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The PhD and Missing Skills: Capacity and capability building for social science engagement with industry

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ABSTRACT

This paper reports on Business Booster training. This initiative was a response to a call for a national level change around the quality of interdisciplinary research teaching to identify and meet industry needs. Planning training in this area required a clear definition of industry early on as referring to private sector, for profit businesses and aimed to explore the question of how social science postgraduates can contribute to industry. This paper reflects upon our planning stage as well as evaluations of the training. Business Booster training was produced with knowledge exchange and impact teams at 3 universities and with Scotland's national Social Sciences Doctoral Training Partnership. The training took place over 4 days, at 3 sites, and delivered, incrementally, engagement between PhD researchers and 4 industry partners: event 1 - to build confidence in use of industry-related terminology; event 2 – to practice translating research ideas for industry; event 3 – to pitch research ideas to industry partners. Thirty places were available nationwide, attracting over 100 applicants from across the partnership (16 universities). The paper will reflect on this incremental strategy as a pedagogic innovation, and our approach to building relationships between the next generation of social scientists and our business communities. Feedback revealed that skills valued by industry were developed: interpersonal skills and teamwork through interacting with other students; communication through learning business language and engaging directly with colleagues from industry; and problem solving with evidence of linking this back to their own research and research strategies. The training succeeded in improving confidence and skills around working with businesses and led to further industry engagement, though evaluations did reveal some limitations in our design.

Keywords: business, collaboration, industry, PhD, postgraduate training, doctoral training, pedagogy, graduate school, employability, work ready

Introduction

The UK higher education (HE) sector has transformed in recent decades, with greater scrutiny on what universities do (Menz, 2020), and who benefits from their work. The Scottish Graduate School of Social Sciences is funded by the Economic & Social Research Council (ESRC) and the Scottish Funding Council (SFC). It is Scotland's only social science Doctoral Training Partnership (Scotland's DTP). We work with 16 higher education institutions (who work in a devolved context with SFC oversight) and as a sibling to 13 more partnerships (with national oversight via the ESRC and United Kingdom Research and Innovation, UKRI).

One challenge that this narrative around what universities do has brought to the fore, is what social scientists can offer industry. Universities must play a role in the UK Government's industry strategy which aims to 'help businesses create better, higher-paying jobs in every part of the United Kingdom (UK) with investment in the skills, industries and infrastructures of the future' (HM Gov, 2017, p12). Here industry is defined in a broad-based way, though dominated by organisations that work to profit. While the goal is clear, there is little guidance about how the doctoral research experience could evolve to produce graduates better able to engage with industry. That is, there is little information available on what 'for profit' industry is, or how social scientists can contribute. Of 23 case studies developed by the Campaign for Social Sciences (2019) around the industrial strategy, 15 focused on business and management and 4 related to economics. Only 4 case studies did not refer to disciplines beyond these two fields. In context, at Scotland's DTP Economics and Business and Management represent two of 15 pathways in social science inquiry. Thus, there is a vast community of social scientists that are hidden to industry. One of the 4 case studies not based in business and management or economics, focused on the ethics and governance of artificial intelligence (Campaign for Social Sciences, 2019, p15), a vital area of research for industry. It is not just 'for profit' industry that could awaken to the potential of closer working, students motivated by a 'mission orientated' (Mazzucato, 2013) approach can find this as easily working with 'for profit' organisations (for example, meeting grand challenges such as reducing carbon emissions) than working with policy makers or civil society. Thus, we need

better knowledge to help social scientists work with industry (Barnacle, 2005), and this needs to filter towards doctoral students (Borrell-Damian, Morais & Smith (2015). As Barnacle notes, there could be more scrutiny on what the 'needs' of industry are, or how postgraduate students might gain awareness of these (Barnacle, 2005).

The Business Booster training was funded as part of an ESRC grant of £250,000 awarded to 2 Impact Acceleration Accounts (IAAs) at the Universities of Edinburgh and Glasgow alongside colleagues from the University of Aberdeen and Scotland's DTP, SGSSS. The aim of the grant was to enhance capacity and capability for engagement with private sector companies. Within the individual institutions, the fund built on existing IAA initiatives at Glasgow (business breakfast events known as the 'Gaitherin') and at Edinburgh (AIM days) and provided seed funding to initiate collaborations between academic researchers and industry.

Three shared objectives were established by the partnership to ensure the funding benefited PhD students across Scotland's DTP: a suite of training (the Business Booster training), a report mapping existing capabilities across Scotland's DTP (Smith, 2018), and a list of businesses to target for future collaborative activity such as studentships and internships. Key to this, the Business Booster funding enabled the project to be resourced by a professional services team of experienced business development and knowledge exchange professionals across the partnership.

Literature review

The apprenticeship model and traditional PhD research

The traditional doctoral researcher works towards a Doctor of Philosophy (PhD) qualification and this journey has been described as an apprenticeship (Park, 2005). PhDs in the UK social sciences work with close supervision of a small team of scholars, likely to have completed the same trial of an academic PhD in a substantive field that the PhD candidate aspires to working within. While social science doctoral students may share office space with other students, they tend to be working on distinct projects, often with different supervisors and so do not have the same team-orientated approach that some other disciplines have (in Chemistry for example).

In producing the PhD thesis, the student completes research, produces new knowledge, writes and enters into critical academic debate (Zukas and Andersen, 2012). Each activity provides a conduit between them and the educational community, but not necessarily any community beyond the academy. In the social sciences, the student's thesis and other publications are written for academic audiences. Borrowing from Hodkinson and Hodkinson (2004), the socio-spatial parameters of work behind a PhD thesis are carefully constrained by the academic community, their rules and regulations. Governing it all, are the supervisors. As Hager points out (2005) the community works by placing the authority for creating the learning space, on supervisors or those with similar status and rarely can students impact, intervene or transform the learning spaces available to them. Many social science students have reported that this model comes with isolation, and social alienation that may be impacting on submission rates as student struggle to endure. Thus the typical social science PhD habitus where disciplinary depth (East, Stokes & Walker, 2014) and presenting solo-authored material is the basis of qualification does not deliver what Borrell-Damian, Morais and Smith (2015) demonstrated were the skills that industry-partners value: teamwork and interdisciplinary working.

Recent research by the Chartered Management Institute (2018) highlighted other gaps, that graduates are perceived to have when entering the workforce. Only 48% were perceived to have problem solving skills, 84% were unable to manage projects and 86% of graduates do not have the interpersonal or communication skills required. Further, 48% of graduates were not perceived to be able to work in a team. While the CMI research focused on undergraduate degree graduates, given the isolating context of social science PhD work, it may be anticipated that these issues remain as problems.

The steady rise in the number of people beginning PhD research cannot be matched by the number of academic posts available. Doctoral candidates who wish to stay in the UK and in the academy face growing competition for jobs. Therefore developing skills valued by industry has become a concern for students. Additionally, teamwork is vital for post-doctoral academic work and key to delivering impact, where research is evidenced as influencing activity beyond the university. The increasing emphasis on impact pathways for the UKs Research Excellence Framework (REF), and impact plans becoming a routine element of UKRI funding, mean that doctoral students can only benefit from collaboration with partners in industry. Indeed, the Quality Assurance Agency (QAA, pertaining to England and Wales but influential to Scotland's DTP given our role as part of the Economic and Social Research Council's (ESRC) Doctoral Training Partnership (DTP) network) have included relevance to work as a guiding principle for research degrees encouraging students to 'cultivate business acumen' (QAA, 2015, p5), skills that move beyond traditional disciplinary focused research skills (Costley, 2013). The Quality Assurance Agency also have a Scottish branch that monitors and advises on providing quality education within Scottish universities (QAA Scotland, 2015). Here there has been an emphasis on enhancement (Dennis, Gordon, Howden & Jindal-Snape, 2017) and two thematic areas that have been given particular attention are 'Graduates for the 21st Century' (theme running 2008-2011) and 'Employability' (running 2004-2006).

Collaborations with industry, have been recognised as strategically important, though difficult to produce with Borrell-Damian et al highlighting the dominant European discourse of 'the basic problem is that universities have no contact with industry and business' (2015: 10). While this view was challenged in their report, and as business partnerships help deliver aspirations of being a 'civic

university', it tends to be supervisors who exploit relationships with industry. Supervisors, according to Borrell-Damian et al (2015) do not extend industry relationships to, or share industry contacts with PhD students.

Collaboration

Collaboration describes spaces where social science doctoral students can engage with non-academic partners. As argued, there are increasing global questions about what a doctorate is for, with an increasing interest in awards and scholarships that have an applied or collaborative element (Gibbons, Limoges, Nowotny, Schwartzman, Scott & Throw, 1994). In Scotland's DTP we use internships and collaborative studentship awards to achieve this. A studentship award funds 3 or 4 years full time study towards earning a PhD. Of the 60+ ESRC-funded students Scotland's DTP award each year, 15-20 go to students with supervision teams that include a non-academic person. The non-academic person tends to represent an organisation working for civil society or in the policy arena, and Scotland's DTP have been trying to increase the number of non-academic actors that come from a 'for profit' industry. The industry partner's involvement cannot be tokenistic. They are expected to input into designing the research proposal and can influence how the research develops. This model aims to emphasize the value of partnership working, co-production of research, while the student retains responsibility for research integrity and academic autonomy of critical elements of the research. While Scotland's DTP have been able to increase the number of 'for profit' industry partners, this has not been easy. More than the 'bilingual' bridging and development of transferable skills (Borrell-Damian et al., 2015) we seek to produce students who are part of a wider network, and who are *confident* in transferable skills. Confidence and assurance are also included in Walker's (2010) theorizing of capabilities graduates need to affect social transformation. Developing capabilities is good for all students (East, Stokes and Walker, 2014) and all sectors of employment.

Collaborative awards have been a successful strategy from the Economic and Social Research Council and have played out well in Scotland's DTP with students on these awards highly rating the 'additionality' of their award. Scotland's DTP have also built a strong internship scheme of 3 months paid work (at the same level as their stipend, with an equivalent extension to their PhD submission date and stipend). The challenge of bringing in new organisations is real, and research commissioned by Scotland's DTP concluded that building relationships takes time and start on a small scale, building up to greater investment (Smith, 2018) such as commitment to part-fund/collaborate on a PhD (10-50% investment depending on the size and purpose of the organisation) or an internship (around £5000 for 3 months full-time work). These larger investments feel risky to collaborative partners when the organisation isn't clear what their return will be, and this has made it difficult to engage partners from industry. There is growing evidence (notably Borrell-Damian et al, 2015) that companies benefit hugely from collaboration whatever the size of their organisation (including small and medium enterprises or SMEs). Benefits include increasing competitiveness, enhanced market position, accessing innovation funding, build cutting-edge and/or technical advancements, and attract stronger employees (including post-docs). A potential solution is to first engage industry in a smaller commitment and meet students during training, as a foundation to greater investments.

Methodology

This paper evaluates innovative training to support working with industry. A broad introduction to the training strategy of Scotland's DTP will provide context of where the Business Booster training 'sits'. The training strategy was developed as a 'vision' in 2017 as the Doctoral Training Centre (DTC) evolved into a Partnership (DTP). This provided a unique space to re-imagine what a comprehensive training programme could be, and to examine afresh what today's PhD students' need. Training that linked to industry models and practices was an evident gap, though one that the Scotland's DTP was fully committed to filling, and thus avoiding what Murray, Tennant, Forster, Craig, Copping & Pilcher argued "... should not be ignored through convenience, ignorance or willful neglect" (2017, p112). The context of Scotland's DTP is outlined, followed by a description of the training and finally the methodology for engaging the actors in the evaluation.

Scotland's Doctoral Training Partnership (DTP)

The Scottish Graduate School of Social Sciences, was founded in 2011 as a Doctoral Training Centre (DTC, 2011-2017), was awarded DTP status in 2017 (2017-2024) and is the only one based in Scotland. Funded predominantly by the ESRC and in partnership with the SFC and the 16 university partners, Scotland's DTP operates the PhD studentship competition (awards) for 12 universities. Scotland's DTP is unique in the DTP network as it has a formal commitment to institutions not included in the DTP (4 universities), meaning the training programme serves around 4000 doctoral students.

In the transition from DTC to Scotland's DTP a new post of Deputy Director for Training (DD-T) was created, a resourced academic post with 0.5 full-time equivalent commitment. Creating this post has enabled a dedicated body of work that has tripled the number of events available and quadrupled the number of hours of training available. Training is thematically divided (see Figure 1 for an overview) and all training is advanced, either in relation to 'core training' (outlined as necessary for a broad-based education in the ESRC's 2015 Postgraduate Training Guidelines (ESRC, 2015)), or in the sense that a researcher must be advanced in their field before the training becomes useful (for example, software training where students must bring their own data).

Events in the Programme by Thematic Area	Overview of Scotland's DTP Training
• **Cohort Building**	
Induction Event: hosted in November of first year for all new ESRC students & supervisors	
Steer Event: annual event for 'steer' award holders: advanced quantitative; dataset; industry & interdisciplinary awards	
Final Year Conference: hosted in June	
• **Method & Methodology**	
Advanced Training, 12 events throughout the year hosted by partners	
Spring into Methods: 8 x 2.5 days interdisciplinary methods training in partnership with Scottish Graduate School of Arts & Humanities	
• **(Inter)Disciplinary**	
Hub Festivals: (inter)disciplinary space to negotiate grand challenges	
Pathway Training: meets subject-specific training gaps	
Student-Led Training Fund: for students to fill gaps, develop leadership	
• **Well-Being & Employability**	
Student-Led Symposium: curated by Student Representatives often focused on well-being	
Business Booster Training	
• **All Themes**	
Summer School: 3 days delivering 40+ half day training events	

Figure 1: Overview of Scotland's-DTP Training in the period 2017-2024

The training: producing a 3-site model

In partnership, our aim was to produce training that could support students' engagement with industry and capture Mode 2 (applied skills) learning in what Nowotny, Scott and Gibbons (2003) described as,

> … problems arise, methodologies are developed, outcomes are disseminated and uses are defined. (Nowotny et al, 2003, p186).

Each IAA was given the task of developing a training idea ahead of a brainstorming meeting held in May 2018. Also attending the meeting were the Knowledge Exchange and Partnerships Manager and the Deputy Director-Training from Scotland's DTP. Thus training was developed at the nexus of those experienced working with industry, those experienced developing excellent academic training and those working across interdisciplinary boundaries. Together we were able to move beyond what we perceived to be traditional models, which tend to be delivered within institutions and missing the interdisciplinary engagement; tend to focus on STEM subjects; tend to focus on entrepreneurial or commercialization themes; and tend not to engage with academic colleagues (see Minocha, Hristov & Reynolds, 2017).

The brainstorming successfully generated a training model that we felt would deliver our objectives and was tailored to social scientists. The training is outlined in Figure 2 and was designed to incrementally, over 3 events, deliver tools, techniques and strategies to help students face a 'live' business challenge as they ultimately pitched research ideas and solutions to businesses. Briefly, event 1 (Dialogue Matters) - to build confidence in use of industry-related terminology; event 2 (What Businesses Want) – to practice translating research ideas for industry; event 3 (Working with Business) – to pitch research ideas to industry partners. To provide continuity through the 3 events, the team appointed Skillfluence, a training organization specializing in transferable and business skills for researchers and academics, to work with us on delivery. Skillfluence were chosen because of their track record of innovative training with STEM students and, crucially, their existing industry links.

Recruitment of students

The training was open to any PhD student who was a member of Scotland's DTP, and thus any social science-identifying student studying at a Scottish university. Thirty places were available, and students applied by writing a short 250-word piece about why

the training would be valuable and committing to the 3 events. Strong applications from 100 students resulted in 31 places being awarded, and students represented 12 different universities. Of those that responded to our evaluation and recorded their year of study, attendance was evenly spread across 1st, 2nd and 3rd/4th year doctoral students. In order not to impose a gender on students by assigning them a pseudonym or reveal identity by using their institution as an identifier, quotes from students will be attributed to a student using their year of study to provide additional context.

Industry partners

A key aspect of the training was to recruit industry partners so the students could apply their knowledge and expertise to live business problems. The Scottish DTP had little existing engagement with 'for profit' businesses, so the team leveraged business networks through Skillfluence and the IAAs. Four small organisations (including 2 start-ups) agreed to participate by presenting an existing real-world problem and asking student teams to pitch solutions.

Evaluation process

This evaluation draws on 3 phases of feedback from students: following the first and second events; and evaluation covering the complete Business Booster training after the final event. The evaluation presented here also includes reflections from industrial partners. As authors, the Deputy Director – Training (not directly involved in training or refined content development) and Knowledge Exchange & Partnership Manager of Scotland's DTP bridge the gap between research innovators and evaluators and our reflections are embedded in the paper. This insider position permits greater understanding of the issues and aims but has the risk of over-stating the achievements, (Mercer, 2007). The involvement of a third party to co-deliver the training, Skillfluence, is a kind of buffer that allows us to be critical in objective as well as subjective ways. The aim of this paper is to ask questions about how we better train doctoral students in building confidence with industry, and our honesty in discussing the gaps that remain from this initiative, we hope, is reassuring that we've not used our insider position to 'sugar-coat' findings.

Findings

Training overview

Three events were held for the same 31 students (see Figure 2): Dialogue Matters in AAA focused carefully on terminology, communicating and networking skills. It aimed to give space for students to translate their skills from academic language (proposal, paper) to industry-speak (pitch, report). The CMI (2018) report had not been published when planning the event, but the aims of the first event chime well with the need for better communication skills. The second event held 6-weeks later in BBB looked at What Businesses Want and used case studies and an industry speaker to reinforce the engagement with what businesses do, and how they use research expertise. Again, planned before the CMI report, this second event focused well on project management aspects.

The final event, Working with Business, lasted 2 days and took place in January (2019) in CCC. This event was pivotal in taking students outside of their academic headspace and into a work-based scenario. It explicitly required problem solving, mini-project management, working as a team and strong interpersonal skills (CMI, 2018).

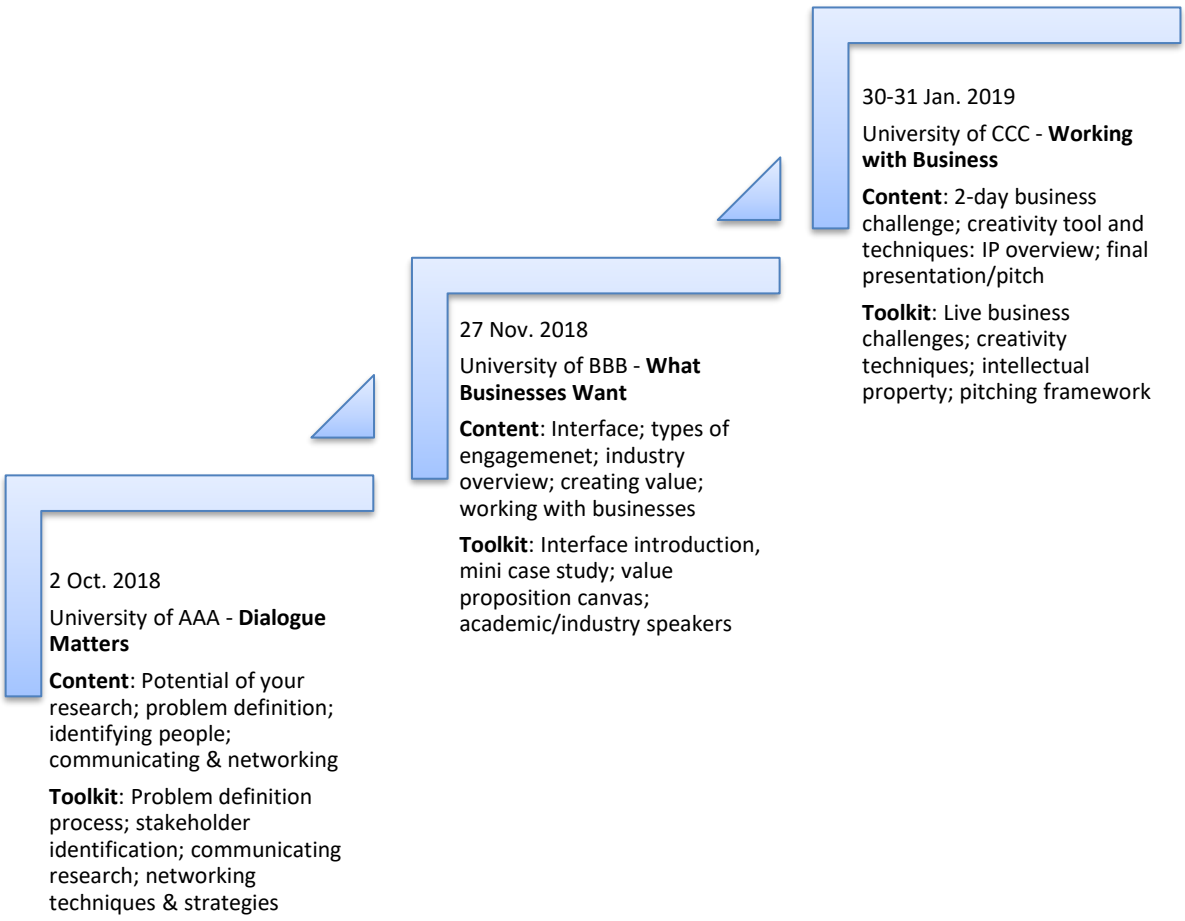

Figure 2: Overview of the 3-site training

Student evaluation of training: overall satisfaction

Beginning with overall satisfaction the section will continue to present two thematic areas that emerged from completed evaluations: the value of interaction and relevance to own work.

The training was a success from our perspective. It helped us understand better what skills and approaches to work were valued by industry, and how students could evidence that they had these skills. The student evaluations were strong, though there were also some learning points about the set-up of events and which industry partners to collaborate with that will be discussed. Although the evaluations triggered a shift in timing/location of the event in later years, the content and structure were valued and have remained the same. Of the students that responded to the question, 'has your confidence in articulating how your research could contribute to business/industry increased?' All said it had, except one, who said it was the same but enjoyed the training anyway. Here we can evidence enhanced communication skills.

> The training program has increased my confidence by highlighting reasons why a business would engage with my research. This included my knowledge of my subject, how I engage with audiences and my critical thinking skills. (1st year student).

Evaluation Question	Scoring system used	Event 1	Event 2	Event 3	Cumulative score
To what extent did the workshop meet your expectations?	5 high vs 1 low	4.15	3.81	4.00	3.99
Substantive content of the event (skills and techniques taught)	5 very useful vs 1 not at all useful	4.00	3.62	3.89	3.98
Quality of teaching (engaging, interesting, well presented)	5 excellent vs 1 poor	4.40	3.95	4.11	4.01
Relevance to my own work	5 excellent vs 1 poor	4.3	3.90	3.67	3.95

Table 1: Average Evaluation Scores for Event 1-3

Table 1 compares average scores given on the evaluation forms from the first 3 events alongside cumulative scores. The scores for the first event are the strongest though some students, notably from a business and management academic discipline felt that the content was familiar to them. Evaluating the second event,

> From a personal perspective, I felt the workshop was less useful for me as a business student, however I know from speaking to other attendees they appreciated [the] tools and frameworks. (1st year student)

Others felt the events were more useful,

> I enjoyed the workshop which clearly took a lot of effort and expertise to prepare. It was also an interesting interdisciplinary cross-section. (3rd year student)

The structure of the events evolved as we were able to reflect on the first and had a gap before delivering the second and then the third. This gap between events was critical to the delivery team as we were able to reflexively unpack what worked, and what didn't. The overall content and intention remained unaffected but responding to students we introduced more interactive sessions which horizontalized the training event (rather than hierarchical training, or top-down approaches where students sit, and listen).

Value of interaction

Interacting with others gave students opportunities to interrogate their learning and apply it to their own fields of research and was highly valued: "Amazing opportunities for networking" (2nd year student). While the speakers were highly valued by students - "Really great speaker. Very engaging, approachable and funny!" (1st year student) - and all students evaluated the quality of teaching at event 1 which was more practitioner-led as being either 4 or 5 out of 5 (5 denoting excellent: average 4.4/5, see table 1), the really valuable learning came when students were able to negotiate the content with their peers and this related to their learning around working with business, but also around their own PhD research. Reflecting on what they liked most was the:

> Ability to learn from others at more advanced stages of their PhD, sharing of best practices and experiences. (1st year student)

Team-working is one element of Mode 2 learning that is not generally associated with the Mode 1 dominated PhD approach which within the social sciences, traditionally isolates students into their disciplinary 'silos'. There is evidence from our evaluation that students had the interpersonal skills to work well in teams. This inclusive habitus made the training initially challenging for some:

> I have to admit I struggled with applying the concepts and framework to my own material (which I expected to find difficult, though maybe I'm also too much on the 'humanist' spectrum?) - I think I would find it a little less alienating if you used some specific scenarios to picture ourselves in. (3rd year student)

From this quote, there is an indication that some students measure the value of the training relative still to their own research, rather than seeing the opportunity to build confidence in skills that industry partners might value. As the events progressed, the student evaluations increasingly praised team-working elements.

The opportunity to interact with and pitch to industrial partners was a clear positive for most: "Presentation was a challenge but very rewarding" (1st year student); "[highlight was] preparing a pitch for real companies" (4th year student); and "[highlight was] engagement with members of the industry" (2nd year student).

The industry partners also provided excellent feedback:

> There were certainly some suggestions that came out from the discussions, we are already looking to incorporate into our strategy. (Expanding IT consultancy)

> Given we are just setting out on our journey this was an invaluable resource. It will really give us some new perspectives that will shape our future thinking. (Small start-up company)

> I was amazed at the insights my group were able to come up with ... I will be using the recommendations from the challenge. Thanks again for a brilliant experience. I just loved meeting the students, it was energizing to speak to them. (Health start-up)

We plan a more in-depth critical engagement with the industry feedback in future work. Here though, it is clear that the industry partners did perceive the students as able to problem solve, to work as a team and manage projects (albeit a very short project), and to communicate well. This training then actively challenges some industry's perceptions about the capabilities of social scientists.

Relevance to own research

The interactive sessions enabled students to draw links between the training and their own work or ambitions, but it was the second event, with an industry expert, an academic that has worked with industry and a post-doc now building business networks that were cited as the element students liked the most,

> The speakers: I found [academic with industry links] information very useful as she gave us useful insight into relationship building within a business setting. (1st year student)

In the evaluations after the 3rd event one student when asked about whether understanding about the research needs of industry had changed since the start of the course said,

> Not really, but the methodological frameworks were of amazing value and will definitely stay with me (2nd year student).

This facility to extract value from a work-based activity back to the traditional academic arena demonstrates what our students are missing when such activities and experiences are considered 'additional' to a PhD and where we draw a line between a PhD being Mode 1 learning and by extension, not requiring Mode 2 learning. Related to this is the quote from another student,

> The course has given me an understanding of key elements needed when working with a Business; for example, a project needs clear communication, expectation management and key milestones. (1st year student)

What is especially enlightening about this quote, is that these project management skills are instrumental to PhD study which requires a clear research aim and questions; good communication between student and supervisors and in time, examiners; management of supervision arrangements and then a clear timeline underpinned by annual progress reviews. Perhaps working with industry improves our academic skills. This is something we have learned anecdotally from our internship work, that working in a non-academic environment improves time management, project planning and communication. Interesting to see this learning appear in a much shorter time-investment. The next quote demonstrates that fieldwork often necessitates academic/industry interactions,

> Thanks for providing this training, I found it incredibly useful not only for when I finish my PhD but even at this early stage, it's shaped how I've approached industry organisations for fieldwork and has been very useful. (1st year student)

Things we chose to do differently in 2019

Student feedback informed redevelopment of the training, which was delivered again in Oct 2019 with some key changes. Some that were relatively simple, such as using less acronyms and getting students fresh air at least once during the day. Other changes relied on developing our networks to tackle issues around choosing the right industry partners.

The evaluation from our 2018 Business Booster Training revealed one industrial partner did not deliver at the level achieved by others: "The [business representative] looked super unenthusiastic and I disengaged as a result." (1st year student). A few students in the group with this industry partner felt it was a disappointing experience working on a task orientated towards economic gain, where the others had focused on 'public good' issues such as sustainability. As we develop more links with industry we will over time be able to bring stronger candidates together. For the 2019 event, we worked with Skillfluence to select industry partners with a social element to their business.

The timing of the pitching exercise was also raised: "I think the group task of working with a business/academic collaborator could have been better if given earlier in the program, I felt we did not have enough time to discuss our ideas." (1st year student). Therefore we brought the businesses in on day 1 of the 2019 programme, and then back for the pitches on the last day. This extended the project management aspect of the training.

Feedback that valued the incremental training strategy also suggested that the 3 sites were not helpful. The long gaps between events were useful for us, but necessitated time spent at each event recalling what was delivered at the last event. This was viewed by students as repetitive. Further the students struggled to visualize the learning delivered at forthcoming events which they described as "frustrating". (2nd year student). In moving to a single, but multi-day event, , we retained the incremental learning approach, so there were still 3 clear stages building towards pitches to industry. We also extended the 'preparing a pitch' teamworking exercise and included space for reflection post-pitch in Oct 2019. Feedback in 2019 and 2020 has been very positive about the structure, content and timing of the event.

The students evaluated the training highly. They have reported growth in being able to evaluate their own skill set, and identify what is of value to 'for profit' industry partners. Further research is planned via our alumni network, to understand more about what students learned, and how this, or if this, helped them navigate into a career. It will be interesting to hear from those working with industry as an employee, as well as early career academics that work with industry partners on projects. We will also take care to hear former students' accounts of why they've chosen not to work with industry.

Conclusion

Having funds to invest into this initiative was vital and allowed space and resource for an imaginative solution to the industry training-gap. Our investment required energy and co-working and has resulted in training that students found exciting and useful. A no-pressure brainstorming session allowed us to collaborate, draw learning from our sector, and contribute according to our own strengths: and others should take time to include this step. Further the project benefitted from having multi-institution buy-in with a national strategy and this enabled us to draw on a range of expertise.

The 3-site model ultimately, enhanced our planning of the training, but did not enhance the training experience. We retained the 3 distinct training objectives which together, delivered the overall aim of building capacity and capability for engaging with industry.

Choosing industry partners carefully is a factor in success, and partners should present strategic challenges (students particularly enjoyed sustainability challenges) rather than operational problems (such as increasing their income/turnover) in order to attract and sustain energy from talented social science researchers. It would be interesting to know if students from other research councils would also value this approach.

This initiative also helped build networks between Scotland's DTP, the IAAs and industrial partners. The Business Booster training helped students evidence their problem solving, project management, teamwork, interpersonal and communication skills in explicit ways. Two of the four industry partners have contributed to higher-investment initiatives such as internships and collaborative awards. It has allowed us to build case studies which we hope will convince new partners to engage with our students, and the social sciences more broadly.

Biographies

Jo Ferrie, is a Senior Lecturer at the University of Glasgow. She is Deputy Director – Training of the Scottish Graduate School for Social Sciences and founding Director of Glasgow Q-Step. Her research focuses on teaching and learning of research methods in ways that encourage practice, and motivate students to harness knowledge production skills. Jo has also published on skills underpinning emotionally demanding fieldwork.

Anna Ashton Scott, is Programme Manager - Professional Development for The Data Lab – Scotland's Innovation Centre for Data and AI. From 2017-19 she led on Knowledge Exchange and Partnerships for the SGSSS-DTP, delivering a national programme of industry-focused skills training initiatives to connect doctoral research with policy and practice.

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