



THINKING HANDS?

Report

SYMPOSIUM TO EXPLORE THE
ROLE OF HAND SKILLS'
DEVELOPMENT IN SEEING,
THINKING AND LEARNING

HELD AT CENTRAL SAINT MARTINS

17 September 2014

Report October 2014

THINKING HANDS? A SYMPOSIUM TO EXPLORE THE ROLE OF HAND SKILLS' DEVELOPMENT IN SEEING, THINKING AND LEARNING, DRAWING ON PERSPECTIVES IN CERAMIC DESIGN, MEDICINE, NEUROSCIENCE.

INTRODUCTION

A decline of hand and craft skills' development is believed to be affecting capacities in a range of fields from literacy development, to design, to surgery. With 3D printing, why do we still need to develop hand skills and knowledge of materials? This day-long meeting explored why hands, clay and a grasp of 3D matter today in seeing, thinking and learning. The day served to test interest in hosting a larger conference in 2015 and to provide content for a Clayground handbook for teachers wishing to introduce or lobby for clay studies in schools.

Combining hands-on sessions, panel and group discussions, the symposium aimed to provide new insights for professionals in a range of fields. Experts in ceramic design, surgery, and neuroscience gave up-to-date perspectives on the significance of hand skills' development. Speakers included: ceramic designers Mike Eden, Tony Quinn, Kathryn Hearn, Neil Brownsword and Tamsin van Essen; eye-surgeon, Bruce Noble; neurophysiologist, Roger Lemon; medical educator, Jamila Sherif; surgical educator, Roger Kneebone (filmed interview), Duncan Hooson and Julia Rowntree of Clayground.

Participants numbering 55 included teachers (primary and secondary, mainstream and special needs), makers, arts educationalists and policy-makers, library and museum learning managers, medical and surgical educators, academics, hand-skills advocates and students.

Thinking Hands? is an initiative of arts organisation Clayground Collective in partnership with Central Saint Martins Ceramic Design and Widening Participation, A New Direction, British Ceramics Biennial (BCB), Canal & River Trust (C&RT) and Camden Libraries, to coincide with the London Design Festival 2014. Supported with funds from the national lottery distributed by Arts Council England.

Thinking Hands? Symposium takes inspiration from Juhani Pallasmaa's book *The Thinking Hand: Existential and Embodied Wisdom in Architecture*.

MOTIVATIONS

Clayground Collective was set up in response to a decline in clay being used in art departments in schools and closure of ceramics courses in Higher Education institutions. During a series of Professional Development sessions in 11 cities with teachers wishing to introduce clay skills to their schools, Clayground was urged to gather evidence as to why clay, 3D and hand skills are important to wider thinking and learning today.

At the same time, linguistic anthropologist Shirley Brice Heath, (Stanford Professor and expert in literacy development), advised Clayground she had noted among primary school children in the States a sharp decline in creative hand work and the ability to discern visual details in illustrations of maps and graphic designs – a key stage in the development of broader literacy and capacities critical to observational skills later in life. Shirley set out to look for knock-on effects in surgery, a professional field dependent on visual acuity and hand skills. Over the course of their careers, she found several heads of department of surgery in the US had noticed changes in students' capacities: *"medical students ..today have no sense of how to use their hands in diagnostic work, for they have come to rely on technologies as their diagnostic tools. ..These young people have difficulty seeing*

and comparing critical details that are there to read in the reports that come from their technological tools.” Others emphasised how the hands complement visual detail detection. Clayground gathered further observations about such gaps in learning in the UK, notably from Roger Kneebone, Professor of Surgical Education, Imperial College and Wellcome Engagement Fellow.

More immediate motivation for connecting with medical educators arose when Clayground was teaching a group of 9 year-olds at Global Generation, a youth leadership organisation located adjacent to Central Saint Martins. One boy showed obvious talent as a maker. When asked if he would continue his art, he said he wouldn't. “Because”, he said, “I'm going to be a doctor”. He could not be persuaded art and medicine were not mutually exclusive. The cultural hierarchy of head and hands dies hard in education and broader culture.

Clayground's intention in putting *Thinking Hands?* together was not to assume every school child is going to be a doctor. It was to begin to address the imbalance between head and hands in the education system by gathering perspectives from a professional field obviously dependent on fine motor and observation skills. Perspectives on the value of hand skills' development from the field of medicine, regarded as high status in our society, were believed to offer useful advocacy material.

No profession is immune to change and the possibilities opened up through new technologies. The question is finding a balance between reliance on technologies and the role of hand skills. Can artists and makers specialising in clay do without such skills in an era of 3D printing for example? Or surgeons when diagnostic and surgical tools are ever more microscopic? These are the topics we aimed to explore.

The day also aimed to test whether a symposium of this kind is useful for participants, whether another, larger scale conference along the same lines might be organised in the future and to gather material for inclusion in a handbook for educators.

Participants were asked to focus on the role of hand skills' development in their particular profession. To ask themselves where this might overlap with that of others; whether their practice and the frame of what they do might benefit from highlighting the hands, what we know through them and associated haptic perception (touch, weight, manipulation of objects, movement of the body in relation to objects).

FORMAT OF THE DAY

The session was held at Central Saint Martins' Granary Building, Kings Cross, combining hands-on making sessions with clay and presentations by specialists. If clay is to be put back on the agenda, it needs putting back on the table. With an emphasis on intellectual and academic achievement, making and contact with materials often sidelined, Clayground sought to bridge this divide and address head and hands together in the same session.

SPEAKERS

Speaker biographies are towards the end of this document.

IN AN ERA OF 3D PRINTING, WHAT'S THE HAND GOT TO DO WITH IT?

Makers' presentation and discussion chaired by Kathryn Hearn, Course Leader, Ceramic Design, CSM. Anthony Quinn, Mike Eden and Neil Brownsword, were invited to make a Pechakucha presentation, i.e. a talk of less than 10 minutes, designed for concision.

Tony Quinn presented a provocation citing innovation expert, John Seely Brown: ‘Now we can do anything with new technologies, what do we choose to do? And why is it important?’ He described the significance of making as democratic, playful, and capable of establishing provenance and identity. More than simply instruments, tools are central to enquiry and to learning by doing.

Tony dismissed the myth that 3D printing will be ubiquitous and in every home. It will be more like the blacksmith, he believes, in every street. It is not a push-button operation but requires connoisseurship and, very importantly, design and hand-skills. He mentioned an exhibition at the Design Museum ‘The Future was Here’ where there was a question on the wall “How interested would you be in owning a 3D printer?” 6% were interested and 80% were not.

He advocated amateurism, people making things themselves, like the ‘Sweding’ home-made film movement, Maker Spaces, and FabLabs, where people can find resources to make things. Working things out from materials is a fundamental part of design. Folded paper or cut out forms are an enduring medium for thinking and physical understanding of form. Tony and colleagues at the University of Nottingham are putting human touch into the digital through combining drawing with the QR code (bar code) in a revolutionary visual recognition app called Aestheticodes.

Tony works in Bergen, Norway, on a prison and product design project. Making can be personally empowering and powerfully communicative when practised in constrained circumstances such as prison.

Designers can work to give agency to others’ ideas. One of his favourite movements is Fixperts, a group of MA graduates from the Royal College of Art who offer their making and mending skills as a service to the community.

Making is fundamental to the economy. One student idea to produce something with £1 coin returned a 900% profit by turning it into a ring and selling it.

Tony also referenced: designers Marco Monterzino, Shin Azumi and Eva Zeisel; wonder material Sugru; Lego Serious Play; the film, *Be Kind Rewind* and Gever Tully’s Tinkering School.

Mike Eden for twenty years made domestic ware with his wife Vicky in Cumbria. In 2006 he did an MPhil since when he works in 3D printing, still calling himself a maker.

Using the hands of course is innate and hardwired in to our DNA. He reminded us of the hand’s relationship to the evolution of tools from the stone axe to 3D printing and the Leap Controller, enabling manipulation of virtual objects through gesture. He questioned contemporary concerns 3D printing would do away with these skills through simple pressing of a button and emphasised these ‘seductive boxes of tricks’ do not replace anything that has gone before. He sees making as building a relationship with a set of tools until their use becomes embedded enabling expression and realisation of ideas. The attraction of 3D printing is it allows making of forms not possible previously.

Over a series of works (including Maelstrom and Vortex), Mike sought to bring two worlds together: the world of ceramics, tactile, fluid and plastic; and the other, abstract, precise and rigid. He used code called Rhino script creatively to make objects with the same qualities as a handcrafted pot. Working in the virtual world meant the ‘clay’ coils he produced did not dry out or crack. Physics, nonetheless, seemed to have a bearing. After much trial and error, objects were printed in nylon,

encapsulated in copper and then silver-plated. He firmly believes he could not have made these objects without his previous hands on knowledge.

To create objects using these new tools, the experience and knowledge of making processes and materials is fundamental. Mike calls for a new Arts and Crafts Movement, less romantic than the original that includes the craft of working with code. The Lunar Society has new relevance too. This group of radical thinkers, including James Watt and Josiah Wedgwood, made technological advances during the Industrial Revolution seeing no boundaries between arts and sciences. They would be working with these tools.

Mike concludes making is about much more than engaging with resistant materials and involves more than just the hands. It means embodied, embedded cognition where, according to Wikipedia, intelligent behavior emerges from the interplay between brain, body and the world.

Neil Brownsword reflected on the relevance of hand skills through the histories of his own practice.

At 16, Neil was amongst the last generation of apprentice model-makers at Wedgwood. A form of CAD CAM introduced could not match time-served manual dexterity for precision. He acquired skills through mentorship and transference of tacit knowledge through observation and imitation. Although this discipline nurtured independence, determination and problem solving, it didn't foster creativity. Since then he has explored the antithesis of skill cultivated by instruction, resulting in abstractions derived from spontaneous manipulation of materials. Improvisation through making, exploiting limitations of processes and embracing the unpredictable has led to an understanding of clay's innate properties in all states.

Clay captures urgency, proximity and intensity of actions. Making creates new knowledge providing subsequent starting points. Clay endorses failure as a positive factor as information is gathered consciously and haptically.

Working with ceramic archaeology is a process whereby the assembly of found forms often dictate their own physical characteristics. The process connects Neil directly to a history and understanding of making that doesn't involve Google.

Neil returned to Wedgwood in 2003 to film traditional craft skills in the process of being displaced in the ceramic industry. A modeller who had once trained Neil was eager to express his concern for sustainability and place of traditional craft knowledge as new technologies continued to streamline and transform systems of design and manufacture. The finesse in handmade pieces of a hundred years ago surpasses the clinical precision of contemporary counterparts. Modern technologies are fantastic tools. But with the huge advance of CAD and production technologies, a lengthy training to acquire competence within handcrafts such as modelling is no longer required, and many of the hand skills Neil once learned and have since filmed sit obsolete.

Looking back into industry from Neil's experience as an artist, his knowledge of clay's materiality led to the appropriation of the residues of production that retained the nuances of skilled action in their fabric to constitute the work *Salvage Series*. Filming the tacit knowledge of this unique culture of labour was in recognition that these skills are an important part of Stoke's cultural heritage. The films also gave makers a voice, allowing them to articulate what would otherwise lie embodied within them. Recent collaboration with former ceramic industry employees to create works which deconstruct their skills were intended to expose their 'know how'.

Making can be erratic as impulse and focus fit from one potential to another. Random placement of objects and structures can produce a new idea or finished work. Site-specific projects have challenged the confines of the studio and the material. Neil has returned to the geologic origins of clay, the clay pit itself, as a space to improvise and innovate. Unpredictable factors force adaptation to what the material has to offer.

As an educator, Neil has witnessed a surge of students arriving from secondary school already well versed with the language of CAD but with very limited experience of discipline-specific skills and the physicality of making. Haptic interfaces into CAD where materials can be similarly pushed, pulled and formed cannot be a substitute for the real thing. Design solutions arrived at within the digital environment still need to be nourished by the trial and error approach integral to most craft practices. The innate aesthetic sensitivities and margins for serendipity that are acquired through direct engagement with materials and processes are unique contributions to design development and innovation.

The physical realisation of a model by hand through iterative exploration and refinement, offers immediate tactile feedback and provides insights into how something can be made and potentially function, that CAD renderings simply cannot reproduce.

As trends in education quite rightly support the current vogue in design led technologies, let's not let these override the importance of the workshop facility. It's essential to maintain a balance where students can continue to be equipped with specialist hand-skills as well as understanding the technology used to support the design process.

DISCUSSION

A teacher participant asked for the panel's advice about a stark issue. In her school the Design and Technology Department has just got a 3D printer for about £3000. Her budget for the entire year for seven year groups is £2000. The kiln needs replacing. The printer is a 'hidden secret' in the school. Not many people seem to know how to use it. How does she persuade school leadership to allocate more resources to ceramics and making?

Suggestions included:

- Giving colleagues and senior managers a personal experience of working with clay.
- There's no escape from the digital revolution and students need to know how to use these tools but it must go hand-in-hand with the development of hand skills and knowledge of materials
- An entrepreneurial and provocative approach is needed, perhaps challenging the DT Department to a making and design competition to re-establish the balance between hand skills and technological tools. "Rapid" Prototyping for example, is extremely slow. You could, for example, challenge the DT Department to make something in a week. They might win (although doubtful) but you would have highlighted hand skills.
- A strategic approach is needed. Invite local press to exhibitions, collaborate with outside organisations, and involve parents.
- You don't need to fire everything.
- Participation is on the agenda in schools. Making activities can take the lead and, crudely, provide photo opportunities in a way that 3D printing does not.
- You have to keep putting clay on the table.

- Gather evidence from advanced professional practices. For example a jeweller from Central Saint Martins working with rapid prototypers was obliged to make wax models for them to produce the kind of detail she needed. Advances are made in dialogue between technological tools and hand skills. A project between departments might reproduce this dialogue in school. Working with materials and tools gives embodied experience of 'good' and 'bad' craft; directly transferable to qualities of writing of code.
- One example was given in which a 3D printer (cost £7000) had sat unused in a college for 3 years. An article produced cost £50 and was 'completely pointless'. Only 6 or 7 students could use it at any one time. Out of a kiln you would get so much more learning and use, so many more quick outcomes. And this learning is transferable to so many other areas.
- It needs to involve more than just the art teacher. A cross-curricular approach is essential and many exciting collaborations can result, with DT, maths, and biology.
- Refer to the Maker movement, and FabLabs. Demonstrate the groundswell moving towards reconciliation between the unruly nature of making, materiality, and the technological aspects.
- Open up the dialogue to the wider school community. Spark debate.

Other points:

- There's a growing crisis in primary schools about whether children should draw literacy books or not. Children are coming through school in 7/10 years who won't have drawn, who won't have used clay, time pressures on the timetable are so huge for results that schools are dropping drawing in literacy books. Time has become a real issue.
- As the next curricula are revised representation should be developed that making and hand skills are absolutely essential as a basis for moving forward on STEM subjects. Hand skills and 3D technology should be looked at together.
- In a special needs school with a range of abilities, the combination of materials and new technologies is rich in learning potential.
- Special needs schools can cross subject boundaries and provide useful testing ground for effective approaches in mainstream schools.
- Libraries could create alliances with the makers through maker spaces and Fablabs, a reinvention of their original role in democratisation of learning during the Industrial Revolution.
- Museums can provide spaces in which to engage with making. As schools struggle, alternative spaces of engagement will become more important.
- Making has the power to bring people together in tangible ways, sometimes 1000s of people at a time. People cannot wait to get to grips with the stuff. Play is essential. Clay is a cheap material. It doesn't have to be fired to get people involved.

BRUCE NOBLE, retired eye surgeon, described how he integrated drawing throughout his surgical practice.

A pencil is Bruce's favourite surgical instrument. When an eye is shown in a photograph it is flat (slide of corneal transplant and fine stitches done by hand). Today's instruments are ten microns thick and the structure on which you are working is only half a millimetre thick at its thickest, the thread invisible to the naked eye. This gives an idea of the fineness of depth of perception required. Noticing detail is crucial and tiny problems have huge impacts.

Bruce describes condition of a patient injured when putting up a shelf. The man's eye presented a clinical problem, affecting his personal life profoundly. Bruce used a whiteboard and pencil to work out how to remove the scar away from the area of injury and bring a clear piece back for the patient to look through. The patient's life was immeasurably improved. A good result but the point is that it was drawing that led Bruce through the process that resulted in the patient's changed life.

From a young age, Bruce had wanted to be a surgeon, but he also drew. It was his art master (a St Martin's alumnus) who gave him licence to reconcile his twin ambitions: *"You can always draw it."*

During his training, Bruce gained an embodied knowledge of anatomy. He gained a 3D memory through tactile and haptic experience, being able to project himself into the patient's body. Drawing sharpened these skills as he learned to represent what he had learned, both in writing and in visual notes.

A hundred photographs will give perhaps one image that's useful if you are trying to teach, but drawings are immediate. The eye offers itself as a natural diagram. As a circle, everyday objects like a coffee mug or paper cup can be a template. With coloured pens and a bit of spittle, you can get wash effects. It was compulsory for all Bruce's students to draw. Every time they saw a problem, they had to draw it. In this way, he could see how well they had been looking. As they drew, they began to see better and when they began to see better, they began to understand what they were seeing. A virtuous circle resulted, using their hands to recognise what they had been seeing. Something of a Noble school has developed: *"Learning to look by using a pencil."*

Drawing was put to other uses. Bruce could show his students an operation, and importantly, explain to a patient what the problem was so that they could understand it.

The nature of surgery changed greatly over the course of Bruce's career. At the outset it was: *"open it wide, look inside, take it out, cut it out, close it up, make stitches and run away"*. Now it is all working within the structure of the eye, a sphere one inch across. This requires highly specialised tools. A series of drawings shows how to bend a needle and move the hand in the course of the operation. Bruce takes hand skills and uses those skills to show students what is required working in a space that is 1.5mm deep like a scuba diver using a needle the length of a baby's eyelash. The ability to draw enabled Bruce to think a problem through, to imagine a solution, represent it in a cartoon strip, which then can become formalized and represented in a textbook to be supplemented for teaching purposes. One drawing and you have explained everything more easily than 100 videos or pages of written description.

By being able to record ideas and observations, imagining the solution and being able to deliver successful surgical intervention, you're able to use that in communication to others. You've got the raw problem, you model it in your mind, you imagine the space and the depth and the movement

that are required and you've then transmitted this into the oldest form of communication which is drawing.

Regarding computers Bruce stated: *"OK, they're good for bean-counters. They record everything. Management want to know how many operations you do and what the outcomes are. But actually, it's not the same as looking and seeing and feeling. I could imagine things to take surgery forward we begin to use 3D modelling, 3D printers, but surgery is moving more and more to robotics as well but somebody still has to put on the scuba suit, get inside that eye, inside that brain, inside that abdomen and be able to think about it and so we all need 3D hands."*

ROGER LEMON, neurophysiologist, gave a picture of what's going on in the brain when we grip tools and manipulate materials. Roger's slides are available on request. Points he raised were:

- What goes on in your brain when planning and executing a movement is dependent upon the sensory, tactile, feedback you get back from the hand, and other senses. The hand is not a motor structure but a sensory motor structure working in partnership.
- There are ten times as many channels of information feeding back from your hands to the brain as there are channels going out from your brain to your hands. Feedback or "sensory re-afference" happens every time you move, handle a tool or explore a new surface. We move, not to move the world, but to generate sensory feedback, called haptics.
- We have different sorts of receptors in the hands: event detectors which tell us when we touch something, and slowly adapting receptors, telling us about the shape of an object and changing conditions.
- Grasping and manipulating objects involves working with predictions. We are always working one step ahead of a problem, predicting grip force necessary to hold/lift solid objects or work with compliant materials. We have to control aperture, position of the digits and force that we exert with the digits separately.
- In patients with injury, manipulatory skill is impaired and can result in paralysis. Their motor side is intact but they cannot use their hands as no sensory information is coming in which they need to control their skills.
- Our hands and the hands of the great apes are very similar but our capacities with those hands aren't. The cognitive abilities that control the hand function make the difference, not bio-mechanics.
- It's the development of control over independent digit movements that makes our hands so special. There are about 30 muscles that operate on the hand, not simple strings and pulleys, but acting across different joints, on multiple joints and multiple digits. A great deal of neurological problem-solving and programming that allows us to produce at the end of a long, bony articulation, forces that are appropriate for whatever it is that you want to do: use a scalpel, shape clay on a wheel.
- Over our evolution, the sensory system such as binocular vision, touch, tactile exploration and control of independent digit movement has moved up into the cerebral cortex, also our main cognitive organ. That is why our cognition and advanced cognitive processing is able

to bear directly on the control of the hand, why we're able to use motor-imagery, motor-imagination, and motor-rehearsal. All these processes that go on in the brain without any movement occurring are very close to the control mechanisms allowing access to the hand and making skilled movement.

- Independent finger movement allows creation of programmes of control using muscles in interesting combinations. A cortico-motor neuron, directly linking the cortex and the motor neuron, doesn't just make one-to-one connections but a whole synergy of connectivity, linking different muscles capable of producing highly varied functional outcomes including the precision grip, very important for tool use.
- What drives the discharges of the nerve cells is what is called an internal model, a representation of the action you wish to execute, built up over a lifetime. These models are laid down from birth, continue to be upgraded using sensory information and are predictive, in action at least a second before voluntary movement.
- The cells carry frequency codes capable of coding many different things such as degree of force trip and degree of opening of the hand. Extremely sensitive to sensory feedback which relays the difference between the mental model and reality.
- How this is organised within the motor cortex is currently represented as a multi-coloured kaleidoscope with each colour found next to any other colour you might wish to use. This allows combination and recombination of manual control more difficult to achieve with a system arranged like a keyboard or spatial map. To get things to happen in the brain they have to be close together. This system allows a highly diverse repertoire of function, possible to expand on even late in life.
- What goes on during learning is to do with linking sensory inputs with motor outputs. The motor cortex is much thicker than the sensory cortex, not because of more cells but because of more wiring. In the motor area you need to be able to link any input to any output to control a skill. The motor cortex is much more complex than the sensory cortex.
- There is good evidence that changes go on in the brain when you learn or perfect a new skill. Scans of someone learning to juggle show huge changes before and after. During acquisition of the use of a new tool, the grey matter is getting more complex, new connections and maybe more cells are being generated. The brain has a capacity to be plastic. Therapy after injury depends on sufficient plasticity in the system to allow rehabilitation.
- We learn in all sorts of ways. That includes just seeing how a lump of clay behaves and by observation. Exactly the same part of the brain used for controlling our own movements is used in observational learning, watching other people do things. They are not two separate systems. Observational learning makes us imagine what we're seeing and makes our own library. Our own programmes attempt to imitate what they are doing.
- Actually watching people do things and learning from them is making use of the fundamental property of the brain – our motor systems are as well activated by watching actions as by doing actions.

QUESTIONS AND DISCUSSION

- It's the doing and the engaging that will get my special needs students to learn but the observing is very very difficult for them to do. Can you explain what's going on?
- Why are individual adults differently able to engage with that feedback loop with materials? Is it a build up of material learning rather than wiring?
- In using virtual devices are we relying on previous experience and understanding of the actual 3D world?

RL: Children doing observational work often move themselves and we learn to inhibit these movements as adults, enabling us to watch without moving.

Each individual is unique in what you're gifted with at birth and how that is developed. It probably does depend to an enormous amount on the experience of those students early in life as to whether they've had that experience or not. It's probably a build up of material learning rather than wiring depending enormously on how you interact with the world and people throughout childhood.

The tablet has made us more of what we already were – an intensely visual organism. You watch kids turning a page. Turning the page of a book is a much more skilled action and your hand will tell you if you've turned the page. You don't need vision to confirm it.

- Is there a link between our use of tools and language?

RL: The structures of the brain concerned with language and the structures that control the hand are immediately adjacent to one another. There are lots of ideas that the cognitive processes driving non-verbal communication, which preceded verbal, made it possible to expand that control from the hand to the whole organ of the respiratory tract and speech vocalisation.

- Did you say the motor cortex is significantly thicker and more complex than other bits of the brain including cognition? If so, the hierarchy attributed to cognition and the head versus the hand, seems to defy logic. It's exactly the opposite. What you do with your hands is more complex and organised than cognition. So I wonder where that cultural flip has happened?

RL: It's very easy to design a computer that can beat 99% of the world population at chess. But to design a computer that actually picks the piece up, moves it across the board and puts it down exactly where you want to play it, is a much bigger problem. We put huge value on a guy being able to hit a ball into a small hole at the end of a piece of grass, or being able to score a penalty. We do actually value these things quite highly. That is why the motor cortex is so highly developed and so thick because we are dealing with bio-mechanically a really complex problem.

- A question about plasticity. Studies have shown that children, if they aren't fluent in language say by 6 or 7, those things begin to shut down. Are there studies about handling materials and whether there is a limit to capacity for development?
- Are there ways of measuring plasticity?

RL: People say: “Well, they can walk and talk with their thumbs.” But that is a totally different sort of control because what they are impacting upon is a switch and that is very different in terms of the force control for example, versus say, controlling a pen or gripping a tool. It will be interesting to see how the efficiency children clearly have with these devices, whether there’s a pay-off benefit or loss in terms of them being able to do other things.

There are incredible new techniques for seeing what goes on in the brains of volunteers. A lot of what we understand about how the brain works has been derived from experiments in animals. We wouldn’t be able to understand things like MRI images at all if we had done the work previously in the brains of animals. You can take people like artists and sculptors and potters and put them in a brain scanner see what’s going on in their brains. It is clearly different to that of the brains of untrained individuals. And that shouldn’t really come as any great surprise to us. Because we can’t learn without our brains and our brains are clearly changing as we learn.

- Addressed to Bruce Noble: Do you find students represent thoughts, ideas and processes in their own way and do you encourage that?

BN: I hope is they will regard the tool of drawing as something useful to them and will develop their own language about the whole thing. Ceramics – I would hate for everyone to make a Leach pot. Without that variety they wouldn’t have the same understanding of it. If you are dealing with someone who is plainly not an artist, then you can give them quite formalised ideas: yellow for pus, red for blood, I use blue for haze. But for those people who take to drawing in a life-long way then they’ll make their language.

- It’s about the eye, drawing and the pencil process. I find myself that the physical act of drawing imprints something on my brain, which I then never forget. I can go back to that lamp or redraw that lamp weeks and weeks later because it’s in my head.

BN: Very succinct. For me it represents a way of crunching things. You can almost see the neurological architecture of my brain going chung, chung, chung, like a perfect laboratory animal as you can actually see the muscles and nerves all settle into that pattern: that’s the way you do that operation.

TAMSIN VAN ESSEN, Artist, **AND JAMILA SHERIF**, Medical Educator, described a course to improve observational skills using arts and crafts techniques, particularly clay, for 5th Year medical students at Imperial College

A collaboration between arts and medical educators the course is aimed at developing effective use of visual and tactile senses in dermatological examinations, enhancing ability to translate between 2D images and 3D people. The process has been a mutual learning experience for all the educators involved.

- Careful observation is a pre-requisite to effective diagnosis. Decision-making is in the visual domain using pattern-recognition and visual data analysis. Visual and tactile perception is crucial to effective examination and diagnosis to aid accurate discrimination and clinical reasoning.
- The clinician’s impulse is to jump to diagnosis. Students are taught to step back, make careful observations, look as an artist might, afresh and new at an image. This helps

generate hypotheses and open up differentials to develop a systematic way of clinical reasoning.

- A multi-sensory approach is emphasised, together with sense-based discrimination, and importance highlighted of palpating lesions, which even experienced doctors are not doing, leading to error. Lesions can look the same. Only palpation will differentiate.
- Why arts? Why clay? Art and clinical diagnosis both involve observation, description and interpretation of visual information. These skills can be developed and practiced effectively in art. Art can be used as a training tool to see a deeper, more complete picture of patients.
- Medicine does not allocate enough training to these skills. Traditionally it did. Several US medical schools propose systematic observation of paintings can be used to aid development of visual observation skills. This principle was extended at Imperial to tactile perception to provide students with a semantic framework for examining such that connections could be made to the clinical context in meaningful ways.
- The course is broken down into a series of workshops, repeated again and again for the whole year group working every 3 weeks with 30 students. Each session is broken down into smaller workshops starting off with drawing exercises to warm up and to get students into thinking a pen or pencil is a very important tool in their practice.
- Students talk about the art they see in a mini-gallery of prints and ceramic pieces, not jumping to conclusions, thinking about the whole picture and being aware of preconceptions. The same principles as in medical examination. Students need to develop pure observation. They each realise everyone sees things differently.
- The tactile workshop involves objects in a felt bag. Students have to describe the objects purely through touch and then reveal them. To develop still closer observation, students feel the objects and recreate the surface using clay. They model and sketch the surface. This reinforces the usefulness of using sketches in their medical notes or to communicate to patients.
- Gloves accustom them to how different things feel. They touch things like soft clay, noodles, familiar things, some simulated lesions made by a prosthetic artist then things that disintegrate to get them used to the idea of disgust.
- Another workshop gets them to use clay to model various conditions: papules, pustules etc. They stick these on a model head and another student has to feel and describe it.
- Evaluation through different methods is used. Using a simulated arm, pre and post-test descriptions are taken. Textual analysis is then applied to discover whether there is more use of descriptive terminology, texture, surface descriptions, colour etc. We also evaluate whether students are touching patients during examination. How many times did this happen before the course, afterwards and during clinic. Formal feedback has so far been very positive in spite of initial scepticism. One student said he was more articulate afterwards. Further evaluation will be done after the course has run for a complete cycle.

DISCUSSION (A brief session as speakers had to leave for another appointment)

- Medical students used to use a lot of experimental stuff to train students now much of this has been replaced with videos.

TVE: Maybe that's why we are now needing this course.

- How did Tamsin and Jamila make the partnership?

JS: Tamsin had presented at a Wellcome Trust exhibition about skin with her Medical Heirloom collection. A colleague recommended I get in touch with her and we went from there.

Duncan Hooson: There's now a link between Morley College Ceramics Department, Central Saint Martins Ceramic Design course and Imperial providing a fantastic opportunity for the design and ceramic students to have a real insight into how their skills relate to a different profession and context.

- In art exhibitions it's very usual to see notices saying: "Do not Touch"

JS: As a child we touch everything and we're taught not to.

GROUP DISCUSSION TO INFORM NEXT STEPS

Questions framing discussion:

1. We have called on perspectives from different fields to illuminate the value of hand skills' development. Is this useful?
2. How can schools today be supported to adopt hand skills more widely? What could be done differently?
3. How might you change your practice in the light of what you've heard today?
4. What additional evidence might we look to include in a follow up symposium?
5. We will be producing a handbook for educators wishing to encourage engagement in clay skills in and out of school, for adults and children, what would you like to see in it?

Outcomes from discussion fell in to 6 areas:

1. DIFFERENT PERSPECTIVES USEFUL?

- Evidence from different fields demonstrates the urgency of the situation, gives new understanding, makes for a more powerful argument, and is crucial to getting the message across to policy-makers.
- Essential to exploring why hands? why clay?
- Fantastic, amazing, linking art and science.
- Valuable for seeing clay as a sustainable resource.
- 3D in the talking makes more real.
- Valuable to see the cross-overs between art and medicine and to break down barriers.

2. ARGUMENTS, PRACTICALITIES AND EVIDENCE TO SUPPORT SCHOOLS

- Provide case studies of successfully developed clay skills projects.
- Lack of hand skills breeds a dependent culture.
- Manual is not retrograde. Objects don't happen by accident.
- Working in the abstract digital world needs to be rooted in materials and use of hands.
- Enable access to best practice, collaboration and networking.
- Examples and information of where clay is used in the rest of our lives – toothpaste etc. – is useful.
- Evidence could be spiritual AND economic.
- Improves clinical skills.
- Hand skills linked to cognitive skills.
- This is how people learn.
- Make practical suggestions and sources of funding, repairs, health and safety advice, after school arts clubs and visitors.
- Share facilities between schools' networks. Team up with libraries, museums, maker spaces, Fablabs, local maker networks, if space and equipment are issues.
- Explore scope for holistic assessment.
- Influence policy-makers.
- Need high-level supporters.
- Remove or reduce focus on testing as driver in schools.
- More technical schools needed.
- Who to influence? Policy-makers, Headteachers, Governors.
- High impact, short messages, bite sized.

3. CELEBRATE, TRAIN AND EXCHANGE KNOWLEDGE

- We are not alone! How do you bring in support that you don't have in the school?
- How do you build internal expertise and make that sustainable?
- Celebrate DIY culture and importance of making/fixing things yourself.
- Devise actions beyond the art room.
- How do we fix it in the short and long term? /enrichment, CPD, teachers' sabbaticals, training new teachers, refreshing practice. Offer more training on PGCE and Teacher Training in hand skills and ceramics. Establish access to makers (and other creatives) in a tangential, creative partnership, type way.
- Identify local makers and bring them into schools. Look for makers amongst parents.
- Set up open weeks for school students to visit universities.
- Send in students and professionals to run practical sessions, talk about ceramics and alternative careers, train parents in ceramics.
- Integrate making into other areas of the curriculum – project based learning.
- Offer advice about artists in residence; make trips to see artists in their studios.
- Talk about expanded field of hand skills on parents' evenings, show 'alternative' jobs/careers and importance of hand skills. e.g. offer films like Clayground's *What can hand skills teach?*
- 3D printing/digital needs addressing in tandem with the teaching of haptic skills.
- Involve schools in action-based research, link with experts.
- Higher standards of handwriting/less 'automatic' recourse to digital.

- Schools to have art exhibition each year at which parents given opportunity to learn too.
- The real world of work is collaborative/team-based so individual testing is not useful in the long-term.
- Week-long festivals with national links.
- Investigation-based and practical approach.

4. WHAT MIGHT YOU CHANGE?

- Take time out! Play– “but I feel guilty playing, we are not rewarded!!”
- We feel pressure to perform.
- Respect the process, not just the end product.

5. ADDITIONAL EVIDENCE NEEDED?

- Gather evidence for messy play and cross-curricular value. *“Play is the highest/finest form of research.”* A Einstein.
- Longitudinal studies re confirming what exists. e.g. behaviour change – how do you get the evidence? At what level? Individual and cultural?
- Gather evidence in innovative ways calling on other expertise, i.e. anthropology, neuroscience.
- Neuroscience of where/what how brain as “predictive organ” works and ‘what’ is the imagination.
- Hand skills: in hierarchy of disciplines arts are low down. Can we increase the value of the research evidence?
- Have we addressed Why Clay? i.e. rooted in traditions and innovative methods. Universal. Recyclable. Can be used without firing.
- Could include others with haptic skills beyond ceramics. Other skillsets/industries e.g. engineers, architects, builders, geologists, musicians, sports people – dexterity (hand eye coordination), model makers, students, and children.
- Medical perspective is a good example but perpetuates the hierarchy.
- More qualitative evidence needed.
- And quantitative for funders and powers that be.
- More research into before and after input.
- More from teachers about decline of hand skills.
- Mixture of hands-on evidence from primary and secondary school.
- Importance of handling and making in cognition, memory, attainment, wellbeing.
- Art therapy/arts in health/special educational needs.
- Has there been a cross-sector, traceable decline in hand skills?
- Hand skills’ role in memory.

6. WHAT WOULD YOU LIKE TO SEE IN A HANDBOOK FOR EDUCATORS?

- Case studies, examples of cross-curricular projects – not just art – in geography, maths, science (STEM) Quotations about its relationship to science (and other disciplines).
- Examples of projects with external partners, e.g. libraries, museums, archaeology.
- References to take back to school.
- Importance of play and failure.
- Importance of play to development at different stages.

- Links to websites of demonstrations and resources.
- What hand skills are: different practical ways of improving.
- Visual literacy link between copying movement/action and describing.
- More examples of how it works with adults – re-finding dormant/forgotten personal and family activities.
- Alternative cultural perspectives – where the maker is celebrated.
- Explore the relationship between process and product – the joy of ‘clay squashing’ rather than “having to get it right”.
- Examples of success stories.
- Evidence about the link between hand and brain – the knock-on effects of making/working with hands. The role of art and design throughout the economy.
- Valuing creative achievement.
- Low cost/high value and clear learning outcomes.
- Accessible to all, speaking to management with clarity and simplicity.
- Supporting local networks, finding threads, finding funding, suppliers etc.
- Cross-curriculum use of materials and ideas, Don't just make pots!

COMMENTS FOLLOWING SYMPOSIUM

Overall, feedback has been rewardingly positive. Comments include:
“Really great day. Fascinating.” Andy Allum, Ceramic Technician, CSM.

“It was extraordinary. Such committed and disparate people. Such talent and everyone so open and friendly. It was remarkable to look at the symposium audience (not really an audience was it? participators all!) and see total engagement from everyone. Wonderful passion from all and great fun collaborating.” Bruce Noble, speaker.

Kate Noble, (PhD in visual literacy, Learning Officer, Fitzwilliam Museum, Cambridge) is exploring potential for running teacher sessions during a forthcoming exhibition on material culture in conjunction with the History Faculty at the Fitzwilliam Museum, Cambridge, of which thinking hands and clay work could play an important part. She proposes more unpicking of perspectives from medics/designers/3D printing and cross-curricular applications of hand skills would make for clearer messages to schools and Senior Management Teams.

“The day was extremely useful. In fact, it was more of an epiphany, especially giving further understanding of the academic significance my hands on work with Clayground on the floating lab on Regents Canal. It tied in so many viewpoints of why the hand and the brain are so inextricably linked when we learn. It may become a central theme in my dissertation. I was taken aback by the engaging lines of argument of Quinn, Noble and Lemon (what great names!) and will be revisiting the notes and work of these individuals in the coming weeks.” Charlie Humble-Thomas, Product Design Student CSM.

“It was very useful. The science behind using our hands is important to know as more and more people are losing these skills, as they aren't deemed as important. With a logical, scientific argument head teachers would be hard pressed to ignore how important these skills are.” Chris Macleod, Head of Art, GEMS Hampshire School, SW3

“I found the day incredibly useful due to the variety of perspectives represented. Not only was I

intellectually engaged but I loved playing with the clay and laughing with other participants about childhood memories. I wrote down about a dozen different project ideas, and have arranged meetings with colleagues to talk them over. I'm hopeful to turn some of them into grant proposals this coming year. I've also been spending some time looking into some of the resources provided in the packet you gave us." Leah Bricker, Assistant Professor, School of Education, University of Michigan

"Useful? Very much so –hands on clay work stimulated the mind – the short, sharp presentations and panel discussions were an excellent way to share and to maintain a focus. The hands on experience, quality of trainers/ speakers and setting were enjoyable. I gained lots of insights and am sharing what I have learned with colleagues and friends, especially regarding the use of clay in medical training. Further fuel for multi-sensory/messy play in learning – something which I am passionate about." Tracy Edwards, Curriculum and Assessment Leader, Swiss Cottage School

The hand-made lunch by Global Generation deserves mention. It received applause. One teacher said: *"It was the best lunch I have ever had at a conference. Ever."*



Thinking Hands? research and symposium is an initiative of Clayground Collective and part of *Clay Cargo 2013-2015*, a project to re-engage people with clay and hand skills.

We thank Professors Shirley Brice Heath and Roger Kneebone for advice and discussion, plus insights from Professor Barry Smith and Tony Marcel of the Institute of Philosophy, UCL.

A particular thank you to Berni Yates and students from Central Saint Martins for symposium organisational support.

Clay Cargo 2013-2015 and *Thinking Hands?* Symposium are supported using public funding by the National Lottery through Arts Council England, British Ceramics Biennial, Canal & River Trust, Central Saint Martins, Camden Libraries, Potclays and other partners in three cities.



SPEAKER AND ADVISER BIOGRAPHIES

CLAYGROUND COLLECTIVE combines public art, education and research. Directors are Duncan Hooson and Julia Rowntree.

Clayground currently works on *Clay Cargo: London to Stoke 2013-2015*, a project renewing links between ceramics and the canal system inspired by Josiah Wedgwood, pioneer investor in the waterways. *Clay Cargo* incorporates large-scale participatory installations, workshops on boats and at canalside locations in London, Birmingham and Stoke-on-Trent, and commissions to artists. It is devised in partnership with the British Ceramics Biennial, the Canal & River Trust and made possible by Arts Council England and many other partners in London, Birmingham and Stoke-on-Trent.

Clay Cargo also incorporates a research strand, *Thinking Hands*, investigating the significance of hand skills' development today by conducting interviews with people who work with their hands in different walks of life. This to gather insights into why making is important to seeing, thinking and learning, thereby strengthening advocacy in formal and informal education for work with clay and 3D.

The company was commissioned by A New Direction in 2011 to lead an enquiry in 11 schools entitled: *What on Earth is Clay?* They advised the Crafts Council's *Firing Up* national programme to revive clay skills in schools and colleges, wrote a handbook and led professional development sessions with 150 teachers in 11 cities 2010-2013. Clayground was awarded a national Craft Skills Award in 2013 for passing craft skills to a younger generation.

Duncan is Head of Ceramics at Morley College and Stage 1 leader BA Ceramic Design at Central Saint Martins. He is author of *The Workshop Guide to Ceramics* (Thames & Hudson 2012) with ceramic designer, Anthony Quinn. Duncan has a broad-based practice including residencies in schools, museums and galleries, hospitals and hospices; working to private and public commission; and cross-arts collaboration. He is best known for his large-scale thrown ceramics.

Julia is author of *Changing the Performance: A companion guide to arts, business and civic engagement* (Routledge in association with NESTA 2006). This outlines her work at the London International Festival of Theatre where she was Director of Development and the Business Arts Forum for 20 years before setting up Clayground with Duncan. Julia researches, curates partnerships and produces works to generate insights across sectors, generations and cultures. She lectures and advises on Arts Development in the UK and internationally and has received Fellowships from the Winston Churchill Trust and the National Endowment for Science, Technology and the Arts. www.claygroundcollective.org

NEIL BROWNSWORD

Neil Brownsword is a Reader at Buckinghamshire New University and Adjunct Professor in Clay and Ceramics at Bergen Academy of Art and Design, Norway. His PhD (2006) combined historical and archaeological research on ceramic production in North Staffordshire from the eighteenth century to the present; the film archiving of craft skills in the industry today; and the creation of a body of artwork in response to this research.

Since graduating from the Royal College of Art in 1995, Brownsword's work has gained both national and international acclaim and resides in eminent public and private collections that include the Victoria & Albert Museum, the National Public Art Collection, Sweden and Fu Le International Ceramic Art Museum, China. In 2009 he won the One Off category at the British Ceramic Biennial and continues to exhibit both nationally and internationally. www.thingnessofthings.wordpress.com

MIKE EDEN

Michael Eden is a maker whose work sits at the intersection of craft, design and art, exploring contemporary themes through the redesign of historical, culturally familiar objects utilising digital manufacturing and materials.

Through this he investigates the relationship between hand and digital tools. He is particularly interested in how the tacit knowledge and sensibility to the 3 dimensional object, developed through extended ceramic practice can affect and influence the approach to the creation of objects using digital technology.

As a member of a unique generation that has bridged the digital divide, he firmly believes that he is able to contrast and compare life before and after the invention of the personal computer. For Eden it is a matter of choice, as life at the beginning of the 21st century has furnished makers with a wider choice of tools, materials and processes with which to realise ideas and concepts. All have their place, the new does not replace the old; the key is to make appropriate use of them.

Having attracted wide media and public attention, his work is exhibited internationally and acquired by a growing number of international Art Galleries and collectors. www.edenceramics.co.uk

KATHRYN HEARN

Kathryn Hearn is an educator and maker. The relationship of a student's learning preferences and their design methodology through ceramic design are of considerable interest to her. She has been a Course Director and subject leader at Central Saint Martins for many years and with colleagues created a unique offer in undergraduate education. Her research interests also include the use of craft within an industrial context interrogating conventions of aesthetics and production. She explores distinctive integrated surfaces and form, reflecting the natural but industrial management and expression of the rural landscape in the production of collectable decorative vessels. www.arts.ac.uk/csm/courses/undergraduate/ba-ceramic-design/

SHIRLEY BRICE HEATH (Adviser)

Professor Emerita, Stanford University, linguistic anthropologist Shirley Heath studies learners across the life span in non-formal learning environments. She gives primary focus to the ways in which speakers, young and old, learn the structures and uses of language as well as the attitudes, gestures, and interactional ways called for in learning environments of all types. In community arts organizations, she has examined the learning outcomes that result when youth living in under-resourced communities participate in planning, creating, producing, and critiquing products and performances. Within community sites she has given special attention to the ways in which science-learning demands close analysis of visual detail, trial and error, sketching and modeling projects, and strategic problem-solving. In her research on families, friendship groups, and community organizations, she studies how responsible roles accelerate desires for organizational, scientific, and mathematical knowledge. Shirley is the author of *Words at work and play: Three decades in families and communities* (2012) and *Ways with Words: Language, life, and work in communities and classrooms* (Cambridge University Press, 1983/1996). Heath has taught at universities throughout the world, most notably Stanford University and Brown University, and as Visiting Research Professor at King's College, University of London. She advises Clayground Collective on Thinking Hands. www.shirleybriceheath.net

ROGER KNEEBONE (Adviser)

Professor of Surgical Education, Imperial College, Roger Kneebone trained first as a general and trauma surgeon, working both in the UK and in Southern Africa. After finishing his specialist training, he became a general practitioner in Trowbridge, Wiltshire. In the 1990s he pioneered an innovative national training programme for minor surgery within primary care, based around intensive workshops using simulated tissue models and a computer-based learning programme. In 2003, Roger left his practice to join Imperial. He leads the UK's only Masters in Education (MEd) in Surgical Education, which builds on educational theory and practice to explore relationships between the biomedical sciences, the craft of surgery and the humanities and social sciences. Current work is exploring synergies between clinical care, biomedical science, art, humanities and performance. He is committed to outreach and public engagement, leading numerous high

profile Festivals and venues to bring simulation into the public domain and highlight both the patients' and clinicians' perspectives. The recent award of a prestigious 2 year Wellcome Trust Engagement Fellowship provides a unique opportunity for him to develop engagement and simulation science within and beyond Imperial. He advises Clayground on Thinking Hands.

www.imperial.ac.uk/AP/faces/pages/read/Home.jsp?person=r.kneebone&_adf.ctrl-state=k4o2r2y8w_103&_afRedirect=166013498532533

BRUCE NOBLE

Bruce Noble was a consultant ophthalmologist (eye surgeon) before retiring early to pursue his artistic interests. He trained in London at Barts and Moorfields Eye Hospitals before appointment as consultant ophthalmologist at the Leeds Teaching Hospitals for 30 years, and director of training for Yorkshire ophthalmologists. Author of many scientific papers, two surgical textbooks illustrated with his own drawings, he was highly regarded as a surgical and clinical trainer in the intricate and delicate world of ophthalmic microsurgery. Encouraged from an early age to draw, he adapted these skills to learn and understand anatomy and later to teach surgery; he encouraged the same practice in all his surgical trainees. He is an exhibiting member of Leeds Fine Artists and Medical Art Society.

ANTHONY QUINN

Anthony Quinn has a broad practice ranging from education, design, writing and consultancy, working across a range of disciplines and materials. He has a successful design consultancy with clients such as British Airways, Debenhams and Wedgwood. From 2010-13 he acted as Project Co-ordinator on Firing Up, the Crafts Council's national programme to re-introduce ceramics into the school curriculum, during which 3800 pupils and 150 teachers were taught the key skills of ceramics. He holds the post Professor of Form at the National Academy of Art and Design in Bergen, Norway. He is the author of *The Ceramic Design Course (2006)* and the co-author of the *Workshop Guide to Ceramics (2012)* both published by Thames & Hudson and Barons in the US. Since 2010 he has collaborated with Horizon Digital Economy Research Institute on the development of a new vision recognition system called Aestheticodes. The mission of Aestheticodes is to encourage beautiful interactions and put the *human* back into Computer Human Interaction.

www.anthonyquinnndesign.com

ROGER LEMON

Professor Lemon is Sobell Chair of Neurophysiology at the Institute of Neurology, University College London. His main interest is the control of skilled hand movements by the brain, prompted by the need to understand why hand and finger movements are affected by damage to the cortex, and its major descending pathways, for instance as a result of stroke or in cerebral palsy. Much of the work involves the use of experimental primates, since these provide the best available model for the human sensorimotor system controlling the hand. His work has provided important evidence that direct cortico-motoneuronal projections from primary motor cortex to spinal motoneurons are particularly important for the performance of skilled hand and finger movements, and has begun to explore the brain mechanisms in premotor cortex that allow visual information to influence activity in these pathways. He has carried out parallel studies in normal human volunteers and sought to apply the knowledge gained from this work to the effects of stroke on hand function in patients, and to try to understand the process of recovery and investigate therapies that might enhance recovery. He also has a major interest in translating basic science into effective clinical treatments for patients with spinal injury. He is actively engaged in the dialogue that explains the responsible use of animals in medical research.

www.ucl.ac.uk/ion/departments/sobell/Research/RLemon

JAMILA SHERIF

Jamila Sherif is a GP in North-West London and Clinical Teaching Fellow, Department of Primary Care and Public Health at Imperial College, University of London. She has been involved in developing a new integrated dermatology/GP course for Year 5 medical students and been part of the team designing an Arts-based observational skills workshop.

TAMSIN VAN ESSEN

Tamsin van Essen is a London based artist, working in ceramics. She is a graduate of Central Saint Martins and the Royal College of Art. Her work explores notions of beauty and perfection through examining scientific, medical and social historic themes. Material experimentation is a strong characteristic of her practice, probing how the technical qualities of ceramics can be altered through creative intervention. She has exhibited extensively throughout the world and her work is in the permanent collections of the Israel Museum in Jerusalem, the Montreal Museum of Fine Art, the Fonds National d'Art Contemporain in Paris, the Wellcome Collection and the Royal Pharmaceutical Society Museum in London. She is currently artist in residence in the Anatomy Department at King's College London and a tutor on the MA Art and Science at Central Saint Martins.

www.vanessendesign.com

PARTNER ORGANISATIONS

A NEW DIRECTION is London's leader in cultural education, connecting children, young people and education with the best of arts and culture. AND

- campaigns for the value of arts and culture to the lives of all young Londoners;
- promotes practical ways that schools and other institutions can develop cultural opportunities;
- works with arts and cultural partners to ensure the highest quality in work with children and young people.

www.anewdirection.org.uk

THE BRITISH CERAMICS BIENNIAL (BCB) showcases contemporary ceramics from across the world in a festival of exhibitions and activities embracing the heritage of the Potteries as the home of British ceramics, and celebrating the city's creative edge as an international centre for excellence in contemporary ceramics. Launched in 2009, the next biennial is in 2015. www.britishceramicsbiennial.com

THE CANAL & RIVER TRUST is entrusted with the care and enhancement of 2,000 miles of waterways in England and Wales plus an extensive network of bridges, embankments, towpaths, aqueducts, docks and reservoirs. C&RT depends on specialist craft skills to maintain these, some of which are over 200 years old. Together with expert and amateur wildlife specialists, boat restorers and engineers, the canals and waterways represent a national network of people expert in hand and observational skills.

www.canalrivertrust.org.uk

The collaboration between **CAMDEN LIBRARIES**, Clayground Collective and CSM Ceramic Design will be an important component of building community resilience through the exploration of clay as a medium for learner, reader and community development. As libraries adjust to changes in access to literature, information and the knowledge economy, they are reinventing themselves as hubs of personal and community learning. www.camden.gov.uk/ccm/navigation/leisure/libraries-and-online-learning-centres

CENTRAL SAINT MARTINS (CSM) – University of the Arts London - is one of the world's leading centres for art and design education. The College brings a broad range of art and design activities together allowing the exchange of ideas and techniques across disciplines, acting as a workshop for thinking and making, underpinned by a strong research base and exceptional technical resources.

CSM CERAMIC DESIGN provides a design-led creative experience of ceramics within a broad subject context bringing an ethos of responsible design to the study of markets and manufacture.

CSM WIDENING PARTICIPATION works with young people in state schools and further education colleges in Greater London, whose parent(s) have not been to university. University of the Arts London believes that widening participation to art and design higher education is essential to nurturing the artists and designers of the future. www.arts.ac.uk/csm

ARTS COUNCIL ENGLAND

Clayground Collective's current project Clay Cargo is supported using public funding by the National Lottery through Arts Council England. www.artscouncil.org.uk

SELECTED BIBLIOGRAPHY AND REFERENCES

- Chatterjee, Helen J., (editor), *Touch in Museums: Policy and Practice in Object Handling*, Berg, 2008.
- Craft, A., Jeffrey, B. and Liebling, M. (eds) (2001): *Creativity in Education*, London: Continuum
- Crawford, Matthew, *The Case for Working with your Hands: Or why Office Work is Bad for Us and Fixing Things Feels Good*, Penguin 2010.
- Donald, Merlin, *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*, Harvard University Press, 1991.
- Heath, Shirley Brice, *Words at Work and Play: three decades in family and community life*, Cambridge University Press, 2012.
- Heath, Shirley Brice & Wolf, Shelby, *Visual Learning in the Community School*, Creative Partnerships, 2004.
- Hooson, Duncan, & Quinn, Anthony, *Workshop Guide to Ceramics*, Thames and Hudson, 2012.
- Pallasmaa, Juhani, *The Thinking Hand: Existential and Embodied Wisdom in Architecture*, Wiley, 2009.
- Sigman, A. (2008) *Practically Minded: The benefits and mechanisms associated with a craft-based curriculum*. Published by Ruskin Mill Educational Trust; www.ruskin-mill.org.uk.
- Tallis, Raymond, *The Hand: A Philosophical Inquiry into Human Being*, Edinburgh University Press, 2003.
- Wilson, Frank R., *The Hand: How it shapes the brain, language, and human culture*, First Vintage Books, 1999.

Links to articles and other references

Two recent articles about the significance of writing by hand:

http://www.nytimes.com/2014/06/03/science/whats-lost-as-handwriting-fades.html?emc=eta1&_r=0

http://www.scientificamerican.com/article/a-learning-secret-don-t-take-notes-with-a-laptop/?WT.mc_id=SA_Facebook

Relationship between fine motor skills and cognition:

<http://www.ncbi.nlm.nih.gov/pubmed/24303571>

<http://www.scilearn.com/blog/early-fine-motor-skills-cognitive-skills>

<http://www.psychologytoday.com/blog/psyched/201402/fine-motor-skills-and-academic-achievement>

Knock-on effects on engineering education of decline in hand skills' development.

Cardenas, M., "The Decline of the Car Enthusiasts: Implications for Undergraduate Engineering Education", *Proceedings of the 2013 American Society for Engineering Education*.

Hand-made Minds in the "Digital" Age, Frank R. Wilson, M.D., Clinical professor of Neurology, Stanford University. Keynote address presented June 21, 2002 to *A Crisis in Early Childhood Education: The Rise of Technologies and the Demise of Play*,

http://www.handoc.com/HandmadeMindsInTheDigitalAge_FW_ConferenceAddress_2002-June-21.html

Ken Robinson on Changing Education Paradigms

<http://www.thersa.org/events/rसानimate/animate/rसानimate-changing-paradigms>

Crafts Council's Make: Shift: Do Conference, Education Manifesto and Parallel Practices.

www.craftscouncil.org.uk

PARTICIPANTS

Andy Allum, Ceramic Technician, CSM

Lucy, Anderson, Ceramic Design Student, CSM

Alison, Ayres, Education Assistant, Fitzwilliam Museum, Cambridge

Peter, Baxter, Senior officer: Learning, Reader Development and Stock Services, Camden Libraries

Darryl, Bedford, Apple Distinguished Educator, Art Teacher, Oak Lodge School for the Deaf

Leah, Bricker, Assistant Professor, School of Education, University of Michigan

Amanda, Bright, Associate Dean, CSM

Neil, Brownsword, Maker, Speaker

Sarah, Christie, Ceramic Design Student, CSM

Laura, Coates, Surgeon, University Hospitals, Bristol

Karen, Dash, Art Coordinator, Field End Infant School, Hillingdon

Jean, Durr, Deputy Headteacher, Highlands Primary School, Redbridge
 Sam, Eastop, Cluster Manager, Camden Libraries (unable to attend)
 Tim, Eastop, Executive Producer, Art on the Waterways, Canal & River Trust (unable to attend)
 Mike, Eden, Maker, Speaker
 Tracy, Edwards, Curriculum and Assessment Leader, Swiss Cottage School
 Emyr, Fairburn, Head Teacher, Kings Cross Academy
 Simeon, Featherstone, Technical Assistant, Ceramic Design, Ceramic Design, Central Saint Martins
 Simon, Fraser, MA Design Course Leader, CSM (unable to attend)
 Alex, Fraser, Lecturer BA Contextual Studies, CSM (unable to attend)
 Carole, Fraser, Occupational Therapist (retired), Addenbrookes Hospital, Cambridge
 Caroline, Gervay, Photographer, Clayground Collective
 Jim, Grant, Assistant Head Teacher, Lauriston School, Hackney
 Barney, Hare-Duke, Director, British Ceramics Biennial
 Kathryn, Hearn, Course Leader, Ceramic Design, CSM
 Rozenn, Himri, Swiss Cottage School
 Duncan, Hooson, Co-Director, Clayground Collective
 Ellis, Hooson, Ceramic Design Student, CSM
 Charlie, Humble-Thomas, Product Design Student, CSM
 Hilary, Jennings, Associate, Freelance, Craft Industry Board
 Rob, Kessler, Professor, Chair in Arts Design and Science, UAL, Ceramic Design, CSM
 Alice, King, Artist, (unable to attend)
 Beckie, Leach, Artist/Lecturer, CSM
 Anna, Ledger, Arts Educationalist/ Producer,
 Roger, Lemon, Sobell Chair of Neurophysiology/ Speaker, Institute of Neurology, UCL
 Chris, MacLeod, Head of Art, GEMS Hampshire School, Westminster
 Matt, Malpass, Coordinator MA Industrial Design / Research Fellow, Design Against Crime, CSM
 Tony, Marcel, Senior Research Associate, Institute of Philosophy, UCL (unable to attend)
 John, McMahon, Head of Learning and Talent Development, Crafts Council
 Steve, Moffitt, CEO, A New Direction
 Lucy, Neal, OBE, Arts Producer/ Playing for Time author,
 Bruce, Noble, Ophthalmologist (retired)/Speaker,
 Kate, Noble, Learning Officer, Learning/ Fitzwilliam Museum, Cambridge
 Ulrike, Oberlack, Lecturer MA Design, CSM
 Ron, Ofkants, Ceramic Design Student, CSM
 Maria, Onyeleke, Programme Assistant, A New Direction
 Anthony, Quinn, Lecturer, Stage 2 Leader, Ceramic Design, Ceramic Design, Central Saint Martins
 Nick, Rhodes, Programme Leader, Product, Ceramic, Industrial Design, CSM (unable to attend)
 Julia, Rowntree, Co-Director, Clayground Collective
 Selina, Shah, Head of Art and Photography, The Holy Family Catholic School and Sixth Form, Walthamstow
 Jamila, Sherif, Clinical Teaching Fellow, Imperial College Medical School
 Andrew, Siddall, Maker Educator, Emergency Exit Arts
 Simon, Taylor, Head of Learning, Ikon Gallery, Birmingham
 Rob, Thompson, Stage 1 Leader, Product Design, CSM (unable to attend)
 Margot, Turner, Lecturer in Community Medical Education, St George's University of London
 Clare, Twomey, Artist & Research Fellow, University of Westminster, Crafts Council Trustee (unable to attend)
 Nicole, Van den Eijnde, Programme Director, Global Generation
 Tamsin, Van Essen, Artist, Tamsin Van Essen Design
 Samantha, Weeks, Director, Early Years, Stamford Junior School
 Claire, West, Associate, Clayground Collective
 Judy, Wilcox, Head of CSM Museum & Archives, CSM
 Elizabeth, Wright, Lecturer MA/BA Contextual Studies, CSM
 Berni, Yates, Coordinator, Widening Participation, CSM
 Akvile, Zukauskaite, Ceramic Design Student, CSM