Building Employability and Industrial Engagement into the Design Curriculum

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Abstract

This paper discusses the interaction of Creativity, Community and Industry. The Cox Review of Creativity in Business identified the need for the United Kingdom (UK) to exploit its creative capabilities more fully, therefore, design and engineering education departments at British universities have been encouraged to reassess previous practice, arguably, especially learning and teaching strategies, placing an emphasize on industry briefs, industry models of engagement with companies, incentives and alumni networks. With the introduction of live client projects into the curriculum, the student's experience has been enhanced. The improvement in graduates' skills and employability are discussed in this submission. The impact of live projects is detailed in the form of case studies, including such initiatives such as the Young Design Programme sponsored by the Sorrell Foundation and qualified by structured feedback from students and industry partners. The advantages for students include portfolio enrichment, networking opportunities, the reinforcement of design management skills in the curriculum, exposure to business situations where they can learn the constraints of working within a business, project management experience and a real understanding of lead times and deliverables in the local community and global economy. In design-based studies, the production of models and prototypes enhances manual skills and a deepened understanding of 3D Computer Aided Design. In a world with many languages and cultural differences, the importance of a visual language, in the form of drawings and models is key, and this has a direct implication on employability.

Introduction

The Higher Education sector, in charge of training engineers and designers, is tasked to educate employable graduates. However, the methods vary. The US National Science Foundation argues for a move away from predominantly lecture based delivery to higher forms of active learning, such as problem solving, learning by doing, and situated learning integrated into the classroom [5]. Teaching styles that bring university and industry together are resulting in enrichment of student portfolio and employability. The authors exemplify this approach through case studies in the UK context, by introducing the Knowledge Transfer Partnership model directed by a government agency, the Technology Strategy Board. This would be juxtaposed with a collaborative programme developed by the Sorrell Foundation, a design led charity that has close links with government initiatives such as the Creative Partnerships and Building Schools for the Future. University-industry partnership programmes are strategic to government's business objectives and are built into the curriculum at numerous engineering and design courses. In the UK, universities and further education institutes made amendments to their mission statement 'to learn, teach and research', now extended to support regional industry and to generate 'third stream' income through commercial activities. This is facilitated through knowledge transfer offices, which are tasked to interface with industry. Models of engagement are typically consultancy or live client projects and the authors present university projects with manufacturing and distribution companies in the Midlands region of Britain. Finally, curriculum enhancement is facilitated through additional industry contacts, typically through company presentations and site visits. Unless mapped onto the curriculum they would not be assessed through assignments set against. However, the shared knowledge is expected to benefit co-current and future projects. These demonstrations and workshops are sometimes held by visiting speakers, sales representatives and practitioners, such as graduates, and inform the curriculum.

Context

In the UK, the government provides strategic guidance on innovation, employability and industrial engagement through a number of publications, issued by the Treasury Department. Relevant for our discussion is the Cox Review of Creativity in Business [1], the Leitch Review of Skills [4] and also the Lambert Review of Business-University Collaboration [3]. George Cox put forward several recommendations promoting multi-disciplinarity in Higher Education as a driver of innovation. These include better preparing students to work with and understand other disciplines. Sandy Leitch is focussing on skills and employability, with implications on Higher Education's engagement with learners, industry and community partners. In design studies, the extent of industry and community engagement, or 'live practice', has been mapped by Viljoen and Hoskins [12]. Other studies on community engagement by university students are exemplified by Smith [10], Rudd et al [9] evaluating the Young Design Programme by the Sorrell Foundation.

Categories of Industry and Employment Enhancing Interventions

In the UK, Evatt [2], Wilkinson and Sale [13], argue for design curriculum reform, which matches the current environment of practice, also acknowledging change within the teaching institutions. The effectiveness of established learning strategies are classified, namely design competitions, industry linked projects, visits and presentations, placements, design centres and labs, also the Design Project Advisor initiative at the University of East London. Building upon these strategies, the University of Northampton facilitates student learning through a set of industry and employment enhancing interventions. These are presented, through case studies:

- Live client projects
- Externally managed live projects and national schemes (Young Design Programme)
- Knowledge Transfer Partnerships (KTPs).

Case study 1: Designing New Product Lines

The first case study of industry collaboration draws from the University of Northampton's legacy of supporting the local business community, in particular, the leather and footwear industry. It describes a recent live project with a 'shoe last' maker, tasking Product Design students to develop new product lines. The client is key supplier of wooden and high-density polyethylene lasts for high-end boot and shoe manufacture. The production is mechanized, with highly specialized staff and machinery including CNC and CAD CAM, with the capability for rapid prototyping, customization and reverse engineering, through 3D scanning. Data transfer to distant manufacture sites is a reality, and the company makes the prototypes for shoes produced in the Far East. In response to more challenging market condition and economic outlook, the company is considering new product lines, which could be manufactured utilizing the existing fabrication methods. The staff team at the University has gained knowledge of new product development through a number of Knowledge Transfer Partnerships with the toy, gift and games industry. With this help, the company would develop and market new products. In return, the collaboration would allow staff and students an insight into a niche market.

Figure 1: Live project. Factory visit. CADCAM. Client presentation

The students were briefed on the design and use of lasts, and the methods involved in manufacture were demonstrated through a factory visit (Figure 1). The students were introduced to batch production, computer aided prototyping and woodworking skills. Subsequently, they undertook some market research, and produced designs that are within

or sensibly close to legal requirements. The ranges included handheld tools, furniture parts, trophies and ornaments, thus, the scope of entering new markets had to be considered and alternate technologies or scenarios explored. The designs were presented to the client as detailed drawings and prototypes. The project followed curriculum requirements, in conjunction with the Design Project, Experimental Design and 3D Modeling and Manufacture modules. The students learnt about the client's specialist equipment, which could be complemented by screen printing, laser cutting and engraving technology available at the college. The students identified manufacturing methods to complement the current workshop range, commenting, that *'The manufacturing processes available to me were limited' and 'In many ways it did restrict, but that is part of the real design world'*.

There had been two review points and on both occasions the company representative was present. Assessed were 2D concept generation, 3D sketch models, working drawings including CAD for final presentation, engagement with client, creativity, quality of design and visuals, also oral presentation skills. Upon completion, the project has been evaluated, through structured questionnaires. The staff team asked, whether the live project changed or developed what students learn at University, also their working methods, and sampled the following feedback [6]:

> I have had a taste for what the industry is like and has opened my eyes to how business work with designers.
>
> I believe I will think a lot more on needs of the client.
>
> Helped to develop my planning.
>
> It has developed skills in modelmaking and design presentation and has included methods of manufacture/ design.
>
> As now I want to work more with PhotoShop to advance my skills, and it has helped teach me about deadlines.

This project supported a kinesthetic learning approach, a teaching style in which learning takes place by the student actually carrying out a physical activity, and thus was a welcome case study for the design team. The students benefitted from a "live client experience", furthering their creative and design management skills. This kind of project provides a comparably low cost option for the partner companies who can then see if this is a fertile route for ideas and concepts, and it would also demonstrate community engagement. A next stage would be the implementation of the concepts, potentially aided by a regional business development grant, safeguarding University involvement. So, the students could see their designs going into production, with benefits for their portfolio and employability.

Case study 2: Sorrell Foundation's Young Design Programme

The second case study, the Young Design Programme, is a partnership between Design students and pupils at secondary schools. Students form small teams and work for the pupils who act as clients, on a design problem in their environment. Initiated by the Sorrell Foundation, this project dovetails with UK government policy of raising standards in education. Through a series of 'conversation' meetings, design solutions are developed together with the pupil clients, for example, canteens, outdoor social spaces or reception areas (Figure 2). At 'launch' and 'celebration' events they have the opportunity to meet with other stakeholders, such as sponsors, education authorities, architects and planners, and discuss the plans to refurbish or rebuild parts of the school campus.

In 2009, 9 Higher Education Institutions, 6 FE Colleges, and 35 Schools took part in the fourth Young Design Programme across the UK with student teams, which were preselected by their tutors [11]. At some of the Universities, such as the University of Arts London, the project is managed systematically as a regular and continuous part of the curriculum [10]. From the University of Northampton, a combined group of 27 Year two undergraduate students in BA Interior Design and BSc Product Design participated in the Young Design Programme and Joinedupdesign for Academies, a pilot scheme aiming to inform the transition of selected schools into academies. These are all-ability, state-funded schools established and managed by sponsors, churches or charitable trusts. After a series of meetings

and presentation to the clients, the students' feedback [7] was sampled through questionnaires and recorded interviews. To summarize, the students commented that they 'liked working with a different age group' as 'the gap (age) was overcome and team and client worked easily and well together' and they enjoyed 'being able to work on a larger, commercial scale'. However, a key issue for them was the organizer's 'communication and organisation (that) needed addressing'. This sentiment was echoed in the pilot evaluation of the programme, stating timing or timetabling issues, "to some extent these are inevitable in a complex multi-site programme as the Young Design Programme" and concluding that the "the client-centred model encouraging 'real life' experience of the cycle of a design project, has been extremely effective in bringing institutions and individuals together" [9], pp 30-31.

Figure 2: Young Design Programme. Briefing by Sir John Sorrell. Client conversations

For the University, the programme supplements employability agendas in Art and Design, as this work moves on from traditional models of live 'commercial' briefs in design (case study 1) and industry involvement provided by Knowledge Transfer Partnerships (case study 3) into community partnerships, making design have a real impact on crucial stakeholders (pupils, teachers, academics) in innovative models of university and school partnerships which respond to both the UK Government's 'Widening Participation' policy and a 'creativity in education' agenda. However, the students were critical about these underlying political agendas, as the 'live projects should be done to benefit the students, not for PR and media coverage' [7].

Case Study 3: Learning through Knowledge Transfer Partnerships

Knowledge Transfer Partnerships (KTP schemes) are based on an UK government funded model, whereby a recent graduate is placed at a knowledge seeking company and embeds, with help of an academic partner, engineering or design competence in the organization. In return, the University benefits through access to the company, supporting staff research and teaching through project work with undergraduate students. Case study 3 exemplifies this industrial engagement with the retail arm of a charity, developing a range of giftware and collectables. This company has extensive experience in retailing both used and new products, utilising experienced professional buyers to purchase in quantity off the shelf items. However, initially the company did not have any designers employed within the organisation, hence self-initiated ideas to develop new products could not be undertaken. This partnership offered an opportunity for a creative individual who could visualise and articulate the design process to the realisation of new products developed in both 2D and 3D.

Figure 2: Young Design Programme. Briefing by Sir John Sorrell. Client conversations

The 'KTP associate', as the graduate working at the partner company is called, composed a student project brief,

based on a current company project - a range of dolls houses to be sold through the charity's chain of approximately 400 shops. A class of second year BSc Product Design students undertook initial designs and developed a range of 2D concept ideas, 3D sketch models and CAD skills, mapped onto an eleven week's timetable. On four occasions, the associate led and reviewed the sessions. He reported from his visit to the manufacturing sites in China and demonstrated the design and prototyping of a 'fantasy castle' and associated set of 40 figurines (Figure 3). In workshop sessions that followed his presentations, students could train and apply the techniques; for example, a vector drawing programme was used to define the geometries. He illustrated, through his portfolio and anecdotes of this communication with manufacturers in Far East, the importance of a visual language, in the form of drawings and models. Competences in these core skills have a direct implication on employability. Through this project, students developed visual presentation and problem-solving skills, used in future assignments. They gained employability skills, such as teamwork, identifying deliverables, adhering to deadlines, problem solving through investigation, experimentation and making, and acknowledged this in the students' feedback [8]:

> It taught me to plan, prepare and present work.
>
> I liked the interaction with the clients, and also the modelmaking.
>
> I liked the output from two people for the dolls house project, able to bounce ideas off another, also tested the team and partnership skills.
>
> Live projects give you a better experience, as work experience is more about watching and learning as opposed to doing and learning.
>
> Yes, they highlight the importance of communication and understanding what people want.

Students gained early insights into manufacturing and managing a design project in an international context and the constraints within in-house design. Through this and other associated design projects, the KTP associate gained a national award in 2008: Business Leader of Tomorrow. This demonstrated for university staff the success of the programme, and for the students, it raised aspirations.

Mapping Live Client Programmes onto the Curriculum

To facilitate student learning through industrial engagement, the tutors took the decision to assign Year two modules against live client projects. As we have learnt from the case studies, these programmes often include site visits and allowances for client-centred models of engagement, facilitated through 'integrated' learning programmes across a number of modules. To exemplify, the students will receive an assignment including an extensive, co-authored brief by the client, and crossing a number of subjects. This document has a breakdown of objectives that would be assessed according to respective module requirements, developing engineering, creative and design management skills. At the University of Northampton, these would be the following modules: 3D Modeling and Manufacture, Experimental Design, Contextual Studies, and Design Projects. Typically mapped onto the curriculum and lasting twelve weeks, the programme includes visits to factories and trade fairs, briefings and review points attended by the clients.

The authors introduced a variety of 'live client' projects with industry and the community into the curriculum, and assessed the resulting improvement in students' skills and employability under the following headings:

- Research and investigative skills, in conducting surveys, and community consultation
- Familiarization with the nature of a feasibility study, master plan or client project brief
- Use of references, site visits and surveys, community engagement and publicity/public relations
- Design skills: concept generation, visual communication and prototyping
- Appreciation of design management skills and deliverables.

The evaluation of this teaching approach has been made through learner feedback and observations:

- Assessment observation, including video recording and scribe taking notes
- Student feedback, through questionnaires on live projects
- Student feedback, through qualitative interviews with focus groups, conducted by the University's Learning and Teaching Department
- Client feedback, captured through email communication.

The impact is evaluated at course level and then reported to the institution at the Course Board of Studies. Through external examiners, the learning approach would be scrutinized and mapped against other Colleges and Universities. In the UK, the Higher Education Academy and its subject centres are additional instruments to raise standards in Learning and Teaching at Universities, and to connect practitioners through seminars and special interest groups. The Review of the Extent of 'Live Practice' within 3D Design Education in the UK [5] is one of these outcomes. Furthermore, academics share knowledge by contributing to international conferences, resulting in changes in design teaching and leading to improvement in relationship between business, community and academic institutions with associated networking opportunities. Participation in the engineering education network and conference supports the transferability to other subject areas and sharing best practice.

Conclusion and Recommendations

The authors detailed current practice by focusing on learning and teaching strategies with emphasis on live client briefs, including models of engagement with community partners. Alumni can provide feedback on the long-term benefits of client engagement. These complement the learning experience through visiting lecturers, company presentations and student design competitions.

In Design studies, live client projects with commercial/industrial partners are enhancing the curriculum and its effectiveness can be demonstrated through resulting employability. Graduates that have found relevant employment would be proof. Therefore, the following recommendation by the Lambert Review would apply here: "Universities, departments and faculties should develop their alumni networks in order to build closer relationships with their graduates working in the business community" [3] p.32. Correspondingly, Rudd et all recommend that an evaluation "would benefit from a stronger longitudal element" and "worth considering systematically collecting and analyzing information on the achievements of the university students involved in the Young Design Programme" [9] p.30. This would underpin the effectiveness shown in the case studies.

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