Investigating Creative Processes and Pedagogy in the UK: Fashion Thinking.

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Abstract

This article proposes that a new generation of designers is needed within the UK Fashion Industry with a combined skill-set of designer-led innovation, a critical approach to new technology and an understanding of new engineering, digital and scientific paradigms. The training of a new type of fashion student/ researcher/ designer is focused necessarily towards one who is able to work in a transdicsiplinary structure, and who also has a deep academic understanding of the field, able to question and hold to account emerging new industrial models.

The machinery and techniques commonly used, practiced and taught within the UK fashion industry and academia have not significantly changed in the past 100 years. However, recent manufacturing innovation and other technological advances including Additive Manufacture, nanotechnology, bio-engineering, electronics enhanced fabrics and digital design processes are enabling the fashion industry to reinvent itself at an international level. Led by a newly developing confidence in practice-based and practice-led research methods

for fashion this collection of technologies and capabilities could fundamentally change the future of the UK Fashion Design Industry, therefore radical change is needed in the training of fashion designers in UK Design Schools.

Introduction

Research initiated as part of a "state of the industry " scoping exercise carried out for the Burberry Material Futures Research Group at Royal College of Art (RCA) in 2018 revealed that sustainable future manufacturing, complex mechanised and robotic systems, intelligent, automated and agile production processes for the manufacture of fashion have been developing rapidly. Advances in manufacturing technologies are leading to more flexible, distributed and localized forms of manufacturing internationally. The research also suggests new pedagogic models for fashion are proliferating in European Universities.

However, through Future Fashion Factory: Digitally Enabled Design & Manufacture of Designer Products for Circular Economies (FFF), a 5 year Creative Clusters Arts and Humanities Research Council (AHRC) funded project initiated in 2018, RCA researchers identified a certain cultural resistance to innovation and modernisation within UK Fashion and textiles manufacturing. David Edgerton, Hans Rausing Professor of the History of Science and Technology and Professor of Modern British History at King's College, London has pointed out, a long held, and what he terms a determined ignorance, of the dynamics of global capitalism. He suggests there needs to be a long-overdue audit of British realities (Edgerton 2019). Historically Britain has seen itself as a great manufacturing and trading nation (Edgerton 2019; *Saunders, 2019)* but because of the current UK and international political situation we need to re understand and re-engage with the nature of our economy and the new relations of capitalism to politics (Edgerton 2019). The contemporary

reality for UK fashion manufacturing is somewhat precarious and home and international markets are uncertain, particularly in the light of Brexit and Covid-19.

A loss of confidence in the UK fashion and textiles manufacturing industry over the last 20 years, uncovered through scoping interviews carried out by the RCA FFF project team explains why SME businesses cannot find the young workforce with the skills they need. Where UK designer/ manufacturers *are* currently flourishing economically their workforces tend to be in their 50's and older. These businesses often cite Italian and Japanese producers as direct competition, recognising the efficiency and dynamism of small scale, often family run, multi generational, networked, high value, technically advanced manufacturing of luxury fashion.

In order to support the previous UK Government's meta narrative for the reshoring of UK manufacturing for Small and Medium Size Enterprises (SMEs) in Industry 4.0, a term which originates from a high- tech strategic project from the German government [Industrie 4.0, Hannover Fair, 2011], fashion researchers at RCA are currently investigating successful small scale, high value international models, exploring cultural differences, manufacturing expertise, historic, political, economic, policy and regulatory factors at play to propose transferable models. This research requires that disciplinary areas such as economics, design, humanities and engineering come together in transdicsiplinary research teams. Alex Coles, Professor of Transdisciplinary Studies at the University of Huddersfield explains transdisciplinarity as proposing a call to rethink the relationship between science, society, politics, ethics and aesthetics, and interdisciplinarity, which is often used erroneously as a synonym, as the mutation of disciplines that led to hybrid practices such as design anthropology (Coles 2012). Using a transdisciplinary approach, it is proposed design, product development and production can be explored from three interconnected perspectives: historic, economic and policy; designer led and culturally specific; machinery and tooling innovation. These positions are informing the development of a new methodological approach through Future Fashion Factory - Fashion Thinking for Social Change, Fashion Thinking for Applied Speculation and Fashion Thinking through Advanced Manufacturing. Furthermore, this

approach is currently being developed into a new pedagogic model at RCA that aims to produce a newly skilled fashion student/ researcher/ designer.

Purpose

This article proposes that the further development of multiple skills is needed to enable UK fashion designers to effectively engage with manufacturing in industry 4.0. In *Design School. After Boundaries and Disciplines*, Rogers and Bremner (2019) suggest that a number of related contextual factors - the education policies of governments, the aims and expectations of the profession, and the organisational strategies by which universities allocate resources, means constant change in UK Higher Education. They state that any repositioning of design education now "must first acknowledge that it has been complicit in creating a world that nobody wants any more" (Rogers and Bremner 2019 p 4). Following their lead this paper concerns itself with the contextual, internal, and external factors that are shaping the transformation of design schools and proposes setting out the necessary new skill set for Fashion Designers.

New tools and technologies

The basic principal of Industry 4.0 is that by connecting machines, work practices and systems, businesses are creating intelligent networks along the entire value chain that can control each other autonomously [Industrie 4.0, Hannover Fair, 2011]**. A** Business of Fashion (BoF) McKinsey Report (2020) suggests that only" the big and the bold" in the fashion industry will survive the current economic climate. However, UK students are trained to become micros and grow to become SME's and UK Government research funding is targeting small-scale enterprises through research with UK universities. BoF (2020) recognises a new role for small players where they might support R &D for larger brands in in-house laboratories or attached to universities. It is proposed this is where UK fashion design practice and training could lead the way, embracing new technical, economic and sustainable challenges.

The linking of small designer business to offshored volume producers is developing at

speed through designers bench and desktop factory technologies - pattern cutting tools that enable digital development of pattern files that can be sent anywhere in the world via digital networks. These tools do not currently serve the industry well. They do not provide accurate enough fit, that is, how the pattern fits together and then fits on the body. The systems have been designed by engineers excluding fashion designers from the process and in the workplace. The systems therefore serve lowest common denominator manufacturers where speed over pattern accuracy has become the most important factor. This has led, it is argued, to the huge problem of too cheap, disposable clothing that ends up in land fill. Disrupting and challenging a mind set that proposes "just about accurate" as good enough is where the designer/ researcher's value lies, engaging in the designing of better systems and more nuanced designer led tools.

Business of Fashion/ McKinsey & Company 2019 report recognized that systems from automotive, aerospace and other manufacturing sectors are starting to inform the way fashion is produced. The international fashion industry is adopting "lean manufacturing systems" also known as a "pull" based supply chain model, where production and distribution are based on demand from consumers. A "supermarket" model is also starting to be developed where stock is replenished once consumed. Changing to a "pull" model is boosted by moving production closer to stores. Therefore innovation in systems design, siting of manufacture and networked digital development will be crucial and transitioning towards circular approaches, and might mean start-ups and SMEs developing new business models that are agile, not locked into existing systems (Stahel 2017).

Also crossing over from automotive and aerospace to fashion production is the use of automation and robotics. The American company SoftWear using their Sewbots system claim to have revolutionized fashion production machinery, using robotics to fully automate sewing. Their research has shown how human operators use micro and macro manipulations of the fabric with their fingers, hands, elbows and feet when sewing garments and their robots are designed to attempt to replicate these manual functions.

(http://softwearautomation.com/products).

Questions that might arise from evaluating and interrogating these models include – why the tooling available to SME and micro designer businesses has not evolved more to enable intuitive, collaborative relationships between designer and robotic functions which might include stitching, cutting, finishing and so on? What kind of tools might be designed to enable new forms of micro production and ultimately lead to the development of new aesthetics? If robots were able to perform sampling and prototyping tasks could they then store information for production? What if these robotic systems could be autonomous, miniaturised and self-assembling?

Some fully automated production systems aim to replace workers in high volume production for standard processes arguing that the technology could have a positive impact in countries with large garment manufacturing industries. Workers might shift into doing more artisanal work, at higher wages they propose. Calling into question the ethics of these kinds of practices, examining the deskilling, or laying off of workforces or indeed, re educating and up skilling of workers should be a central issue and role for a newly informed designer led practice.

The necessity for technical textiles to be skilfully manipulated in automated systems could be seen to be driving simplicity of garment construction. Manufacturers rather than designers or consumers are then driving the production of goods. Newly graduated designers might well question what it is that they have been trained for if they are unable to make an informed contribution to this new design landscape. Data driven volume production and economies of scale might mean fewer choices for consumers and will mean fewer traditional design jobs. For instance, new developments in 3D weave technologies ,where highly complex digital jacquard machines are able to produce 3D garments and have been used in the production of sports shoes and trainers, require a whole new skill set and design understanding that will present many challenges for fashion designers only able to model on the stand or cut flat patterns. The coming development of 3D wovens will mean working in close cooperation with design engineers, yarn producers, textile technologists and scientists.

Customization in apparel has been seen by manufacturers as a way to satisfy increasing consumer demand without radically re tooling factories which is expensive, time consuming and can mean retraining workforces. In Mass Customisation – where consumers have the possibility to specify colours, logos etc. before an item is produced - choice is often limited to small detailing or embroidering of logos or in the case of shoes, colour combinations for sole and uppers. This is very easily achievable but can be sold as a premium personalized product. It is, however, an approach that immediately adds to the complexity of disassembly and recycling, as well as a proliferation of product. The potential for consumer dissatisfaction post purchase might even increase the amount of discarded clothing in this co-design scenario.

Architect and founder of the Product Life Institute in Geneva, Walter Stahel, states that Linear Industrial Economy (LIE) models, where competitiveness comes from higher economies of scale – bigger volumes enabling lower unit costs – mean the ownership and liability for the cost of risk and waste are passed on to the buyer. Challenging this model in an innovative way will fundamentally alter how designers can and will engage with industry 4.0. (Stahel 2017).

Circular Economic Models propose that many new technologies and processes in chemical engineering and material science can be focused on re use, repair and remanufacture in the creation of what Stahel calls "framework conditions," promoting and rewarding the emergence of sustainable, ethical and competitive solutions (Stahel 2017). He proposes R technologies - ones for re-use, repair, restoration and remarketing which remanufacture and reprogramme, re refine and recycle, using what he describes as "tolerant equipment*"* to cope with qualitative variations. Here the newly skilled designer /researcher investigating the potential for the use of a mono fibre for all garment components including finishes and trims also has the opportunity to consider what kinds of new "tolerant" tools might be designed to facilitate this culture of repair and reuse that do not currently exist.

Fashion Education: Old & New Models of Pedagogy

The last UK Government championed the STEAM agenda for UK education and looks set to continue to do so post the 2019 General Election. The merging of Science, Technology,

Engineering, Art and Maths (STEAM) for transdiciplinary and interdisciplinary education has now been adopted by the Royal College of Art. This pedagogic model originated from Rhode Island School of Design (RISD) in the US. Researched over the course of 4 years from 2011, the proposal was driven by an understanding that design education fosters critical thinking and comfort with risk taking that is necessary for success in a 21st century workforce. Babette Allina, executive director of Government Relations and External Affairs at RISD, explains that the ambition was "to reach consensus among disciplines on the requirements of the 21st Century workforce" (Allina 2019 p32).

The Design Council in their capacity advising the UK Government published *Designing a Future Economy- Developing Skills for Productivity and Innovation* in 2018, suggesting that design skills are the fusion of creativity with technical ability and interpersonal competencies. They highlight moving from STEM to STEAM+D – adding in both A and D, Art and Design – suggesting this would ensure a resilient economy in the longer term. The report encourages policy makers and education providers to consider how to develop the complex problem solving, critical and creative thinking skills that are essential to innovation (Design Council 2018). These skills are here understood as vital communication tools needed to engage with the developments in digital technologies in industry 4.0, as suggested by Klaus Krippendorff through the idea of the Linguistic Turn. He sees design as the driving activity of a post-industrial society where digital tools become prostheses of human intelligence. This new image of ourselves is tied to language, dialogue and discourse in order for us to make sense of a new reality. He proposes that "humans are beings who language each other into being" (Krippendorff 2006 p15) and considers language to be " a cultural artefact that enables humans to coordinate their conceptions, engage in joint actions, and construct and reconstruct the realities they see". (Krippendorff 2006 p20)

Following the conclusion of the RISD research in 2014, the UK Design Council's 2015 policy recommendation *Leading Business By Design: High Value Manufacturing* suggested that young people at all stages of education required exposure to the

multidisciplinary mix of science, technology, arts, humanities and enterprise to enable creative and manufacturing success in the UK. Government is encouraged to provide incentives to universities to deliver an increased range of multidisciplinary design courses in partnership with expert bodies to enable engagement with the fourth industrial revolution.

Traditionally focused on training students in conceptualising, designing and making their own solo collections, undergraduate and postgraduate fashion courses in the UK have not significantly evolved over the past 25 years. A report by Limei Hoang, The state of Education for Business of Fashion (2017) showed that fashion students entering the UK jobs market were lacking knowledge specific to new technologies resulting in impaired ability to challenge current practice or develop new design-led roles. This situation is partly economic – there are not the funds nor technical staff to fully equip Fashion Schools with all the tools that are current industry standards. Therefore universities need to make closer ties with manufacturers to enable access to these technologies at an international level. Only then will students be able to propose new tooling, a systems approach and technical advancements that might enhance their practices. Fashion courses are also not equipping students with the language or expertise to address environmental concerns in the rigorously informed way demanded by both industry and consumers. A Fashion Thinking approach to training that encompasses critical, linguistic and communication skills and competencies is imperative. The tension this has created is recognised by Rachel Cooper, Professor of Design Management at University of Lancaster when she writes that in a study she carried out in 2017, academics seemed to value design as a thinking and research discipline, where practitioners placed more stress on aesthetics and expertise (Cooper 2019).

Challenging Nixon and Blakely's notion of fashion thinking as "adding meaning and value to the functional and experiential spheres of products and services," (Nixon and Blakely 2012) but building on their idea of fashion thinking as a paradigm of critical thought and creative agency, its first function could be to serve a new generation of thought leaders within the fashion industry. The future of the UK Design School may depend on these new insights. Multi disciplinary universities in the UK have already understood design thinking, speculative

design, and critical design methods developed in Design Schools as useful approaches to innovation (Rogers and Bremner 2019), and are now leading the way in research and pedagogy of new economic models for values led entrepreneurialism and the design of 'volume to value' business models that champion profit without growth. Textile Science and Engineering courses and Design Engineering degrees are already training students with skillsets valuable to design industries. As Rogers and Bremner suggest, tomorrow's designers may well emerge from businesses such as health care, education and computing. They recognise a shift in Design School approaches from an emphasis on design to a desire to "gain academic legitimacy" establishing dialogues with history, scientific and philosophical theory, then a "search for legitimacy through design science" and finally a push towards interdisciplinarity "in an allegiance with technology." (Rogers and Bremner 2019: 5)

Alongside more traditional research activities, Aalto University in Finland has introduced platforms to galvanise researcher's contributions in digitalisation, energy, entrepreneurship, experience, health, living, materials, and sustainability. These groups investigate cross-disciplinary research. By partnering with industry, students' work is provided with a more pluralistic, real-life picture. In her publication *Recrafting Craft - An Exploration of Speculative Scenarios for Tomorrow's Fashion Education* Mascha van Zijverden (2018), based at Willem de Kooning Academie in Rotterdam, presents speculations on possible pathways for future fashion education. She explores six different readings of the fashion system: engineering, bio-design, curation, sustainability, modes of production and no fashion school at all. At the Sandberg Instituut, a progressive Postgraduate programme of the Gerrit Rietveld Academie Amsterdam, a temporary programme structure has been introduced that reacts to urgent matters - be they ecological, societal or political. These courses have predetermined lifespans, designed as a reaction to imminent demand in a particular field. Once less urgent, courses are closed and replaced. This flexibility is unprecedented in keeping the university offering current and relevant to its students. Beyond the expanded curriculum and new ways of teaching, the Sandberg Instituut is testing new external funding models for art and design education. But Fashion education is no longer exclusively offered by schools

and universities. The online fashion platform Business of Fashion (BoF) offers time-effective courses with industry experts, that are aimed at Gen Z, who are statistically less likely to invest in university education but instead are *assembling* their education to their exact needs via various short courses relevant to their interests.

A New Model

A series of 'platforms' designed to encourage engagement with Fashion Thinking perspectives have been running for three years in the Fashion Programme at the Royal College of Art. The original platforms were Bio Design, Sports as Identity, Digital Technologies and Future Systems; they have now been rationalised to three - Bio Design, Digital (AI and VR) and Advanced Manufacturing Systems. There is an explicit understanding that there are shared rationales and synergies, and that collaborations across these areas should happen, and are encouraged. The year long studio based investigations are led by experts in digital, sustainable, ethical and design practice joined by other specialists, from engineers to neuroscientists, supported by visits, industry facing projects, a parallel lecture series and work in progress show.

The following are examples of academic thinking that support this new positioning: - "irresponsible design" as proposed in Rogers and Bremner (2019); feminist pedagogic models (Trogal 2017); design anthropology methods (Gunn, Otto and Smith 2013; Clarke 2018); Transition theory and new economic models (Stahel 2017; Tonkinwise 2017; Mazzocato 2019); and practice based and practice led research methods (Vaughan 2017). Vaughn suggests that the issues and connections between design, practice and research are as relevant to master's degrees as they are to doctoral research. She proposes that underpinning practitioner research is an understanding that the practitioner–researcher has the skills and expertise in the actions of the field to be able to undertake research within it. Citing Schon, Vaughan points to the transition from designer-practitioner to designer-practitioner–researcher in the course of academic study, as a shift from being able to understand and articulate the value or challenges of technical acts, to being able to place these in broader socio-cultural, technical and economic contexts.

RCA Fashion researchers propose three approaches within a broader understanding of Fashion Thinking. Fashion Thinking for Social Change, Fashion Thinking for Applied Speculation and Fashion Thinking through Advanced Manufacturing can be viewed as distinct, but also linked and coupled, to co-generate knowledge and form new propositions for designer led research and practice. The *Fashion Practice* Special issue on Fashion Thinking (2016) recognised a definition of Fashion Thinking as not yet stabilised. Skov and Melchior's (2010) identification of an object based, culture based, practice based and production based approach has informed the RCA research position where Fashion Thinking for Social Change follows a humanities trajectory, holistically looking at systems for sustainability and bio design applications as well as user experiences informed by psychology and new economic models; Fashion Thinking for Applied Speculation critically assesses movements within the industry and speculatively positions work within the context of new technologies, aesthetics, philosophy and sciences; Fashion Thinking for Advanced Manufacturing encourages work that radically reimagines making processes, machines and systems from a designer led perspective and sits within the context of Industry 4.0 and circular economic models. The platforms enable the co constructing of knowledge between students and research staff at RCA.

In participant feedback from the original Future Systems platform students discussed the impact of the new positioning on their practice explaining how it challenged them to demand context and contemporary relevance from their work.

" We were asked to explore and understand the complex landscape of industry that's in front of us, and offer positive alternatives, solutions, and new definitions for fashion practice. This critical discourse and collaborative engagement supported us in developing valuable skills that have carried into our current practices." Participant CF

"The Future Systems platform reinforced my very pragmatic approach to fashion, but also, I'm finding that the theoretical aspect of my thinking has enhanced and added depth to my work" Participant LB

"The Future Systems platform allowed me to engage in a critical and design thought

process which illuminated aspects of my work that I had never previously considered. The platform is performed as a collaborative effort, which allowed me to work and think alongside my peers- this helped me realize the importance of shared skills and collaboration. " Participant KP

"This shift in practice was kick-started by the Future Systems platform. The group discussions, presentations and sharing of texts and ideas effectively challenged me to think about industry beyond its current praxis, and my position within it." Participant AB

Conclusion

The aims of the RCA Fashion Programme and the Future Fashion Factory research converge around driving designer led creative innovation through digital, robotic, networked, agile technologies and new systems thinking for the reshoring of UK fashion design and manufacture. The research has begun to define a new approach to Fashion Thinking and concomitant fashion pedagogy. This repositioning takes a more intellectually robust stance compared with existing fashion education models where there is an expectation of a skillset for fashion graduates that is led by design but includes critical questioning of existing paradigms, a better use of language and communication skills, an understanding of sustainability and the possibility to transition to better, less environmentally harmful and wasteful practices. Also crucial to an ability to communicate and thrive in trans-disciplinary teams, is investigating and redesigning systems to urgently address multiple fashion industry generated problems. Reconsidering the UK's relationships to reshoring, near shoring and with an understanding of the legislation, policy and meta-narratives driving the UK and international economies, fashion designer/ researchers in the UK should then be able to make a world leading contribution to changing fashion practice.

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