The Impact of Collaborative 'Live' Industrial Partner Projects in Product Design Higher Education

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Abstract: The aim of this paper is to critically review the value of working with industrial partners on 'live' projects with product design undergraduate students in the context of whether this has a positive or negative impact on student motivation, engagement and subsequent final output for the project.

Further to this, the paper investigates students' wider perceptions in the validity of working with industrial partners within the changing academic landscape and in the wider context of their future careers and employability.

The paper uses the case study of a specific second year product design cohort at the University of Derby who were engaged in a 'live' industrial partner led project. The form that the project took is examined alongside the previous year's project that was not industry related and comparisons are drawn from the research conducted in the form of a literature review, industrial partner interviews and specific qualitative and quantitative data collected from the students.

The paper concludes with an outline of the possible implications for academics developing or running similar industrial partnerships in the field of undergraduate product design education.

Key words: Product Design Education, Industrial Partners, Live Projects, Working with Industry, Student Experience

1. Introduction

The shakeup of the higher education sector in the United Kingdom by the Conservative Government in the early 1990's helped change the public's perception of not only which sections of society can benefit from a University education, but also arguably the purpose of such an education from a vocational knowledge acquisition activity to a focused pursuit in gaining the skills required for employment.

Industrial partnerships with universities' as a whole has already been well-documented, less well documented is the industrial engagement in 'live' projects specifically in relation to product design higher education.

Product Design undergraduate education in its current form is a relatively new subject area which has its roots largely in technical colleges and post-war polytechnics. Due to its very nature, Product Design as a subject area and indeed a profession involves a broad range of skills drawn from a number of different disciplines. A Product Designer must be a jack of all trades and a master of many [9], therefore undergraduate teaching encompasses everything from lecture theatre based teaching, through to studio and engineering workshop. Engagement with industry for 'live' projects broadens the student experience still further in addition to industrial placements and competition entry.

In the context of this paper, a 'live' project for a product design undergraduate degree programme is defined as assignment work set by an academic who ensures that the academic standards and learning outcomes are met.

Further to this the project is enhanced by allowing students to engage with professionals from industry on projects that are focused towards specific outcomes that relate to the company's product line or the companies market sector(s). The involvement of the company can vary considerably depending on a number of influencing factors on both sides of the partnership. On the company's side the availability of personnel, the cost implications of having staff out of the business for several days. The timeframe of the project, the on-going commercial viability of any outcomes and the complications of patent infringement and intellectual property rights all have their influence. Whereas the University's considerations are mainly centred on meeting the requirements of a predefined module specification and ensuring that the project fits within the time frame of the semester that the module runs in.

The research conducted for this paper seeks to acquire greater knowledge and understanding of the impact of such 'live' industrial partner projects in the product design higher education sector and its development and implementation by academics and partner companies. More specifically the research focuses on the learning processes of product design undergraduate students and how contact with industry effects their performance and employability after graduation.

Do product design academics and students see 'live' projects as a vital element of product design study that should be integrated into teaching practice? Or do they feel that 'live' projects are an unnecessary complication? Further to this, is there any evidence that 'live' projects can improve student engagement and performance? And does exposure to industry linked projects improve employment prospects for undergraduate product designers?

2. Literature Review

In recent years the higher education sector in the United Kingdom has undergone some radical changes. Lord Browne's review of student fees and finance has had a huge impact on the structure of the sector [14] that has seen not only a shakeup in the way that undergraduate study is funded, but also the criteria of how prospective students are selected for places at University. Over the last two decades Bridges argues that almost every one of the boundaries which gave definition to a university and to students' experience of it have been removed [3].

This has led to changes in expectations from both parents and students in terms of increased focus on the impact of programmes in terms of value for money, such as contact hours with academic staff, the transferability of key skills to the workplace and ultimately students' employability after graduation. Bridges substantiates this stating that there is a need to link higher education more closely to employment and to meet the needs of students to combine study with earning money [3]. A report from the 1994 Group of universities found that 80% of students said future employability and salaries were a factor in deciding which university to apply to. This rose to 89% when students were deciding which particular course to take [2].

As a backdrop to this, the media has focused on the arbitrary nature of some undergraduate programmes on offer at UK institutions, with the subsequent lack of faith in undergraduates' abilities with leading multinational companies citing psychometric or aptitude testing as a vital tool for monitoring the quality of graduates before employment. The Association of Graduate Recruiters' (AGR) are clearly of the same opinion but in a wider sense across all disciplines of University education stating that *"It is clear that for many AGR employers, the days of academic criteria as the be-all and end-all are long gone"* [10].

'The Future of Higher Education', a Department for Education & Skills (DfES) white paper in 2003 identified

closer relationships between employers and academics as a critical factor to preparing new graduates for work and continuous professional development. The report goes further to say that at their best; these links should be highly interactive, with each partner well aware of what the other can offer, and of what their needs are [4]. The Royal Academy of Engineering stated in its 2007 '*Education Engineering for 21st century'* paper that Universities need to attract more student's and University programmes must recognise the changing requirements of industry and provide students with practical skills to work effectively in industry on graduation [12]. This indicates the need for a more 'professional' higher education with a stronger focus on key skills and strong links with industry. Soltani-Tafreshi states that it has become necessary for academics and industry to collaborate to bring about essential improvement and mutual benefits [13].

The historical context of such collaborations can be traced back as far as the Bauhaus with Walter Gropius's proposal for the establishment of an educational institution to provide artistic advisory services to industry. Gropius called for close cooperation between the industrialist and engineer on the one hand and the artist on the other [5] and spoke of '*the same spirit'* and *'oneness of a common idea'* [6], philosophies that still echo in the creative disciplines today.

If we focus our attention more specifically at design graduates skills and abilities, the design industry is keen to express its concern at the level of design graduates understanding of the finer points of commercial design practice. Gadi Amit, famed designer and President of NewDealDesign LLC, a strategic design studio stated that *"The problem has become increasingly acute. I'm eager to hire the next great class of designers, but to my dismay and the dismay of many young hopefuls who've often spent many years and a great deal of money preparing to enter the industry, I'm finding that the impressive academic credentials of most students don't add up to the basic skills I require in a junior designer"* [1].

In undergraduate design, 'live' client projects are enhancing the curriculum and challenging students' with outside constraints and deliverables, furthering learners' professional knowledge.

Product design education at undergraduate level benefits from its practical, learn by doing nature. Programmes must expose students to a broad range of teaching and learning styles and approaches which mirror the design environments they are likely to work in [8] and therefore has a stronger case than most for demonstrating positive impact by answering the demand from industry and in a wider context contributing to the growth of the economy.

There are numerous approaches available to programme managers and module leaders of undergraduate product design programmes for clearly demonstrating the industry focused relevance of a programme. Perhaps one of the most visible and student experience enhancing approaches is via 'live' industry partner led projects. These can take several forms, including major projects where it can represent the culmination of a final year students study and therefore is a major contributor to the students degree classification, 'design week' projects where individuals or groups of students are asked to create conceptual ideas in a limited time frame, or individual module assignment based work, where the project could form only part of the content of the module and be implemented at any stage of the programme i.e. stage one, two or three.

It is the latter that is the focus of the research for this paper in that the case study used is that of a specific product design second year cohort who were engaged in a 'live' industrial partner led project in 2010. Through the use of this specific project it was hoped that measurable data could be gained from all parties as to the validity of 'live' industrial partner projects as well as highlight opportunities for other academics developing such projects in the future.

3. Background to the Research

The *Design Project Conception* module is undertaken by stage two BA and BSc Product Design students at the University of Derby in the autumn semester of a two semester year. The module is linked with the *Design Project Realisation* module that follows it in the spring semester. Both modules are weighted at 15 credits out of the total of 120 credits for stage two and so represent a sizable percentage of available credit for the academic year. The two modules expose students to the full range of design practice processes, from design research, ideation and design development through to final realisation for manufacture. This outline is, to a lesser or greater extent, representative of the processes undertaken by practicing product designers.

Design Project Conception centres on the research and ideation phase through to the production of a conceptual model with students working for the majority of the time individually to generate their own designs. For *Design Project Realisation,* students work in groups to develop four chosen concepts through to a realised, close to production ready product.

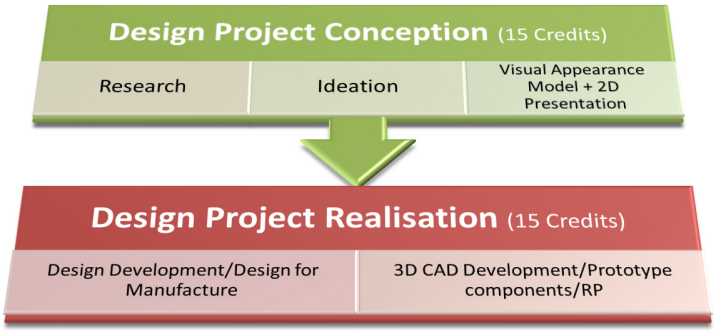

Figure.1 Diagram showing the dividing of the design process between the two sequential modules

In previous years the modules project assignments have not been 'live' industry led projects. The products that the students developed for the second module phase were selected by the academic tutor and subsequently purchased by the University in order for them to be disassembled for the students to investigate. However, feedback from students expressed a desire for industry contact in these modules, backed up by the programmes external examiner who stated that *"the practice of 'live' projects is one that is appreciated by the student body and forms an important part of exposing students to 'real' world scenarios"* [7]. It was therefore clear that links with industry must be not only maintained but strengthened to cement the integrity of the programmes, and that for the 2010 academic year; an industry partner would be sort for these modules. This presented the author with an opportunity to measure the impact of a 'live' industry driven project against the non-'live' project data from the previous year.

Bababing! Ltd is a Yorkshire based design led baby products Company who specialise in change bags and baby bouncer products. The Company design their products in the United Kingdom and manufacture in China; therefore engaging in a fairly typical commercial design process that most students will be exposed to after graduation.

The Company approached the author looking to involve students in a design competition that would provide fresh creative input for expanding the BabaBing! brand into the lucrative infant highchair market. Representatives from BabaBing! and the author met to discuss how the competition could be integrated into an academic assignment brief and it was agreed that the *Design Project Conception* and *Design Project Realisation* modules

met the needs of both parties as *BabaBing!* were specifically interested in working with the entire year group of second year product design students. They agreed with the authors view that stage two was a good time to introduce 'live' projects to students due to the combination of acquired skills and unbridled creativity at this stage in their design careers.

The research for this paper focuses specifically on the *Design Project Conception* module phase during the twelve week autumn semester between September and December. After an initial presentation from *BabaBing!* in week one the first six weeks were spent in the design studio researching and developing the students initial design ideas. Following this during weeks seven to twelve, students worked on their conceptual designs through the development of visual appearance models in a workshop environment. These models were then presented to representatives from *BabaBing!* during week twelve.

4. Research Methodology

The research for this paper was conducted in four phases using a number of discrete methods over a two year period.

Firstly, in order to gain a more general understanding of 'live' projects application within the University, a pilot study was conducted to collect qualitative data from key academics. Previous 'live' projects at the University were investigated with the assistance of staff from different specialisms, departments and faculties. This was facilitated by semi-structured interviews. Members of staff were asked to express their views and experiences of working with industry partners on 'live' projects with a focus on the problems that they encountered integrating such projects into their programme modules learning outcomes. The qualitative data obtained was analysed using a coding and clustering approach, common in qualitative research.

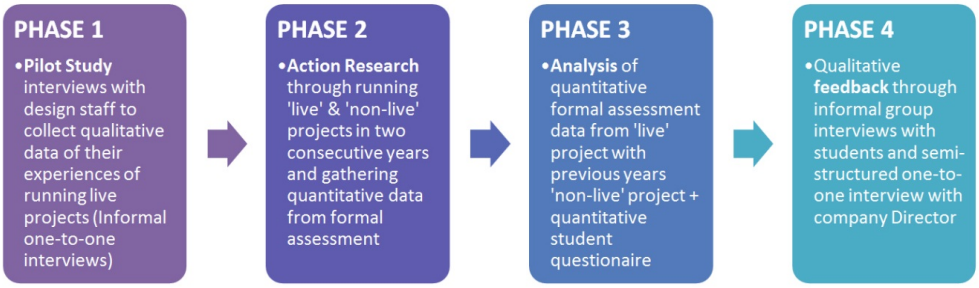

Figure.2 The four overall phases of the research project

The findings from the analysis of the data collected from the phase one pilot study were used in phase two of the research. This helped formulate the content and structure of the 'live' project and required assignment brief document that would allow the author to use action research [11] to gain further, more focused qualitative and quantitative data from the second year student cohort. This would be achieved through the University's official module feedback forms process as well as the outcomes of the students formal assessment from both the 'live' project and the previous years 'non-live' project. This data would provide the author with a balanced overarching perspective of 'live' projects in higher education.

Phase three of the research pulled together and analysed the different strands of quantitative data from phase two. This involved comparing the formal assessment data from the 'live' project with the previous years 'non-live' project as well as data from a quantitative student questionnaire that was conducted after the project, allowing the

students to reflect on their experiences.

The final qualitative research conducted in phase four enabled the author to triangulate an overview of the success of the 'live' project via semi-structured interviews carried out with second year students and a separate one to one interview with the BabaBing! Company Director. Open style questions were used to start the feedback process, allowing the student's and the Director to express their views and concerns rather than any preconceptions that the interviewer may have had. The student responses were recorded and analysed by mapping each interviewee's perceptions on top of each other around corresponding issues relating to the 'live' project itself.

5. Research Results

The initial pilot study conducted with academic staff before the main action research phase found engagement with industry actively on the agenda of both the University at a strategic level and with academics within other faculties at programme level. This has snowballed tremendously in the past few years as the University repositions the way that it presents itself to a prospective student customer who is increasingly focused on the 'end game' to their education, namely employment. It also became clear that contrary to popular perception, a larger number of companies were keen to engage with creative students during a recession as this provides opportunities for a type of controlled 'crowd sourced' design providing a wealth of fresh ideas for a relatively small outlay.

5.1 Academic Staff Views

'Live' industrial partner projects at the University of Derby outside of the product design department gave an indication of how narrowly focused the application of 'live' projects was at the University. Although the University had several notable industrial partnerships, providing tailored computer aided manufacturing qualifications for engineering apprentices from Rolls Royce Aero Engines, to engineering degrees for Kuwaiti oil company employees, support for involving companies in undergraduate teaching and learning was inconsistent and underdeveloped.

The Programme Leader of the textiles undergraduate programme at the University of Derby has headed up several 'live' projects that have involved students creating designs for local businesses and international brands. The Programme Leader stated that *"All of the 'live' projects I have undertaken with my students have been a nightmare to shoehorn into the learning outcomes of programme modules. The rather rigid structure of the design of our modules and the fact that we inherit modules from other members of staff, as well as the lead times that are required to modify a module to incorporate a change such as a 'live' project have shown that at present we're not really set up for it".*

The Programme Leader cited the main advantages of working with industrial partners as being relevance and fresh approaches, stating that *"Students and staff get a real buzz out of working with companies in their field. There's a sense of working on new fresh challenges and a relevance to what they see themselves as doing when they graduate that's impossible to get from the University alone".*

The Senior Lecturer in Imaging in the Radiography subject area has been working with the National Health Service (NHS) on 'Live' projects with her students for a number of years. The academic had a background in the NHS herself as a Diagnostic Radiographer and used her contacts there to help, a theme that seems common among academics setting up 'live' projects. "*I contacted friends that I'd worked with to get the ball rolling. In my experience its left very much to the academic to draw on the network of people you may or may not have met*

during your time in the work place. Starting from scratch would be a real struggle, but Derby does have more staff than older Universities who have a practitioner rather than a research background'.

Fellow academics within the product design programmes shared their experiences of 'live' projects that they had ran prior to the research for this paper, stating that *"most of the time the projects ran smoothly, although we did have problems with the availability of staff from the companies, some moved on during the course of the project, and if that initial contact is lost it makes it difficult to keep the students motivated if the company doesn't return to judge the work the students have produced".*

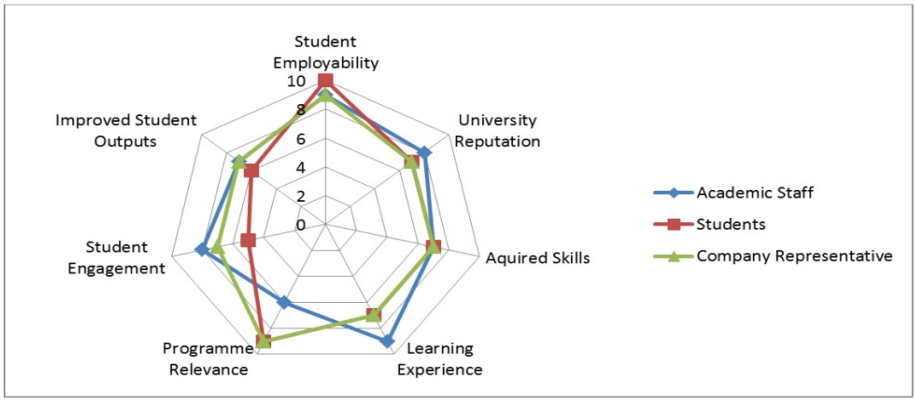

Figure.3 Pilot Study into Academic staff opinions regarding
'Live' Projects overlaid with Student and Corporate Partner opinions

As can been seen from figure 3, staff where asked to rate key aspects of the value of 'live' projects to students alongside the benefits to the programme and the University. Factors that scored highest with staff were a perceived improvement in student employability, a broader learning experience for students and that visible connections with industry enhance the University's reputation.

5.2 Action Research Findings

There were a number of key findings from the action research conducted during the twelve week length of the project during the autumn semester. Firstly, there was a notable improvement in student engagement throughout the course of the semester with full attendance for four out of the twelve weeks in comparison to only one week out of twelve in the previous 'non-live' year as can be seen in figure 4.

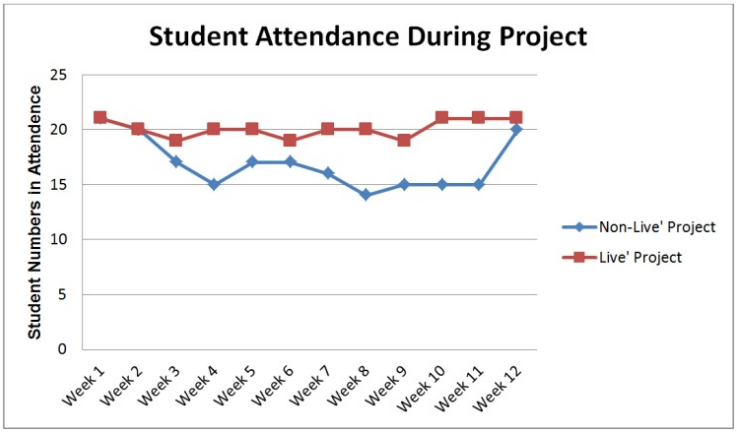

Figure.4 Record of Student attendance during the twelve week project

Academic staff also commented on the significant improvement in the quality of the concept ideation, model making and final outcomes stating that *"the work was noticably more professional than in previous years"* and that *"students have said they feel like the pressures on and they don't want to look daft in front of BabaBing!"*.

Another notable outcome from the action research phase was the significant improvement in grade point average of the student cohort as a whole. With a significant shift up the grade scale as can be seen in figure 5.

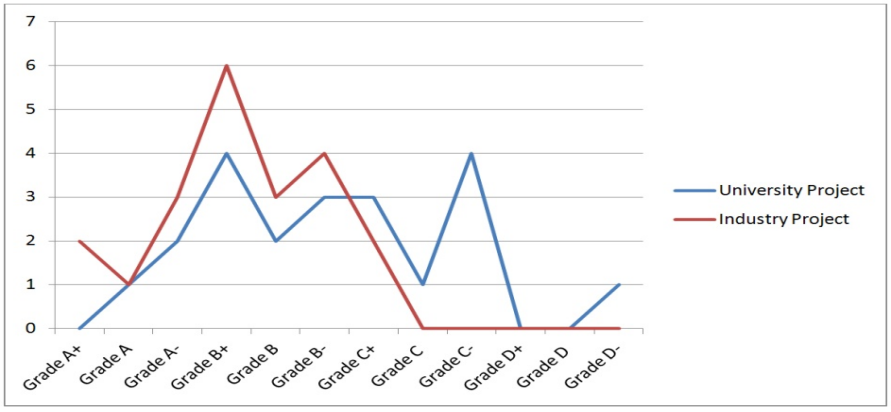

Figure.5 Notable improvements in grade point average over University led project

As a result of this, there is also a significant drop off of lower grades, with the lowest grade achieved being a C+ as oppose to a D- in the previous year.

5.3 Student Views

The student's responses to questions after the project were favorable as can be seen in figure 6, with 83% of the cohort seeing industrial partner projects as an important element in a product design undergraduate programme.

65% of students thought that the work they had created was of a higher standard than it would have been if the project had not been backed by industry. A 78% majority thought that industry projects should be a core element of the product design programme. But perhaps most notable is that 92% felt that working with industry improves their chances of employment after graduation.

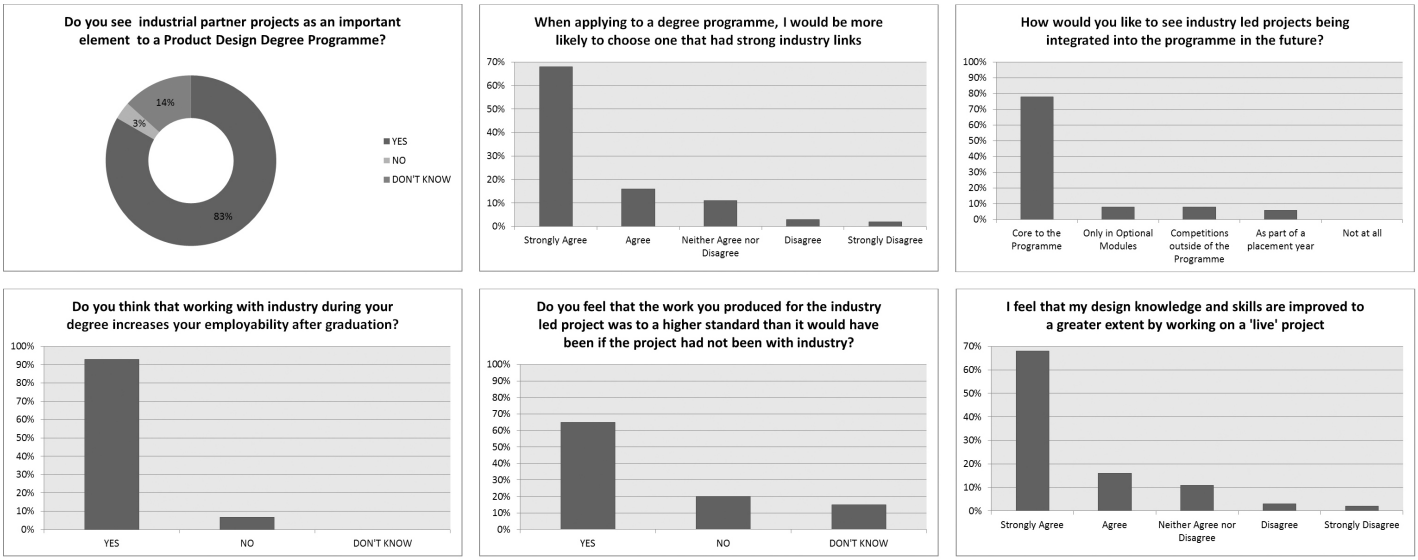

Figure.6 Data collected from Product Design Students

When asked to comment, students were upbeat about the project, with one student stating that *"As far as I'm concerned, where I'd come from a degree with no 'live' element at all, I think both my engagement and resulting success were far higher when the project was based within a more 'real' grounding"*.

Interestingly, a number of students also thought that they were more likely to seek a placement due to their experience stating that *"It wasn't something that I thought I'd be able to handle before; I didn't think I was at the right level. This project showed me that I wasn't, but I feel I am now from the work that I've produced and the feedback I've had from the company"*.

5.4 Corporate Partner Views

BabaBing! Company Director Ashley Robinson was asked to express his views regarding the success of the project, he stated that *"During our visit we certainly found each student took the brief seriously, and approached it in a mature and enthused manner"*.

Mr Robinson also commented that *"It's so important [for students] to have experience of working closely with industry. There is no better period to grown as a designer and to be exposed to the commercial world, and understand the process from design to market launch"*.

Figure.7 Ashley Parker, Development Director of BabaBing! Ltd reviewing Student design proposals

When asked if whether or not a student designer had industrial experience during their studies would influence him or his company in employing a design graduate, Mr Robinson said *"Without a doubt, we're at the point now where it's practically essential for anyone we'd be taking on"*.

6. Conclusions

In response to the original research questions posed at the beginning of the project. That asked if academics see 'live' projects as a vital element of product design study that should be integrated into teaching practice there is a strong argument from the findings in this research to say yes. They do add perhaps unnecessary complication to the already convoluted process of developing and running an undergraduate design programme but these are issues that can be resolved by updating how programmes are developed and are not an inherent flaw in industrial collaborations.

The findings of the research also suggest that 'live' projects do improve student engagement and performance, and that they benefit not only the students engaged in the project, but also the perception of the programme to

prospective students, industry, alumni and the reputation of the University in a wider context.

From the research conducted for this paper, it is clear that 'live' projects can enhance the student's experience greatly. It is also clear that more often than not, implementation of 'live' projects is picked up by proactive members of staff and used for innovation in areas within their core teaching responsibilities. In a changing academic landscape, Universities need to develop better systems to help integrate industrial partnerships into core teaching activity if they are to keep pace with the demands of design graduates and industry.

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