working on a single interface as opposed to a wide and endless substrate.

A clearer delineation between the skills of designing and visualisation could also benefit students to understand and develop a healthier relationship with their use of digital tools particularly among those who struggle with their ideas. Coyne, Park, & Wiszniewski, consider inexperience as a cause for misunderstanding:

> *If you only know how to draw a box, your building will be a box, and if you know how to design anything on the computer you can design anything, (2002, p.270).*

Appreciation that an image of a design is not the design itself, but an interpretation of the micro and macro elements at a single point in time is important, rather like a photographic snapshot of a family: it is a useful record but tells us nothing about the nature or dynamics of the family in a real life situation.

Goldschmidt's, (2003), observations on the value of expertise should be acknowledged to ensure the designer's relationship with sketching will be sustainable. Spending a few hours a week for a single year learning a new language is not enough to gain expertise in it; it has to be sustained and supported by constant study – this also applies to the visual language of sketching, so why is it treated so differently?

Attitude of the student is vital to their ability to engage with sketching as a language for creative development. As Leblanc, (2015), states, those students willing to invest the effort into developing their skills can conquer their issues of inhibition – others will fall by the wayside. Students, through no fault of their own, are generally unable to elaborate on

the benefits that sketching brings to design; the cognitive processes it supports and the symbiotic relationship between sketching and idea development. They need to have basic anatomy and physiology of sketching before they can even begin to engage with it in a meaningful and sustainable way. Leading the student to water is the easy part, but as any journey through educational proves, the desire of the individual to learn is essential.

Curiously, the five-year-old congratulated for his naïve mark-making will no doubt become the nineteen-year-old too fearful to record any kind of thought through sketching. And there lies the paradox: that something so intuitive and natural can mutate into something that terrifies intelligent adults. Lambert & Firth, (2006), observe that,

> *…students are entering design courses with less skill (so) we should be weighting more of our teaching time towards drawing than ever before at undergraduate level, as well as in secondary schools and sixth form colleges, (p6).*

Even if the secondary education system and other more complex social issues, (Booth et al, 2016), are complicit in this, with just a little practice the confidence of sketch inhibited individuals can grow rapidly. An example being a recent student of mine who spends time with her eyes closed during studio sessions, creating mental images then sketching them, regardless of how they appear on paper: her design ability and confidence have grown in just a few weeks.

Lastly, and possibly most controversially, questioning the trend for a problem-based approach to learning and considering the dirty word of apprenticeship or a shift toward classical approaches to the teaching and learning of new skills. Fitton, suggests that,

> *We're all a bit timid about pushing students to do things that they don't want to do, and I think you have to, (Fitton, 2016).*

Before the student can develop their own vocabulary they need structure, a toolkit of methods which they can then refine and develop, experiment with or leave behind if they so choose – but at least they have the choice, rather than deferring their creativity from an analogue to a digital process with no understanding of the differences between the two worlds.

Conclusion

The purpose of this paper is not to romanticise pre-digital practices or malign vital digital tools: it is to encourage debate about the importance of sketching, to identify the functions that it alone can provide for the designer and suggest ways that the concerns of industry, educators and students alike can be addressed. Reconsidering sketching not as an outdated practice to be replaced or avoided, but as a cognitively essential process to drive creativity, and consciously imbuing it within higher education can only be healthy. Empowering students with the confidence to handle the indeterminacies, intolerances and vagaries of the design process that only sketching can embody, rather than to cling onto a simplistic, linear approach can never be a bad thing. In doing this, as educators, we can help empower design graduates with greater creativity, inspiration and ambition when embarking on their careers – something which will ultimately prove beneficial to everyone.

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