

AN EDUCATIONAL AND COMMERCIAL PRODUCT DESIGN SYMBIOSIS: A CASE STUDY

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1 INTRODUCTION

Throughout the academic year, the projects unit of an undergraduate product design course at Bournemouth University is delivered by 2 – 4 members of the design staff. Individual projects are typically managed by 1 member of staff and projects for Year 1 and 2 students generally run for between 4 and 5 weeks within the university term.

A typical project will present the students with a design brief and will require them to undertake some background research before they start to develop initial ideas. Throughout the project, students typically have a focused lecture programme backed up by studio based tutorial sessions. To be able to complete the project, students are also required to work independently outside of these structured sessions.

The current process of developing industry collaborative project briefs can for subject staff be challenging. Problems can occur when collaborative project briefs do not align with;

- University programme term dates.
- University project submission deadlines.
- Context requirements for ILO's (Intended Learning Outcomes)
- University and student resources.

Whilst the academic environment at university will inherently contain expertise of the highest level, collaborative third party input to undergraduate multidisciplinary design projects can often provide the benefits of specialised industrial expertise, anecdotal relativity, and a broader view of design.

As a result, many institutions incorporate the use of industrial partners, design competitions, or 'live projects' to help enhance the learning experience.

In the case of the institution of the authors of this paper, implementation of many such 'live projects' used within the Product Design Bachelors degree has increased steadily from their occasional use since the degree's inception in 1990 to the current provision of 3 annually in 2010. Each project is typically from a different industrial partner and often incorporating different deliverables or philosophy. This allows students to be constantly challenged and to avoid formulaic approaches to design and its process.

However, a distinct novel feature from traditional live projects in this case has been the use of a variant of *peer assisted learning* (PAL) strategies [1]. This is defined as the ability of students from different academic years to pass knowledge between them in an effective learning relationship. Previously PAL had been a problem to implement in the past due to its difficulty with the provision of willing or suitable role models with which students would aspire to [2]. Instead, it was attempted to be undertaken here albeit with a less formulaic method than the more formal process used at the same institution on a more widespread basis.

A design studio format was used as a base upon which both years of student worked in project teams but within the same atmosphere. This has provided the cross fertilisation of ideas, aspects of competitiveness, and created both extrinsic and intrinsic pressures to the students. Approximately 140 students derived from two academic years took part in the study.

The partnership discussed in focus within this paper was between Bournemouth University (Bournemouth, UK) with Anglepoise (Portsmouth, UK), a well known design and manufacturer of exclusive lighting products. Their thoughts on this method of engagement were:

"This type of relationship has clear advantages for all parties concerned. The students get to hear from a company digging away at the coal face of commerce, and are able to be given a brief that they need to answer. This brief is commercially viable and gives them a tight framework so that they have to work hard to find solutions to the brief, giving them a real world experience. I am then able to come in as a client and respond to their work in a way that the teaching staff are unable to do, and be a fresh pair of eyes with opinions."

Each project took place at the end of the academic year and its deliverables (whilst varying in format) involve a hand in which encompasses evidence from all aspects of the degree programme. This would include documentation or artefact based evidence of *technology, applied mechanics, model making, computer simulations, material selection, concept generation, design process and logbooks, market research, sustainability, technical drawings to BS standards and both small scale (<10) and large scale (>150) presentation skills.*

The aims of this project were:

- To determine if mixing two levels of academic experience within the same environment is beneficial to both groups of students.
- To establish whether is it possible to marry the needs of an industrial partner within the framework, demands and timescales of a degree programme.
- To see whether student learning is enhanced through use of industrially partnered projects.

2 BACKGROUND

Among the various learning and teaching activities adopted or developed by university design courses is the 'project' approach. It allows students to not only gain a more in-depth and informed understanding of theories through self and group exploration, but also to apply, affirm or rebuke the knowledge or theories they have learned in related subjects also taught within a design programme of study [3].

Among the benefits of industry based design projects the following four items are given by Okudan, Mohammed and Ogot [4].

1. Because of their inherent layers of complexity students confront issues that stretch them beyond text books.
2. As these projects are done for a company that cares about the outcome students feel more motivated.
3. The project scope generally demands team work and, therefore, students learn project management.
4. These projects give students exposure to industry cultures and practices.

Industry-sponsored projects not only provide a link between practicing engineers/designers and students, but also give students a deeper understanding for how they will use their discipline-specific knowledge and skills in industry [4].

Only through different kinds of collaboration can students know how to communicate with different work partners, discover their own strengths and weaknesses identify their roles and positions and improve themselves for their future career [3].

Some studies have been undertaken to gain a better understanding of the impact of collaborative industrial projects at an undergraduate level. Rohatynski's work [5] looked at the need for taking into account future industrial needs in the education of engineering designers. Additionally the impact of industrially based projects have shown how these motivate students to produce "highly professional work and helps them adapt to industry practice quickly" [6].

Evidence has therefore shown that a product design students career prospects will be greatly improved by the experience of industrial engagement during their studies.

Peer assisted learning or supplementary instruction enables the development of transferable skills between students and can provide heightened performance [1]. The purpose of the technique is to allow students to collaborate to supply missing information to help solve problems [1] or to allow students to work under the guidance of those from the year above [7]. It is typically noted as a formal process but derivatives and variants of this have allowed for a wide scope and differentiation between how this process is implemented operationally. Essentially, whilst the methodology may differ, the objectives remain the same and it is not a rigid system in either its protocol or practise [7].

2 METHODOLOGY

The symbiotic relationship began in 2007 culminating in subsequent projects in 2008 and 2009 and will do so again during spring 2010. It has used different operational details in project implementation whilst also using different briefs each year conceived between the academic institution and industrial partner.

In essence the project was set by issuing a documented design brief, the groups were appointed by the academic staff, a period of time was issued (typically 5 weeks) and this then culminated with a formal presentation to a large audience in a formal venue.

The nature of the projects was:

Table 1. Annual Design Briefs

Year	Design Project
2008	A lighting product for a new range
2009	A furniture product to expand the company's footprint of commercial interest.

The format of each project evolved from year to year and can be shown as:

Year	Project	Nature	Operation	Assessment Style
2008	Lighting	Group (by performance)	5 weeks sole focus	x2 industrial workshops + 1 viva
2009	Furniture	Group (random)	2 weeks normal timetable, 3 weeks focused.	x2 vivas

Table 2. Annual Project Operation

In 2008 and 2009, the students were often expected to spend 5 days a week in the design studio in a group structure determined by aggregate academic performance of that year by that point in time. No other criteria (such as sex, age, or experience) were considered. A project group team typically numbered 8 members and there were 9-10 groups per cohort. With the time allocated to this project, each individual member would have the potential for some 150 hours of design work but with 8 members in each group this could be factored up by some considerable margin. The industrial partner made several visits to help communicate their professional philosophy in both their expectations and product design itself in 2008

whereas in 2009 they focused more on the assessment milestones. The final viva in both 2008 and 2009 was made to the entire student body, academic staff, industrial partner and guests.

The 2008 brief gave great detail about the industrial partner, a presentation on both their history and ethos and a detailed explanation of the projects core values (in this case, 'cradle to cradle' based design). However the specifics relating to the lighting design itself (its use) were intentionally vague to encourage lateral thinking and creativity. The project was an intense 5 weeks in the design studio.

In 2009 the students (after they were briefed on the project) continued their normal timetable (comprising the degrees core units) for 2 weeks before switching to 3 weeks of sole focus on this project based within the studio environment. To guarantee a relatively steady output of effort a viva was placed after the initial two weeks whereby each group would present its chosen concept to a panel of academic staff. This prevented a 'last minute' approach to the project in general but also to the process of the chosen solution.

The 2009 brief used a more traditional approach requiring the student to research themselves their interpretation of Anglepoise's ethos and increased the scope for the design solution to that of a chair or a table.

The informal peer assisted learning method aspect to the project involved the cohorts from both years involved being based within the same studio. This allowed them to see each others work. The method used as part of this case study is not a rigid learning process. However, this allows the students to discuss ideas and directly and indirectly influence each other especially during intense periods of designing within a studio environment.

3 RESULTS & DISCUSSION

Whilst the projects varied slightly in their operation from year to year, the general perceptions of the staff were very similar on both occasions.

The quality of the design solution from the groups in both year one and two of the projects did not always reflect the knowledge of the groups. For example, there were cases of two groups in 2008 and again in 2009 whose solution and quality of work surpassed that of the majority of the older students. In many cases, once a group had captured a great idea, the enthusiasm showed through in the presentations to both the client and academic staff and this flair and innovation was not defined or limited by age.

Once the groups were assessed at the end of both viva's, a typical bell curve distribution of marks was evident. However, what proved interesting was that in both cases, groups were constructed for this project based upon their aggregate academic overall performance (by that point in time) yet the final mark of the group did not reflect their standing of selection. This was mainly noticeable with groups comprising students at the lower end of performance prior to this project. In all cases, their ability was at typically around the overall mean rather than the bottom. This could be due to being the last project of the year and some groups having a 'last ditch' opportunity to push their marks up whereas the better performing groups may not have the same concern.

In 2009 use of two vivas took place to add a milestone by which the concept would be approved by the client before final development of the idea was undertaken. In the original conception of the projects, it was conceived that all the concepts would be reissued to different groups thus creating a situation often apparent in industry whereby designers sometimes have ownership of only part of the process. When some of the teams demonstrated great passion for their concepts, the academic staff decided to remove this aspect as it was felt taking students 'babies' away would seem unfair.

Another interesting effect of the 2009 milestone viva was that sometimes groups who had not bonded well would try and propose multiple ideas to the client (even when only one was specified in the brief). Pressure was applied by the academic panel at this point for the group to make a decision on one. This forced the students to adopt skills in communication, reconciliation and negotiation initially with the assessment panel and later the group.

From an academic point of view, this method of activity carries some risks. With such large cohorts of students involved, the brief had to be carefully chosen to not only represent the 'best case' scenario but also the worst case. Bad design work would potentially embarrass the institution or undermine the

student's confidence in the degree programmes academic content. However, get this right and the students obtain 'real world' experience working for a professional client.

Looking at the professional relationship with the partner, there were concerns at the point of planning if the needs of the company could be met alongside those of the institutions (such as timescales and learning objectives). Essentially, would Anglepoise be satisfied and was it in everyone's best interests to showcase design work on a relatively inexperienced design student with a professional brief? Anglepoise as a result of these projects have commented:

"It is essential that local businesses work with Universities as it creates opportunities for all concerned and ultimately gives the students an insight in real world experiences, focusing their studies and ensuring that they are more employable when they complete their studies."

And when the projects in 2008 and 2009 were conducted, upon reflection Anglepoise felt:

"It gave some very interesting results and I think showed the Students just how complicated the design issues surrounding this are."

As well as:

"I think they really rose to the challenge with some really interesting solutions, which could be made into products."

There are however, some operational challenges. Group work was required to handle the large numbers of students involved. The selection was done in such a way to minimize any impact to an individual's academic performance but this type of project would have to be used occasionally rather than frequently. In addition, the student objectives and educational requirements can conflict with the commercial constraints of the industrial partner. To reduce the risks of a conflict of interest, the experience showed that the projects must be carefully aligned with the expectations of all involved so fundamentally, good planning and foresight is essential. With this in mind, any risks need to be carefully managed through use of a carefully constructed brief and an open minded and honest relationship with the partner in terms of expectations.

The effect of the method of peer influenced learning through use of mixed cohorts employed here proved extremely interesting. There was clearly some pressure on the older students to perform and when being in the same room for such long periods, several similar ideas floated through several groups. However, where the cross cohort effect was very evident was whereby the younger year one students could see the work standard produced by the older ones and would attempt to match it. This influenced the younger students to 'punch above their weight'. Knowing this then put the older students under some pressure to attempt to distance themselves from the younger ones! An interesting way to increase the effect of an indirect PAL process would be to have mixed cohort based groups in the future. This was decided against here as there was a concern that the year 1 students would not have the confidence to challenge the year 2 group members with key design decisions.

4 CONCLUSION

The positive results from this study shows that working with industrial partners continue to develop real world experience and provide credibility and relevance to student outcomes. Students have the opportunity to benchmark themselves against industry standards and other students of varying experience within the degree programme. Personal development as a result of this experience will potentially lead to employment pathways for the students and their peers. The students should hopefully benefit from the relationship by being better prepared for the practice of product design through the opportunity to balance theory with real world practice.

The use of a mixed cohort year environment with this kind of project was unique. In summary it proved a positive experience with students learning from each other and having an aspirational feel being generated between the cohorts. It should be noted that pure PAL though involves an active learning experience between two students whereas in this case it was a more competitive environment and therefore a more indirect effect. The anecdotal feedback from the partner, the academic staff (and more importantly) the students themselves was all extremely favourable (hence why it is repeated year on year) but this could be improved further in future with use of a qualitative assessment of students who have sat this project 2 years running (both as year 1 and year 2 students) to ascertain any longer term benefits. The industrial partner was pleased with some of the performances over both years to the extent that some projects are under consideration for further development and has also yielded opportunities for student employment. Considering the student's young age and relative inexperience, this engagement has been rewarding to all parties and will be continued into the future.

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