

EDUCATION: CREATING INNOVATION

Alan R CRISP, Leslie ARTHUR and Christine HARDY

Nottingham Trent University, School of Architecture Design and Built Environment

ABSTRACT

The synergy of design education and business innovation although much talked and written of is less than tangible, indeed tenuous by nature. Immediately one asks can creativity and innovation be taught, what are they? The Design Councils answer via Cox was 'creativity is the generation of new ideas, innovation is the successful exploitation of those ideas, design links the two. Should they be included therefore in the curriculum or if they cannot be 'taught' does the curriculum require space to provide the time for experiential learning, in the belief that both; i.e. creativity and innovation are the result of experience? The intrinsic link between design and business, good business has been exemplified many times, Raymond Loewy remarked 'good design is an upwards sales curve', perhaps the best possible reason to link design to business. Design, itself a business, results in multi-discipline practice across the industrial and commercial field, which in turn spawns creativity and innovation as ideas in one discipline are taken up by another. The best practice currently at undergraduate level would be the sandwich programmes, the vocational aspects of design practice, the acquisition of wisdom being formulated by the period in business i.e. studio, commerce or industry. One question whether or not such a system could be developed at master's level and if integrated provide the link between the programmes of study. However, when considering the trigger of creativity the supposition is that the resultant process of design education coupled with experience and later wisdom is the causation of the action, not the taught theoretical philosophies of design as a specific.

Keywords: Creativity, innovation, egalitarianism, curriculum

1 INTRODUCTION

This paper argues design should belong to the broad church of subjects taught by a university, whose name 'is inconsistent with restrictions of any kind' [1]. The egalitarianism of design education should in itself be the catalyst for creativity, freeing the mind across a range of subjects, however this subjective stance is not enough and it is argued cannot be applied to commercial innovation, but would apply to pedagogic innovation e.g., new paradigms for design curricula. This paper proposes that individual innovation can only stem from designed creativity, it cannot be produced by educational establishments in isolation but requires partnership with industry and individually acquired experience and wisdom, it is suggested Cox's definition is too simplistic e.g., to drive Texaco through the great depression Teague brought together designed creativity and branding, the innovation to introduce a revolutionised petrol forecourt; 'large glass areas, white, easy to clean walls, canopies over pumps and rest rooms' [2].

The innovation of introducing a multi-disciplinary designed artifact engineered through researched focus groups had a tremendous impact, Texaco prospered through the worst economic depression of the modern age, within fifteen years five hundred iconic Texaco styled petrol stations had been built, a design unchanged today. This paper argues that universities cannot provide this experience but through industrial led student activity, described by case studies, and revised curriculum and teaching paradigms the first veneers of required experience and wisdom can be applied.

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' [3]. 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 and partnership with industry and commerce may stifle education and may in turn stifle creativity and innovation, however if one accepts that industrial experience creates the embryo of innovation, as also argued by this paper, then through two elements of teaching as practiced by the authors; namely, 1) the sandwich programme and 2) multi-discipline project working, it is possible to create an atmosphere in which innovation and creativity thrive and in so doing enhance the business acumen. The multi-discipline working takes part at both under-graduate and post-graduate level, placement in industry and commerce currently takes place only at under-graduate level, however, new initiatives are being undertaken to introduce internships at post-graduate level also. This paper describes the novel experiences and results in academic and educational terms of multi-disciplinary working at post-graduate level; and further proposes paradigms and thoughts for future working at this level.

3 DESIGN TEACHING: MULTI-DISCIPLINARITY

The need for multi-disciplinarity in the teaching of product design students is seen as fundamental to the future of the design profession and product designers themselves. Only twelve years ago the profession was extolled by the then Prime Minister as part of the creative industries, Julier stating 'few professions in the industrialized world have grown in terms of economic presence and cultural import as design has in the past two decades' [4]. However, since that statement the world economy has suffered a series of setbacks culminating in the banking collapse of 2009-10 and the slowing of the growth of world economies. The market for 'pure designers' has altered and if one accepts the findings of the Design Council's report, 'Design in the knowledge economy 2020' [5], 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. The need, practically for designers to be able to function in a multi-disciplinary manner within industry and commerce is from these findings self evident, however, and more importantly, considering the national, international and global economy, it is also self evident that designers should be educated and taught in a multi-disciplinary manner for as stated by the chairman of EEF, the manufacturing organisations forum, Martin Temple; 'the economic goal of generating more wealth from new science demands multi-disciplinary teams of designers, engineers and technologists designing around the needs of customers' [6]. The type of multi-disciplinary project work and whether it is implemented within the curriculum or is operated as an extra curricula activity is the first focal point of interest; for if one believes that innovation, creativity and business acumen can be taught one could develop a curriculum inclusive of creativity and innovation and therefore follow a multi-disciplinary and vocational approach. However, excepting that only experiential learning provides for creativity and innovation, as argued by this paper, a second option would be to write curricula that is exclusive and overtly academic by nature and operate a multi-disciplinary Masters' module, 'extra curricula' and in parallel with taught modules, for as Van Dijk states 'this type of service requires intensive cross disciplinary collaboration and sharing', the 'T' shaped graduate [7]. This latter option was the choice of the authors who sought to use live projects integrated with industrial and commercial experience and expertise, enabling academic tutors to take the post-graduate students through the total design process including the realization of the products to the satisfaction of the customers i.e. the industrialists and members of commerce.

4 DESIGN TEACHING: CASE STUDY

Students from the MA Product Design suite of programmes, were offered a choice of industrially led design projects to work through as an extra curricula activity during the academic year 2009-2010, they chose a light engineering project, which included a significant amount of market research and re-branding to design a new product from the companies extant brochure. They were joined in this activity by MSc students from the Nottingham Trent University Business School and the School of Science and Technology, who initially were all introduced to a variety of design methodologies to follow in the course of their design work and encouraged to form a small company with working groups of specialized interests; each group having a manager, designer, accountant, market research head etc. Immediately interesting points were raised and patterns emerged; firstly few of the students had any idea of working practices i.e. methodologies, secondly none had experience of industrial working, indeed none had seen the inside of an industrialized factory, thirdly and from the authors perspective the most interesting, they all wished to manage, only two, exceptional European students on the Erasmus exchange programme appeared to want to be innovative, creative or practise as designers. The product was aligned with the leisure industry and aimed at the teenage market, it required discrete market research in an attempt to find a new niche market, develop a new brand and target the correct audience at the correct price, whilst designing and manufacturing a product fit for purpose. They were also introduced to the fundamental requirements of design practice within the department, namely that through design techniques and activities, they should:

- Define their problem and identify its constraints;
- Design solutions according to the customer and users' needs;
- Use creativity and innovation in a practical context;
- Ensure fitness for purpose (including operation, maintenance, reliability etc);
- Be mindful to adapt extant designs to meet new purposes or applications;
- Demonstrate intellectually the development of the subject and the product;
- Define products within appropriate historical, intellectual, cultural or institutional context;
- Analyse and evaluate the commercial and economic context of designed product;
- Apply design management techniques to achieve design objectives;
- Recognise and apply personnel, health, safety and risk requirements (including environmental risk) to design activities;
- Identify and use a high level of professional and ethical conduct in design;
- Within the finalized product locate, contextualise, and communicate the visual and material culture of the geographical region and or chronological period

4.1 Industrial Collaboration

The logistical difficulties encountered were at times almost insurmountable, not least the different timetables operated across the university. It became increasingly ironic to all academics involved that to cross discipline boundaries and engage with colleagues from eclectic backgrounds was not only mutually beneficial but extremely easy to manage compared to organizing a multi-discipline seminar across three schools that all operate on a different year, e.g., September, January or Easter start. The [un]-common, common ground was not and is not academia but logistical administration. That which became the essential element in the activity was the involvement of the industrialist, for it was his expert knowledge of the market and his industrial business acumen coupled with his ability to involve the students at grass roots level with the company design engineers and production engineers that drove the project forwards. His involvement in terms of personal time grew with the project, which lasted fourteen weeks, the business school students leaving the project after five weeks of intense activity, during which he conducted 'expert' seminars at both the university and the factory. His seminars focused on a design brief he had issued at the start of the project, namely:

'a company that specialise in the integrated leisure, engineering and construction industry. Currently they manufacture and install leisure facilities which range from simple shelters for playgrounds to all weather playing surfaces and associated accessories. Underpinning the company is a wealth of experience producing steel fabrications for the mining and heavy engineering sector, this knowledge and skill is now transferred to the design and manufacture of Contemporary Street and Park Furniture, multi-use games areas, skate parks and the ancillary equipment. Working mainly for national and local government bodies and UK based commercial enterprises the company provide a range of

exceptionally durable products, capable of withstanding the worst excesses of vandalism and weather, yet remain throughout their life span aesthetically pleasing.

The company now wish, in association with NTU, to develop a range of modular adventure playground equipment, on a scale not yet envisaged by the current market, enabling totally different themes to be constructed on one playing area, changing time being limited to one or two days. The main design feature of this modular system will be a 'peg-board' system of fixings in the playing area, into which can be installed the modular fixings, they themselves being fixed one to the other by a similar system of locking. The design and manufacture of a locking system which can be used for the holes and the modules, vandal and weather proof yet easily locked, un-locked and moved is the main criteria of the design brief.

The requirement is for an initial set of six modules, with the possibility to attain 5 metres high maximum. The modules will enable builds of controlled risk environments which will bring controlled chaos and adventure to the users. The design and build activity is seen as mutually beneficial for both partners, as knowledge and skills pertaining to design, manufacture, materials, marketing and finance can be exchanged between them, particularly opening the door for students to experience manufacturing processes in situ'.

The resultant marketing report led and managed by the business school students in association with the industrial partner was termed invaluable and gave direction to the concepts and final design.

5 CONCLUSION

'We need more entrepreneurs. We need more innovators. We need more scientists, engineers and designers who can turn ideas into working products', [8].

'We need business people who understand creativity, who know when and how to use the specialist, and who can manage innovation; creative specialists who understand the environment in which their talents will be used and who can talk the same language as their clients and business colleagues; and engineers and technologists who understand the design process and can talk the language of the business,' [9].

Cox recommended that multi-disciplinary centres be established within universities, the majority of these Cox Centres would be on Masters level programmes which would bring together the different elements of creativity, technology and business, enabling students from different backgrounds and with varying levels of industrial experience to work together. The outcome, said Cox, would be: executives who better understand how to exploit creativity and manage innovation, creative specialists better able to apply their skills (and manage creative businesses) and more engineers and scientists destined for the boardroom' [10].

A Multi-disciplinary Design Network, within HE, was formed in 2006, supported by HEFCE and NESTA, to facilitate the sharing of knowledge and best practice across universities, importantly to improve curriculum design and assess the impact of these new programmes. The network currently consists of more than 30 universities. Nottingham Trent University is part of this network and as such has and continues to develop its Multi-Disciplinary Masters Projects, which, as previously stated involves students from Art and Design; Architecture, Design and the Built Environment; Business, Science and Technology; and Animal, Rural and Environmental Sciences working collaboratively on projects sponsored by industrial and commercial organisations.

One of the recommendations in the Multi-Disciplinary Design Network report November 2010 *Multi-disciplinary design education in the UK: Report and recommendations* was that an important area of work in multi-disciplinary design education involves research into how multi-disciplinary teams function, and what are the ways in which multi-disciplinary approaches are taught and learned. This work has begun at Nottingham Trent University with the establishment of a team of multi-disciplinary academics working to evaluate the multi-disciplinary masters' projects. These projects have involved disciplines with different epistemologies and ontologies working together and one of the foci of the work is how individuals from differing disciplines work together, both in terms of the team and the individuals themselves, and the benefits these projects can bring to the academy, the individual students and the sponsoring organisations. The authors teach Design and Design Management at under-graduate and post-graduate level across the diverse range of the subject matter; from Furniture Design [BA] through to Industrial Design Innovation [BSc] and from MA Product Design through to MSc Smart Design. The holistic philosophy of the design programme cluster has been articulated [11], but the philosophies and paradigms associated to the discrete academic subjects of multi-disciplinary

learning and teaching e.g., design management, business research, materials science, etc has not. The design of the curriculum; which knowledge and how much to impart to the students, is the focus of debate amongst academics and associated teaching staff. Often the teaching is centred on available academic expertise and ensuring students are employable on graduation. One point this paper suggests is a broader view should be taken and analysed against accepted practice. The integration of discrete philosophies relative to the individual subject areas has not been discussed or articulated in the light of the referenced design reports and the knowledge economy or the impinging and restrictive nature of subject specific paradigms when attempting to teach multi-disciplinarity across subject specific boundaries. The need to de-structure, stand back and re-design multi-discipline design programmes against a backdrop of now disorganised capitalism, moving from post-modernism is compelling, as Lash and Urry state “a crucial effect then of the electronic media and spatial-temporal changes in our disorganising capitalist societies has been the de-centring of identities and the loosening or deconstruction of group and grid” [12]. To focus then on curricula development, e.g., although technology is by nature structured, as often is the teaching method, design, creativity and innovation require freedom of thought. Too often disciplines, particularly those of art, taught within the confines of universities encourage their own ‘ossification’ [13], teaching, delivery, philosophy and practice are developed to meet targets and tick performance box indicators. The need to ensure technology is taught integrated with design, appearing truly seamless to the students, with an encompassing, contemporary philosophy is of paramount importance, as is the need to define the breadth and depth of the knowledge, the paradigm and the philosophy of their chosen profession in the context of multi-disciplinary working.

The need to design curriculum that will provide students with the necessary attributes with which to work in a multi-discipline manner such that their designs are make able, sellable and useful products, it is proposed, starts with the analysis of needs not taken from a pedagogic perspective but from a metaphysical one. The need of an object, its causation, may be the incubation point for a new approach to multi-disciplinary design teaching in the context of products. Whether defining a shape or defining the use of a space, invaluable to the student and in sustainable terms the community at large maybe to ask, why do we need this? Contemporary thoughts on time, space and inevitably free will should be the first stirrings of the creative mind, both in reality and in the nature of mind, through which many designers now operate e.g., virtual reality. The desire to create something more than a product should be at the forefront of the design brief; ‘design culture as en-cultured practice may also extend beyond the orchestration of new consumer-producer relationships within corporate frameworks, to a process that works to transform every day public lives and aspirations’[14]. Designs both of products and exciting new materials from which they are constructed e.g., memory alloys, still revolve around first principles both in scientific and design methodology terms; but are created through ontological thought process taking into account the nature and style of living most suited for these contemporaneous, changing times. To usefully create it is necessary to understand the concept of knowledge, the methods of imparting knowledge and to realise the limits of understanding and of what and how we know. The delivery of the curriculum for multi discipline working should, it is argued, be heuristic and didactic, teaching by explanation and demonstration rather than a set of rules to follow, as is often the case in structured studies akin to technology. The teaching philosophy should revolve around the interpretation of the metaphysical associations between design and technology i.e. multi-disciplined; the delivery itself heuristic by operation and epistemic in quality and quantity. The re-design of the curriculum both content and delivery and the re-design of the teaching environment to facilitate the promotion of a philosophy which integrates design, science, business and technology i.e. multi-disciplinarity at an academic level is seen as timely, as Putman states, “the spaces for creative engagement perceived by contemporary creative explores may be dramatically re-shaped by changes in institutional circumstances and agendas” [15]. Further, it is proposed that the use of specific knowledge which has been imparted through the articulated philosophies will have a synergised benefit both for the individual, be that student or academic, and the community in general.

6 FURTHER WORK

The authors intend to showcase their findings through publication and workshops operated through the auspices of Nottingham Trent University. The multi-disciplinary masters’ programme will continue to operate for the foreseeable future, strengthening the role of NTU within the Multi-Disciplinary Design Network, the authors exploring, analysing and reporting on the teaching strategies within multi-

disciplinary projects and programmes both at NTU and within a selection of HEIs, as identified in the Multi-Disciplinary Design Network, the findings of this analysis will be of mutual benefit to the student, the academy and industry/commerce.

REFERENCES

- [1] Grumett D. Times Higher Education, Thomson Reuters TSL Education Ltd. London, September 16-22, 2010, No. 1965, pp 28-29.
- [2] Design Council. *Design Council Magazine, A Short History of Profitable Design*, Haymarket Network Ltd, London, Autumn 2008, Issue 5, pp 32-33.
- [3] BIS: *Higher Ambitions, The future of universities in a knowledge economy*, November 2009, © Crown copyright, BIS/11/09/0.5k/NP URN 09/1447, page 6.
- [4] Julier G; *The Culture of Design*: Sage Publication; London; Second Edition 2008; ISBN 978-1-4129-3046-8 pbk;
- [5] Hutton W: *Design in the knowledge economy 2020*; Design Council/The Work Foundation, 2010, www.designcouncil.org.uk, page 9.
- [6] Design Council: *Multi-disciplinary design education in the UK; '8 Case Studies'*, Design Council Report, November 2010, HEFCE, NESTA. Available from: http://www.designcouncil.org.uk/Documents/Documents/OurWork/MDnetwork/MDNetwork_FinalReport.pdf.
- [7] van Dijk J. [*Un*] *Common Ground*, BIS Publishers, Amsterdam, 2007, ISBN 978-0-69-166-0, page 29.
- [8] Multi-Disciplinary Design Network (2010) *Multi-disciplinary design education in the UK: Report and recommendations*. London: The Design Council with hence and NESTA. November 2010. Available from url: http://www.designcouncil.org.uk/Documents/Documents/OurWork/MDnetwork/MDNetwork_FinalReport.pdf [Accessed 25.11.10].
- [9] Rogers, P (2010) *Towards a New Disciplinary Framework for Contemporary Creative Design Practice*. The Design Council. February 2010.
- [10] Multi-Disciplinary Design Network (2010) *Multi-disciplinary design education in the UK: Report and recommendations*. London: The Design Council with HEFCE and NESTA. November 2010. Available from url: http://www.designcouncil.org.uk/Documents/Documents/OurWork/MDnetwork/MDNetwork_FinalReport.pdf [Accessed 25.11.10].
- [11] Crisp A R; Dale J; *New Perspectives in Design Education: International Conference on Engineering and Product Design Education*, Universitat Politecnica De Catalunya, Barcelona Spain; 4th-5th September 2008; Artyplan Global Printers Ltd; Spain; ISBN 1-904670-04-0; page 42.
- [12] Lash S; Urry J; *The End Of Organised Capitalism*: Polity Press 1987; Cambridge; 1996; ISBN 0-7456-0069-7 pbk; page 299.
- [13] Julier G; *The Culture of Design*: Sage Publication; London; Second Edition 2008; ISBN 978-1-4129-3046-8 pbk; page 16
- [14] Julier G; *The Culture of Design*: Sage Publication; London; Second Edition 2008; ISBN 978-1-4129-3046-8 pbk ;page 205
- [15] Putman T; [*Un*]-*common Ground*: BIS Publishers; Amsterdam;2006; ISBN 978-90-6369-166; page 51.