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CREATING INNOVATION: STIFLING EDUCATION

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ABSTRACT
Business, commerce and industry are extolled to be creative, innovative and entrepreneurial, education, particularly HE is now drawn into the arena, but in what sense and for why? One questions at what point did HE become the catalyst for economic growth? The question may be answered in terms of new university status i.e.1992. Prior to this date the universities operated research in pure terms leaving the Polytechnics to 'teach' to degree level, research for industry and commerce, providing solutions whilst supplying cohorts of specialist graduates for specific fields e.g., civil/mechanical engineering. The concept of the broad university education was the domain of the old universities who fed the professions; the 1960's universities taught specialist subjects academically, the polytechnics vocationally, none required industrialized innovative or creative skills to graduate or indeed fire the engines of commerce and industry. The datum or level of education required entering commerce or industry was the honours degree, graduants accepting positions at graduate level not necessarily in their 'subject'; post graduate activity and subsequent gleaning of experience nurturing creativity and consequently innovation. One questions at this point, when did HE become responsible for industrial and commercial activity in terms of creativity and innovation?

Keywords: Creativity, innovation, egalitarianism, curriculum,'t-shaped'

1 INTRODUCTION

The answer may lie in the globalization of the production, distribution and consumption of goods and services [1], and the realization that a new profession 'product design' had emerged at the centre of industry and commerce; and that new academic subjects had emerged within the European Universities i.e. BA Honours Product Design and BSc Honours Industrial Design. Julier states 'few professions in the industrialized world have grown in terms of economic presence and cultural import as design has in the past two decades' [2]. This paper argues that although the universities have provided academic support for this new profession, they have not moved wholly to a point where creativity and innovation are taught overtly within the curriculum and that to provide the knowledge bank as advocated by the Department for Business Innovation and Skills in its paper 'Higher Ambitions' one of two paths must be followed. One would develop a curriculum inclusive of creativity and innovation and therefore follow a multi-disciplinary and vocational approach or excepting that only experiential learning provides for creativity and innovation a second option would be to write curricula that is exclusive and overtly academic by nature, as Van Dijk states 'this type of service requires intensive cross disciplinary collaboration and sharing', the 'T' shaped graduate [3]. This paper proposes a return to a more traditional curriculum; it suggests product design is not an academic subject but an amalgamation of small aspects of other purer disciplines, suggesting that Product Design is not a profession but again an amalgam of other professions, easily fabricated by experienced graduates of other professions and disciplines; leading to a curriculum that is secular, intensive, able to create a graduate well versed in the techniques required to become on graduation and with acquired experience an asset to commerce and industry as a designer.

2 DESIGN EDUCATION IN THE KNOWLEDGE ECONOMY

Currently the Universities, particularly the 'new' post 1992 universities are encouraged to provide graduates ready for employment. Employability deemed by many to be the measure of success for the institutions; all institutions are extolled to teach and develop within themselves and their students and staff the attributes, skills and knowledge to produce a future commercial and industrial sector. This sector, based on employability, creativity, innovation and business acumen will provide the building

blocks for the United Kingdom's economy, the new 'knowledge economy'. The 'creative industries' the buzz phrase from the Blair dynasty being replaced by Mandelson's new mantra, which the coalition government have espoused as their own, namely; 'boosting the general employability skills expected of all graduates' [4]. This has led, this paper suggests, to a total watering down of academic subjects, learning in-depth and specialisms in all areas. The binding subjects of any discipline have and are being replaced by tactics to teach creativity, innovation, business acumen and professionalism, all to be measured against employability and the intangible outputs of the knowledge and creative industries. What one asks of education, the broadening of the mind, this paper suggests that creating this educational landscape without careful and thoughtful planning is stifling education and may in turn stifle creativity and innovation.

2.1 Design Engineering Educational Changes

One of the great changes in education in the last forty years has been the decline of engineering programmes and the rise of design programmes particularly 'Product Design'. It has been fuelled by a collapse of heavy engineering and a perceived, if false assumption, that engineering, in all its guises was no longer a career choice. Change underpinned by the 'glitz' of design and the sheer arrogance of the design profession who assume that in any sector of industry or commerce design can regenerate and rebuild the infrastructure for success, as stated by Hutton; 'by 2020 the UK must create a balanced and sustainable knowledge economy with design as a critical and central part. There is no other option [5]. He further states; 'successful companies will be those who develop innovative products and processes, so creating new markets and reputations for themselves [6]. Of course he is absolutely correct, but what type of graduate is required for this market? A graduate, taught, if it is possible, to be innovative and creative or a graduate with in-depth skills in design engineering and specific skills and deep understanding of science, technology, engineering and mathematics i.e. STEM.

Hutton further states 'in all industrialized economies it has been the technology and knowledge based industries that have driven the rise in jobs and exports [7]. The author argues these are the subjects that higher education should therefore be extolling, genuine deep knowledge and 'stem' subjects, particularly design engineering, a stiffening of academic purpose, learning that is tangible, not the intangible abstract notions of creativity and innovation, these can be developed within industry and commerce during the sandwich year (placement) and after graduation, for as described later, *section 3 Contemporary Teaching,* design graduates are finding it difficult to move sectors due to a lack of fundamental knowledge, failing in both the horizontal and vertical bars of the 'T-shaped graduate'. Interestingly in the Design Council's paper; Design in the knowledge economy 2020, Hutton moves to redefine Cox's definitions of creativity, innovation and design, stating; 'design is the bridge between the consumer questing for the experimental and the company trying to meet that appetite with an offer that presents the new in a user friendly and innovative way' [8].

2.2 Defining the Design Practice

In essence the author agrees with the statement, finding the definition matching much closer to the professional design practice associated with engineering than was Cox's. However, whilst reflecting on the content of the current curricula of most design schools with their emphasis on employability, creativity and innovation, one finds it extremely difficult to visualise design graduates bridging the gap between consumer and manufacturer with their extant knowledge gleaned from contemporary curricula. Interestingly, to evidence design as the bridge and as the core of the knowledge economy Hutton finally states' design spending as an intangible within architecture and engineering currently stands at £44bn, 30% of total intangible investment which is 1.5 times greater than the spending on research and development (R&D) [9].

One questions, why and how does the design practice find itself separated from R&D, the author would argue they are inseparable, and suggests it is in and through R&D that the design practise is carried out, that during R&D innovation, that is invention, the act of design practice takes place. The author further suggests the attributes, knowledge and skills which underpin the design activity within the R&D environment are those, which we should implement within the curriculum at higher education level, namely; research tactics, research methodologies, design methodologies, data acquisition, data analysis and evaluation and statistical analysis. These attributes are built on the bed rock of in-depth academic study of a variety of subjects, mainly taken from the STEM grouping, a

cohesive grouping that together should form the syllabus for Product Design and by drawing elements from all should form the subject area of Product Design.
It is argued the contemporary make up of the Product Design syllabus at undergraduate level is not sufficiently academic, broad or deep enough in the STEM subjects and in the past five years too much emphasis has been placed on employability, creativity, innovation and in particular the notion of the 'T-Shaped' design graduate, resulting in a lack of focus on the core issues and design graduates unable to move across sectors or function fully as 'total designers' making life post graduation and outside design extremely difficult. This need for multi-disciplinary work, the ability to move across sectors of industry and commerce is vital for graduate employability, innovation and creativity within the professional sector. However, in our desire to strengthen, in terms of academic, employable, innovative and creative, the designer's attributes the horizontal bar of the 'T-Shaped' graduate have we, as the author suggests, weakened the vertical core? As design graduates move into even newer sectors, such as 'service design and manu-service design', described as the digital infrastructure for the procurement, maintenance, design and research and development of our needs, that is social and personal, they require more than ever a full knowledge and understanding of the total design activity and how to practice it, as van Dijk states; 'the development of this type of service requires intensive cross-disciplinary collaboration and knowledge sharing, and in different ways than before. It requires a new, broader combination of disciplines and a more design and consumer focused way of thinking' [10].

2.3 New Curriculum

The author argues we must provide a curriculum both broad and deep in academic and vocational terms, a curriculum not stifled by encumbering notions 'of teaching innovation', enabling the students an enhanced experience, providing them with the attributes and skills to join the 'manu-service design sector'. This sector it is predicted will move to invest increasingly in the intangibles, more so than the service sector, students must be prepared to enter this domain; as Hutton states 'it employs as big a share of knowledge intensive workers as does the high technology service industry, its most important intangible is investment in design' [11].
The stiffening of the curriculum in academic terms would result from a revitalized syllabus, having greater class contact hours, more time spent on discipline appropriate 'STEM' subjects and added value given to design theory and design responsibility. The stiffening of the curriculum in vocational terms would result from widening the participation of the placement year, currently one of the enhanced features of the Product Design degree programmes the author teaches on. The author suggests in terms of professional practice a sandwich degree offers greater opportunity for employability post graduation than a full time-degree, whilst nurturing within the placement period genuine experience of creativity and innovation being practiced by professional engineering designers. There is clearly a need to extend the current period of industrial placement from the norm of thirty-six weeks to the full year, for although many students do stay with an organization for the full year, a statutory period would ensure the maximum exposure to creative and innovative practice.

3 CONTEMPORARY TEACHING

Current teaching practice within design schools revolves around design practice, design professionalism and design studies, often based on a four year sandwich programme of three years academic study and one year (thirty-six weeks) of industrial placement. However, this mode of operation applies mainly to art, design and vocational programmes, which it is suggested it enhances, although these types of programme are now in a minority offered at higher education level. This period of training sets the programmes apart from the majority and is defined by the institutions historical background i.e. an English Polytechnic, delivering 4 year honours sandwich programmes. This places the institution in a unique position, figures from the Higher Education Academy suggesting that less than 10% of undergraduates are enrolled on sandwich degrees, as shown by table 1.

Table 1. Undergraduate sandwich students, UK [Source: HSE table H] [12]

	First Degree, N =	Other undergraduate, N =	As % of all Undergraduates
1997-98	115,743	8,059	8.8
1999-00	118,510	6,150	8.6
2001-02	120,655	5,525	7.8

It is perceived that the new universities offer the majority of their programmes at sandwich study mode, usually 55% of all programmes, where as, the traditional universities can be as low as 1%. It is this artisan experience that provides for students the necessary attributes for post graduation employment, currently 76%, within the author's institution's Product Design subject area.

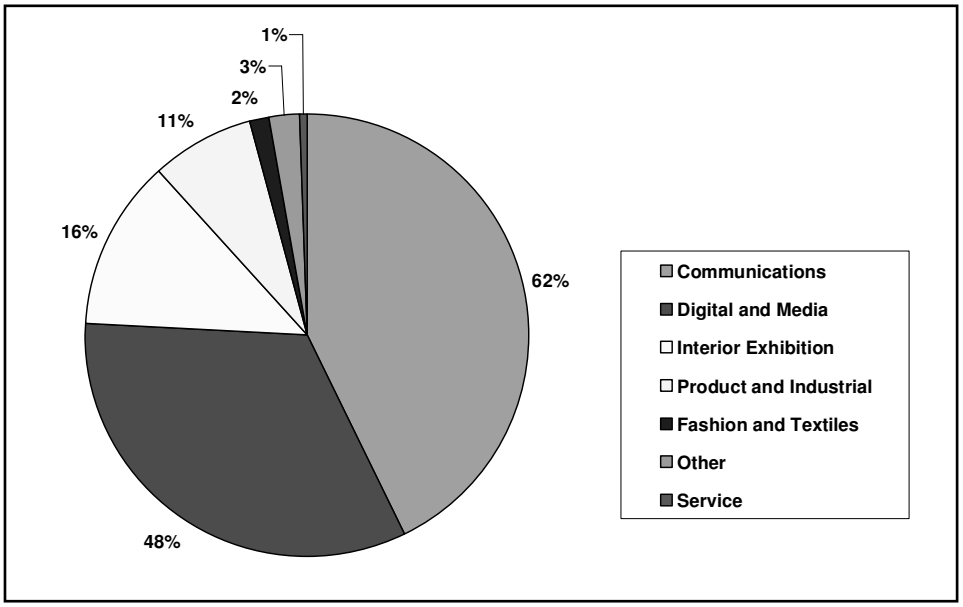

Figure 1. Designers Engaged In Various Commercial Sectors [13]

However, if one accepts the findings of the Design Council's report, 'Design in the knowledge economy 2020', figure 1, it becomes apparent that graduates of design must be equipped to move across the sectors to find design work. The report suggests that of the entire population of workers in the product and industrial design sector only 11% are designers, whilst within the fashion and textile industry this falls to 2%; when one considers the number of graduates within these disciplines and the size of the United Kingdom market one realises just how flexible in their approach, attributes and knowledge these graduates must be to move across the market for employment, presumably in the communications [62%] and media and digital [48%] sectors of industry and commerce.

3.1 T-shaped Graduates

The purpose of the teaching mode is to develop 'T-Shaped' graduates for the product design sector. However, it is the authors opinion that in general across the engineering design education arena, having placed much emphasis on the 'T-shaped' profile, creativity, employability and innovation we have failed to 1) recognise and further enhance the industrial placement, which it is suggested will realise employment and nurture creativity and innovation; and 2) failed to deliver, particularly in the widening of the subjects of the horizontal bar of the 'T'. This has meant that graduates often do not possess multi-disciplinary skills and therefore fail to move through the various commercial sectors where design is practised. Geoff Mulgan, Tony Blair's ex-strategy advisor, when speaking on this

problem of designers who had entered the social design space and failed, sites the problems as their 'naiveté, their lack of knowledge about the public sector and their inability to effect change' [14].
It is believed this criticism is well founded for in higher education, industry and commerce the expanding arrogance of the design profession proclaims that being multi-disciplinary by nature, it can move into any sector and with its perceived attributes of innovation, creativity and business acumen effect change, designers becoming facilitators, often termed 'design thinking'. Design thinking itself is fraught with misinterpretation, ranging from Integrative thinking through to a new spin on design, the middle ground usually occupied by methods employed to make managers think like designers or visa versa. However, in academic terms it is often the case that the vertices of the 'T' is often sadly lacking in academic substance, that is learning and teaching, which invariably amounts to hours of CAD practise, model making in workshops, studio rendering tutorials and preparation for placement, dubbed professional practise. Not surprisingly Mulgan suggests the vertical block as the weakness, they hit a wall of incompetence pertinent to their new sector, he states they have; 'a weak vertical stack of capabilities that are relevant to their new discipline or problem area' [15]. It is clear that the good educational base now enjoyed by engineering design students could be enhanced by focussing and enhancing on the excellent practise, namely industrial placement and academic study in design and let industry and commerce, starting with placement on sandwich programmes initiate and nurture creativity and innovation.

4 CONCLUSION

The author concurs with Mulgan, it is obvious that if the design attribute is weak then the graduate must compete on the skills and knowledge enshrined within the horizontal bar, generalist competencies that are often held and demonstrated at a higher level by graduates of engineering, science and mathematics. Also in the horizontal bar are generalist skills and academic knowledge pertinent to research, management and business that are studied to great depth by graduates of social science and humanities, these are the lateral attributes that have allowed good designers to move into other fields, however to many graduates of design this is their weakness, 'a weak vertical stack of capabilities that are relevant to their new discipline or problem area' [16]. Designers need to be aware that they are not the only graduates or professionals in the market who can solve problems or display creativity. The majority of solutions do not require visual creativity, a thorough understanding of algebra and its application to the solving of problems and the proposal of solutions is a far better preparation for worldly problems than is the ability to render a surface meshed geometrical shape on a computer aided design system.
The author suggests that the traditional skills and knowledge of the industrial, product or engineering designer are clearly not enough in the rapidly emerging knowledge based economy, particularly as the specific design knowledge has been watered down to enable employability, creative and innovative factors to emerge. The design disciplines as given in figure 1 of communications, digital and media, interior and exhibition, product and industrial, fashion and textiles, others and services provide clear examples of the range and depth of knowledge required of the vertical stem to operate within the industry in a secular fashion, underlining the extra professional attributes one needs to move across the disciplines, emphasising the level of expertise required in the horizontal bar if designers wish to move their creative and innovative skills into other sectors e.g., manu-services and business.
One returns to the original question posed, when did HE become responsible for industrial and commercial activity in terms of creativity and innovation? The perceived need is for more academic study relative to design and its associated disciplines, ensuring the 'T-shaped' graduate has genuine academic strength in the vertical stack coupled to thorough understanding and practice of the vocational requirements of design. To promote a true egalitarian education, it is necessary to accept that students are products of their social and educational environment, an environment that academics are responsible for, it is incumbent upon higher education to ensure that if in a desire to enhance the student experience to aid employability, creativity and innovation in so doing the explicit skills both academic and vocational are not diluted. Designers as well as academics should recognize this situation where one element of a system i.e. curriculum, will affect and respond to another, that which Poole called the 'relative continuum' [17].
Students it is believed are part of 'an intrinsic learning and teaching system', [18], a system which is under increasing pressure to deliver on behalf of the United Kingdom the answer to the economic malaise of the 2000-2010 period by delivering the component parts of the knowledge economy, as

Hutton states; 'the knowledge economy led the recovery of the 1980's and 1990's, it will lead the recovery of the 2010's' [19]. It is imperative the balance in the curriculum is correct, thorough in academic delivery, engineering design at its centre, ensuring industry and commerce through the sandwich activity nurture the embryo thoughts relative to creativity and innovation. Graduates within commerce and industry can then build on that education adding to their already considerable attributes business driven creativity and innovation.

This partnership with industry through the sandwich scheme and the creation of 'T-shaped' graduates is of the utmost importance, to ensure in the attempt to create innovation we do not inadvertently stifle education; when clearly the desire through education is to inspire creative and innovative thought and practice.

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