

DO AS I DO, NOT JUST AS I TELL YOU: TAKING STUDENTS ON A RESEARCH JOURNEY

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ABSTRACT

This paper explores four key case studies involving 2nd and final year BSc Product Design students in academic research projects, engaging with the public, industrial clients, and the public sector on live externally funded research projects. Undergraduate students are often taught how to undertake research or required to engage in meaningful primary research on their own projects. However, the opportunity for students to engage on real live projects working alongside academics is explored in this paper alongside the benefits and pitfalls of engaging in such projects as active design researchers. The case studies range from 2018 to the present day and concern two Road Safety projects and a Circular Economy study. Students were led through a research process as apprentices collecting and analysing their own research alongside academics, receiving guidance and support from a range of qualitative research techniques including interviews, observations and focus groups. A key benefit of conducting research collaboratively is that students gain a genuine appreciation and understanding of the rigour required in research. The inclusion of undergraduate students also demystifies the research process for the students and has benefits for the academics and external agencies involved.

Keywords: Research process, live projects, case studies, qualitative techniques, cognitive apprenticeship

1 INTRODUCTION

In recognition of the importance of undergraduate research emerging from the US [1 2] as a result of the Boyer Commission over the past 20+ years [1] as well as the long-established dissertation or capstone project in the UK [1]. There is a growing emphasis and requirement for undergraduate students to incorporate primary research within their dissertations or capstone projects. However, such requirements are becoming ever more challenging due to the increasing numbers of undergraduate students, further compounding the difficulties of access to appropriate research participants and actors [3]. Such issues can invariably lead to students' overuse and reliance on poorly executed quantitative surveys or questionnaires [4], commonly posted on social media as a tokenistic measure to fulfil this requirement. Such quantitative measures often lack the rigorous consideration of appropriate demographic sampling [4] required for representative quantitative analysis and leave students with an incomplete understanding of the robustness and rigor that is required in research studies. This can give a false impression and even confidence at the point they are due to graduate and start their careers lacking an understanding of the fullness of academic research.

This paper presents a rich qualitative research approach instead and details opportunities undertaken with 2nd and final year BSc Product Design students to involve them in real life active research projects through a cognitive apprenticeship model [5]. The cognitive apprenticeship model emphasises the traditional 'Master' and 'Apprentice' approach whereby the lead academic transfers expert knowledge to students modelling research behaviours to improve and develop the students' expertise and skills via collaborative learning in contextual activities [5]. Four cases are given as examples on how this has been developed over a 4-year period, presenting models of engaging by involving students in real life research practice through live projects. The approach adopted provides close mentoring and supervision to students to give them a realistic and robust research framework, within which to conduct their own research amongst research and academic staff as apprentices, demonstrating the use of appropriate qualitative research methods, with the required rigour in a safe and nurturing environment.

The premise behind a cognitive or research apprenticeship approach is not new and is noted as being used with undergraduate students in human services [2], the sciences [5] and psychology [6 7] and is also described as being applicable to creative subjects [5]. Furthermore, the ideal of a ‘Master’ ‘Apprentice’ model in design is as old as design education itself being a cornerstone of the discipline, relating to the Bauhaus. However, the inclusion of undergraduate Product Design students as active user centred researchers, in collaboration with commercial, industry and council partners lacks documentation.

Guberman et al., (2006) describe 6 responsibilities of mentoring in scientific research, these are outlined in table 1 below, with an indication of which actors performed what role for the students involved in the research.

Table 1. Mentoring UG students in research (adapted from Guberman et al., 2006)

| Role | Responsibility | Agent |
|--------------------|--|---------------------------------------|
| Advisers | People with career experience willing to share their knowledge. | External Stakeholders |
| Supporters | People who give emotional and moral encouragement | Peers |
| Tutors | People who give specific feedback on one’s performance | Academic |
| Masters | Employers to whom one is apprenticed | Academic/PI |
| Sponsors | Sources of information about opportunities and aid in obtaining them | Research Assistant Research Fellow |
| Models of identity | The kind of person one should be to be an academic or a professional scientist | Research Assistant Research Fellow |

This paper considers several opportunities made available to students to engage them meaningfully within the research process using qualitative research methods alongside active mentoring. The interventions described go beyond the realm of traditional live industry projects as previously explored [8]. These case study interventions encourage students individually to adopt both ‘inquiry-based learning’ and ‘problem-based-learning’ approach [1]. Being involved as active researchers in real life research and or consultancy projects with academic staff and researchers, as opposed to solely ‘problem-based-learning’ in live projects where students typically in groups are provided with pre-prepared research and background. Including students in this way gives them first-hand experience and rich insights into qualitative user centred design research, providing students with a real-life understanding of what is involved rather than relying on superficial attempts at survey based quantitative research as described above [4]. Qualitative research methods are ideal, due to their potential for small sample sizes and rich data, introducing UG students to a thorough approach to sampling, data collection and rigorous analysis methods giving them a more complete and appropriate understanding of user centred research approaches relevant to the Product Design discipline.

2 METHODOLOGIES

This paper explores the inclusion of students on live funded research and or consultancy projects, offering students the opportunity to engage with external stakeholders including experts in industry, councils, and public research participants. The study represents a series of projects from 2018 to 2021, with the students involved being engaged in qualitative research studies, conducting interviews, focus groups and observational research. Each of the students involved was supported by an academic supervisor who was research active and 1-2 researcher assistants or fellows depending on the project in question. The project supervisor was the principal investigator on the funded projects who acted as in the role of ‘Master’ and ‘Tutor’ [5 7 9]. Whilst the research assistants or fellows acted in roles of ‘Sponsors’ and ‘Models of Identity’ [7 9].

The students’ engagement and involvement in such project ranged as follows:

- 2017-18 – Eight 2nd year students worked alongside a research fellow and project supervisor on a Circular Economy Study of Children’s Toys [10]. The students undertook a structured plan of research tasks under the supervision of the academic, as more novice students require greater structure [9]. They engaged in a range of data collection including interviews of store owners, parents and childcare workers, simplified life cycle analysis and the implementation of CE analysis tools developed by the research fellow [11].

- 2018-19 - Two final year students were involved in a consultancy funded cycle safety research. They assisted on a cycle safety day in the running of four mixed HGV driver and cyclist focus groups and an exchanging places event with HGV drivers and urban cyclists. In addition, the students also conducted their own semi-structured interviews of HGV drivers, driver trainers, local council planners and cycling representatives to inform their projects. Their experiences fed into their live capstone project with a large multinational construction materials and logistics company designing safety innovations for HGVs and cyclists respectively.
- 2019-20 – An individual student worked alongside the Road Safety Research Group including his project supervisor and two researchers investigating and trialling the effectiveness of new road flooding signage in Nottinghamshire. This student had previously been involved as a second year in 2017 toys research and was keen to be involved in further live research opportunities, rising to the challenge, and demonstrating a far higher level of autonomy. This project involved liaising with the local road management agency and the County Council, with the student attending and preparing materials for focus groups, meetings, undertaking expert interviews, conducting observational research on site visits, and being involved in a funding pitch to the council for the continuation of the work.
- 2019-20 – Two students were involved in an industry funded research project, that focused on cycle safety, building on the earlier 2018 work. The students’ live capstone projects focused on developing innovative safety warning for HGVs. The students’ work involved liaising closely with the industry sponsor, their HGV drivers and cycling infrastructure experts at Transport for London, with the students conducting semi-structured interviews, observation research on site visits and travelling in their vehicles. These students were also invited to attend a very high-level management meeting regarding cycle safety at the company HQ.

The students involved in the above projects were approached in early 2022, typically 18 months to 2 and half years after they graduated. Five were sent a message on LinkedIn by their project supervisor requesting their reflections on the experience both in relation to what went well and what could be improved. Four students responded all of whom are now in graduate level employment in the automotive or aerospace industries and each provided between half and a whole page of insight. The delay in seeking these reflections meant that they also have reflected on and contextualized their experience in relation to their career since.

3 DISCUSSIONS

Whilst involving undergraduate students in live research projects introduces an element of risk, the students in all cases rose to the challenge with the utmost professionalism and robustness in their approach and behaviour, with the external stakeholders viewing the students very positively, engaging with them as research assistants and treating them accordingly. Whilst there was a difference in the engagement autonomy as expected between the 2nd year and final year students, all students benefitted from the experience and reflected positively on the opportunity to be included.

Through engaging with live research projects, the students recognised the opportunities this brought in being able to access individuals in high level positions that they wouldn’t usually be able to reach and engage with [3]:

“Providing links to people with a lot of both experience and knowledge around the subject, a good example of this was ‘senior manager’ for Transport for London. I personally believe that without being involved in this research project, it would have been very difficult to get a meeting with him, however as he was able to see that it was part of a research project, we were taken seriously” (S1)

Students also attended and sat in on very high-level executive meetings giving the students tremendous insight into the project and company and client policies.

“During this meeting we were also looking to secure some funding from the council to help fund the project going forward, involvement in this meeting was extremely helpful in knowing how to phrase and ask questions to get the best response from council members who hear pitches like this on a daily basis” (S2)

In addition, the demographic sample and observation experiences that students were exposed to was far richer because of being involved on a live research project.

“This gave me a strong pool of people to interview and discuss their concerns and ideas around the topic, directly feeding my research and the direction of my project” (S3)

“The supervisor’s knowledge of how to arrange a focus group, how to find the best sample of drivers and how to keep the drivers engaged during the focus group made the event into a success and helped us gather valuable data we would never have found otherwise. I know from speaking to other students on my course who held focus groups without the help of a lecturer that theirs were no way near as successful and the data they collected was not as helpful to their project.” (S2)

“When working on a cycle safety project around HGV’s I found it incredibly valuable to be exposed to and able to explore ‘company’ fleet first-hand and be able to take journeys in their vehicles.”

The experiences and insights gleaned from these opportunities also increased the students’ confidence, knowledge and insights benefiting both their projects and subsequent employment.

“Away from the major project my involvement with ‘company’ was a beneficial selling point when applying for jobs post-university. Being able to demonstrate the ability to work successfully with industry was picked up on by companies in the application process.” (S4)

Furthermore, the benefits to the both the academic staff and external stakeholders involved included additional resource and the ability to explore additional smaller projects that the students engaged with as part of the project.

4 CONCLUSIONS

These case studies describe the inclusion of students on live funded research projects demonstrating how undergraduate students can engage in meaningful projects gaining valuable experience, knowledge and insights whilst also benefitting live research projects from a resource perspective enabling additional complementary projects to be undertaken alongside the main study. Furthermore, involving students in qualitative research enabled students to engage with richer understanding of experiences, phenomena, and context and provided them with an opportunity for them to collect, analyse and interpret data in a robust way that couldn’t be reduced to numbers [12].

Our findings showed that the experiences of the students and external stakeholders was positive in all respects, the inclusion of students as apprentices in the research greatly benefited the existing relationships and provided further opportunities for collaboration and in some cases providing additional student projects in subsequent years alongside new or existing funded research with the same external partners.

The exercise as performed with the final year students undertaking their capstone projects was more natural and effective than that performed with the 2nd year students in a studio project, who required a more structured and focused task. The key distinctions were in the maturity of the final year students who, having completed a placement, were two years older, in addition to the fact that the capstone project was longer and more valuable to their degree outcome. These aspects were demonstrated through high levels of autonomy, greater responsibility for their work, a pro-activeness in following leads and engagement with the researchers in developing the breadth of their projects accordingly, a difference even evident in the student who had completed both.

5 FUTURE WORK

Following the success of this approach, further postgraduate curriculum development has enabled bespoke live research opportunities to be included on a suite of new MSc Engineering courses. In a 20 credit Research Methods module as part of their qualitative research methods instruction all students are given the opportunity to be participants in focus groups on live research projects to gain an enhanced understanding of the approach. Further opportunities for individual capstone project opportunities as explored in this paper will also be continued where possible in future.

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