

Apprentices' longitudinal perspectives of the tripartite collaboration at the heart of degree apprenticeships

Track: 2. Collaborative approaches to work-integrated learning

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Abstract (250 words max, including keywords)

Purpose: In degree apprenticeships, the tripartite collaboration between the apprentice, the employer, and the university is key to success. As the apprentices are at the centre of the degree, their lived experience and reflections are essential to understanding this collaboration, so that all parties can be supported to effectively play their roles.

Methodology: A qualitative, longitudinal study, spanning four years, in which apprentices (n=11) studying towards computing degrees in Scotland (BSc / BEng) were interviewed in both their first and final years. The protocols covered their experiences of the apprenticeship, including work, study, and its impact on their lives. Data was analysed via a framework matrix, which focused on the collaborations between the three parties and also surfaced any changes to the apprentices' perceptions between first and final year.

Findings: The tripartite collaboration is logistical but also, like learning, social. Apprentices benefit from interest and support from their employers and colleagues as well as integration between their work and studies. The collaboration between apprentices feeds into their work, as well as their studies, and extends from peer support into meaningful friendships. The university plays a key role in facilitating these essential connections and needs to be aware of where and how that happens.

Originality: While the tripartite collaboration has been discussed theoretically in the literature, this is the first longitudinal investigation based on the lived experience of a cohort of apprentices from the start of their degree to in sight of finish line.

Keywords: degree apprenticeship; tripartite collaboration; work-integrated learning; mentor.

Introduction

As the UK's first cohorts of degree apprentices graduate, we take the opportunity to explore the collaboration at the heart of their programmes: the tripartite relationship between the apprentice, the employer, and the university (Basit *et al.*, 2015; White, 2012). Degree apprenticeships enable people to complete higher education degrees while employed, including gaining credit for work-based learning. The aim is to deliver work-experienced graduates, with skills aligned to industry needs, especially in sectors such as digital, which claim a skills gap (Shadbolt, 2016; Taylor-Smith *et al.*, 2019).

The financial model breaks from contemporary UK higher education (HE), where students increasingly accrue debt. Instead, employers pay apprentices' salaries and fund tuition through an apprenticeship levy (Powell, 2019), topped up by the European Social Fund in Scotland (SDS, 2019) where this study is located. Reflecting employers' financial contribution, employers influence the programmes' curricula, collaborating on the frameworks that govern the contents of the degrees (Powell and Walsh, 2018); they also recruit the apprentices. This financial model enables apprentices to earn as they learn, widening access to HE (QAA, 2019; Smith *et al.*, 2021) by opening the degree to those keen to avoid debt and also to those with financial commitments such as dependent families.

However, this collaboration also brings challenges. Universities need to foster core HE skills: 'developing broadly adaptable knowledge and critical stances' (Billett, 2009, p.828; cf. White, 2012), while fulfilling the technical skills needs of the frameworks, within reduced and concentrated contact time (online or face-to-face); employers need to release 20% of their apprentices' time to study and also provide workplace mentors; apprentices need to balance the demands of their jobs with university study (attendance, reading, coursework), and their personal lives, for up to four years. The three parties can smooth these challenges through good communication and positive relationships, leading to meaningful integration of work and study. While much has been written about challenges from the point of view of the university (e.g., Basit *et al.* 2015; Billet, 2009; QAA, 2019; Powell and Walsh, 2018; Rowe *et al.*, 2018) and employer (e.g., Antcliff *et al.*, 2016; Emms *et al.*, 2021; Roberts *et al.*, 2019), this study investigates the apprentices' lived experience of this collaboration. In understanding potential models for this collaboration, with apprentices at the centre, we draw on Fuller and Unwin's concept of expansive / restrictive learning environments (2003).

Literature review

Collaboration in work-based learning

Effective work-based learning is a partnership of apprentice, employer, and apprenticeship degree provider (described as educational institution or university in this paper). The partnership features: collaborative self-interest ensuring each partner benefits; transparency of the requirements of each partner in terms of the nature of the outcomes, and; means of negotiation to arrive at an agreed programme of learning (Smith and Betts, 2000). A successful outcome for the apprentice is academic credit leading to a degree award. For the educational institution, success is ensuring academic standards leading to progression and award. For the employer, the work undertaken by the apprentice must be aligned with organisational goals. As such, the tripartite collaboration is individualised, requiring all partners to be active to ensure a successful outcome, for example, promoting

their self-interests through negotiation. However, this carefully balanced collaboration designed to ensure all parties benefit, may falter in practice. Reeve and Gallacher (2005) identify three barriers: limited evidence that employers want to engage in such collaborations; cultural barriers limiting negotiations about learning outcomes; and quality assurance processes that are designed for traditional learning.

In the case of degree apprenticeships, employer demand is robust in the UK (IFF, 2020; Scottish Government, 2022), however engagement at the level of the apprentices' mentors and line managers is less well evidenced (Siriwardena *et al.*, 2019). Apprentices report that career appraisals do not take account of university learning, employer expectations of skills do not align with university courses, and reflection (a general requirement for work-based learning outcomes) is viewed negatively (Siriwardena *et al.*, 2019). To some extent the cultural barriers cited by Reeve and Gallacher (2005) are addressed by the published standards and frameworks which govern the degree apprenticeships' content (Fletcher, 2019). Further, quality assurance processes, especially accreditation by professional bodies, increasingly help to recognise the ways in which work-based learning fulfils learning outcomes (Felce, 2019).

This longitudinal study explores the apprentices' experiences of the effectiveness of the tripartite collaboration, revealing where predictions about barriers (Reeve and Gallacher, 2005; Siriwardena *et al.*, 2019) are prescient or unfulfilled. One influential model for effective work-based learning is Fuller and Unwin's (2003; 2004) expansive / restrictive learning environments, characterising employers' approaches to work-based learning.

Expansive / restrictive learning environments

As in Lave and Wenger's situated learning theory (1991), Fuller and Unwin's framework describes work-based learning in terms of the apprentices' *participation*, though privileging employers' agency in the learning environments. Based on their case studies, workplace cultures are modelled on 'three participatory dimensions:

- a) opportunities for engaging in multiple (and overlapping) communities of practice at and beyond the workplace;
- b) access to a multi-dimensional approach to the acquisition of expertise through the organisation of work and job design; and
- c) the opportunity to pursue knowledge-based courses and qualifications relating to work.' (Fuller and Unwin, 2004, p. 126).

Twenty elements of the work environment are paired and described in terms of expansive characteristics (potential approaches which facilitate a rich environment for work-based learning) and restrictive characteristics (which limit meaningful participation). For example, and of specific relevance to degree apprenticeship models, the expansive characteristic 'Planned time off-the-job including for knowledge-based courses, and for reflection' contrasts with the restrictive end of the scale: 'Virtually all-on-job: limited opportunities for reflection' (Fuller and Unwin, 2004, p. 132). Also highly relevant to our study is the expansive feature 'Organisational recognition of, and support for employees as learners', with its restrictive opposite: 'Lack of organisational recognition of, and support for employees as learners'. The expansive characteristic 'Reification of workplace curriculum highly developed (e.g., through documents, symbols, language, tools) and accessible to apprentices' and its restrictive partner 'Limited reification of workplace curriculum; patchy

access to reificatory aspects of practice' help to describe the aims of elements of the degree apprenticeship such as learning agreements and reflective diaries — ways to manifest and record work-based learning, but also ways to support collaboration around this learning.

However, the expansive/ restrictive framework rather underplays the role of individual apprentices in participation, whereas their personalities, contexts, and personal histories (ontogenies) influence their attitude to and participation in work and learning (Billet, 2006). The apprentices' different contexts and attitudes, especially over four years, including the disruptions of the Covid-19 pandemic, underly this study. The aim is to derive a rich account of degree apprenticeships, based on the heterogeneous experiences and perspectives of these apprentices (Braun *et al.* 2021).

Methodology

This qualitative, longitudinal study, uses data from interviews with degree apprentices studying towards computing degrees in Scotland (BSc / BEng). The apprentices were interviewed, in their first and final years, about their experiences of the apprenticeship: work, study, and its impact on their lives. The university's ethics and data management procedures were followed and the study approved. Interviewees signed informed consent forms and the transcripts were carefully anonymised.

This study uses a post-hoc analysis of the interview data. Neither interview protocol focused specifically on collaboration, though both included questions about interactions between the apprentices' work and study. Interviews with first years were conducted face-to-face and interviews with final years were conducted online. Interviews were recorded and transcribed. Of the extant interviews, eleven pairs were identified, where the same apprentice took part in both their first and final year. Of these eleven interviewees, five were women and six men (we asked them), eight were in the 20 to 30 age group and three were over 30. They were on three different degree programmes, though all used the same model of one day on campus per week for the first two years, then one day per month for third and fourth year.

One of the researchers had conducted the interviews and previously analysed the datasets, so began this study with a high level of familiarity with the data. The Framework Method (Gale *et al.*, 2013) was chosen, so that after the initial framework analysis conducted by the first researcher, the research team could easily collaborate. The analysis was conducted within NVivo, which supports the framework method. Interview data was analysed to investigate these research questions:

1. How do degree apprentices experience the collaboration between the university, their employer, and themselves?
2. Where is this collaboration strong or weak?
3. How does this experience change over time?

Interviewees were pseudonymised and each interview became a case in the framework matrix. For example, Becky's two interviews became the cases "Becky 1st year" and "Becky 4th year". The attributes recorded for each case were: age group, gender, programme subject, whether they started in first or second year, and their recruitment into the apprenticeship (i.e., whether they joined their employer to do the apprenticeship or were already employed there). The data was then coded to identify *interactions*, rather than

collaboration specifically. The less specific *interactions* was chosen to enable the researchers to review and discuss whether interactions could really be called collaboration. Interactions could appear in more than one category. The codes aim to identify the parties in an interaction, but that was not always clearcut in the data. The final category, *missing collaboration*, highlights the elements of the collaboration that, like infrastructure, become visible when they break down (Star, 1999). The codes identifying interactions, which became categories in the framework, were:

- *All parties*: interactions involving apprentices, university, and employers/ colleagues.
- *Apprentices and employer*: interactions between apprentices and colleagues/ mentor/ line manager, etc.
- *Apprentices and university*: interactions between apprentices and university staff (teaching and support).
- *Employer and university*: interactions between employer/ mentor and university staff.
- *Within cohort*: interactions among the apprentices.
- *Missing collaboration*: an interaction seems required, but is not quite there.

Once the data was coded, the framework matrix was charted by summarising the data by category from each transcript (Gale *et al.*, 2013, p.5). Example quotes were added to the framework, so that it could be shared beyond NVivo (which presents the coded data alongside the framework cells). This was an iterative process, with drafts of the framework matrix shared and discussed with the research team. Where omissions or anomalies were noticed, coding and charting were revised.

The findings presented below reflect the patterns that the research team noticed in the framework and our analysis of these patterns. This was informed by Fuller and Unwin's work on work-based learning, specifically their concept of expansive / restrictive learning environments (2003, 2004). Our previous research had revealed the importance of the apprentices' very different contexts and their attitudes or personalities on their perceptions of the degree apprenticeship (Fabien *et al.*, 2021), so we were not surprised to find differences in the apprentices' experience of collaboration.

Findings and discussion

Overview

The interactions identified highlight the importance to the apprentices of: identifying meaningful links between their study and their day-to-day work; active support from employers, in terms of flexibility and pro-active mentors; and the collaboration between the apprentices themselves (including its facilitation by the university). The apprentices' contexts varied widely, especially according to their different roles, level of responsibility, workplace environment, and degree subject. This impacted the strengths and weaknesses of the collaborations. While these years included the unplanned challenge of the Covid-19 pandemic, apprentices also experienced shifting relationships within the collaboration as their responsibilities changed over the years. The findings below are presented according to the collaboration parties. As the data comes from interviews with apprentices, interactions are predominantly seen from their perspective, so it is a situated, rather than comprehensive view of the collaboration.

All parties

The collaboration between all parties in the tripartite collaboration (apprentices, their employers/mentors, and university staff) manifests most clearly in terms of skills and knowledge. For example, apprentices applied knowledge they had gained through their work to their studies at university. Occasionally, apprentices would share this in lectures, demonstrating how theoretical knowledge was applied in practice. Steven shared his experience of designing an IT system, based on observing the people who needed it and now use it: '[The lecturer is] talking about it and you're thinking: that's exactly what we did. And it does work. We've proved it works.' The apprentices also applied what they learned at university in their workplace, improving their performance and also introducing new technologies and processes to their teams. Paul described bringing useful applications into his work: 'So being able to understand it and pass out that knowledge and say "Have you tried this tool? This is what this tool does." It's been really good passing on that knowledge to others amongst the team.' Over the four years of the study, most of the apprentices were promoted and some of them explicitly credited what they had gained from the course. Becky told us: 'my job role has changed and I've been promoted since then, probably based on a lot of what I've learnt through the course.'

The challenge within this collaboration was the combined load of work and study. Most of the apprentices struggled at times to balance the workload and the rest of their lives. Steven loved his work and enjoyed the study, but commented in fourth year: 'So the whole work/life balance I think is wrong... It feels when we do finish this, in a way it will be a relief so you can get your life back together again.' Apprentices made some suggestions for ways that their employer or the university could help with this, but mostly needed to shoulder the burden themselves.

For apprentices with less responsibility at work, employers could help by allowing apprentices to use any work downtime to study. However, over the four years these apprentices gained responsibilities and lost downtime, especially those whose workload increased due to the pandemic. It was also helpful to have a strong integration between the apprentices' studies and their day-to-day work, especially for their applied project in their final year. Apprentices whose project was not part of their work role needed to find time to work on it in addition to their job and the other modules they were studying that year, whereas apprentices whose project was embedded in a work assignment could mostly complete it in work time. Employers could benefit where apprentices applied best practice to the project and savvy line managers and mentors helped to choose projects that would benefit the business, as Keiran describes: 'Between myself and my line manager, we wanted to focus on something that I could do day-to-day that is needed within the business, within IT, that I would benefit from doing and the business would benefit doing.'

Apprentices and employer

As noted above, the apprentices and their employers (managers, mentors, and colleagues) could work together to improve the experience of the degree. Some employers encouraged their apprentices to use work time and meeting rooms to catch up on study when their work role allowed it or if coursework and assessments built up. Apprentices needed to take the lead in this, for example, by keeping their line managers up to date on their university workload, as Sophie describes: 'everybody has supported us in the circumstances, as long as

you say something before it's a bit too late and something's due tomorrow and you've not had a chance to work in advance.'

The apprentices' colleagues also took active roles in helping the apprentices with certain university modules. They could contextualise concepts according to their application within the organisation and/or take time to go through questions one-to-one. Colleagues in software development roles were particularly helpful for apprentices learning programming in their first year. Becky's colleague stayed late after work to help her: 'So, the software development module, I got to speak to [our developer], who does a lot of our Java work here, and he was helping me out...explaining what things were in a work context, rather than just out of books.' Kelly reached out to colleagues across her company: 'If I need help with something from a specific area, someone will help you find, or I will just know within my own network, someone who does that as their job, and they will help me.'

Mentors and managers who took an interest in their apprentices' studies not only supported the apprentice, but helped leverage new knowledge and skills for their organisation, such as through identifying useful fourth year projects. However, this was far from universal. Paul observed that 'it was pretty much left to me to decide what I wanted to do, with no forethought as to what the organisation needs.' And Laura was left struggling with her project, which could be useful to her company, in her own time, as her mentor had not engaged with the process and her day-to-day role was too narrow to support a suitable project.

Apprentices and university staff

The main interactions between apprentices and university staff were around learning/teaching and support. The paradigm underlying Fuller and Unwin's expansive-restrictive learning environment (2003) is one of learning as a social practice (Lave and Wenger, 1991), so learning was an activity apprentices needed to *engage* with, rather than something which lecturers could just make happen. The apprentices were the first degree apprenticeship cohort at the university and helpfully collaborated by providing feedback on what worked or was problematic and speaking up when they needed additional flexibility. Keiran took a positive view of this: 'Because it's the first year it's started, the university itself is still kind of learning as they go and maybe trying different things and they're open to suggestion. So if we've got any worries or queries about anything, one of us is the class representative, and we'll just go to him and he obviously portrays that back to [university staff]. And they've all been pretty good. Certainly, if people have had any problems, they've been pro-active to try and fix it.' The university provided additional communication opportunities such as pizza lunches for apprentices and their lecturers, as Laura noted: 'I think what's been done well is the kind of pizza lunches, where we get to actually talk to people, because it can be very difficult to have an actual chat about how things are going, when it's not something like this...Whereas with this, every so often actually having some contact, I think, adds to feeling part of the university.'

The missing collaborations code highlighted the kind of issues that arose when lecturers forgot the needs of the apprentices as full-time employees, such as having relatively inflexible timetables compared to on-campus students. Mishaps included lecturers scheduling additional tasks on non-contact days, re-timetabling exams, and giving new information about coursework at the last minute. Some apprentices had to book their

annual leave well in advance, so needed exam weeks to be fixed. Equally, the demands of their day jobs meant that they need to schedule their university work over time. As Kelly pointed out: ‘a lecturer changed or provided new information about a coursework four days before it was due. And that might work for on-campus students, but that doesn't work for us. I'd finished doing it by then. We don't have the time to be able to pull all-nighters two days before the deadline, I have to go to my job.’

Employer and university

According to the interview data, there were few interactions between the university and employers that did not involve the apprentices too. This largely reflects the apprentices' perspective (what they were aware of) but also says something about the tripartite collaboration — that the apprentices are at the centre. It is their lived experience to an extent beyond that for the other parties, for whom it is just part of their day job. The exception to this is the collaboration between the employer and university around recruitment. Especially because it was the first year of the programme, university staff had to recruit employers and help them to identify suitable candidates, whether from their existing staff or by advertising new posts. For the university, this is a noticeable shift from recruiting and admitting students to employers recruiting or identifying potential apprentices. The university also provides some training for mentors, where apprentices are not present.

The missing collaboration coding also highlighted a couple of early mistakes where university staff had emailed employers without including (cc'ing) the apprentices.

Within cohort

Peer collaboration among the apprentices is the strongest theme of this study. Friendships formed quickly, as the apprentices identified what they had in common, including being older and more experienced than traditional students, working in similar roles and environments, and sharing the often challenging experience of the degree apprenticeship itself. The apprentices stuck together, supported each other, and helped each other out. Looking back, Jack felt that ‘the people on the course generally, probably have made it easier, because you're like friends... It's given another social element to life, you know, meeting different people.’ Apprentices discussed how to approach each coursework, as instructions were not always clear, and helped each other as necessary. For Keiran: ‘If you're struggling, there's always somebody there to help you, if you need help....you've got your classmates.’ This support was crucial through a challenging four years. Sophie ‘definitely coped by speaking to and working with the other apprentices. I think only people that are doing that exact thing can really understand what it is that you're going through...I think that's been the biggest challenge, just balancing everything and I'd say that the others are the thing that got me through it.’

The apprentices could also usefully pool their workplace experiences. Jack described this as a *bank of knowledge*: ‘the university would normally be teaching people who have got limited experience with various things, different systems or softwares, whereas all of us are in a job for a start. Some of us have had more than one job, so there's a good bank of knowledge.’ While lecturers often presented a theoretical or idealised version of a process, the apprentices shared how it was done in practice. This sharing could also be useful to their

work, their careers and businesses. As Keiran noted: ‘So you might be talking about something and then you think: Oh that would work really well at my work. And then you bring back that extra knowledge about how other companies are running their IT departments.’ This aligns with Fuller and Unwin’s recommendation for ‘Participation in multiple communities of practice inside and outside the workplace’ and ‘Breadth: access to learning fostered by cross-company experiences’ (2004, p. 132).

The model followed by this particular group of computing apprenticeships programmes, with one on-campus day every week for the first two years, is one of many used across the university. Apprentices seemed to find it helpful in facilitating the cohort’s friendships and collaborations, as Becky appreciated in first year: ‘being in the university environment is brilliant – actually having the opportunity to go in once a week. I think it might have been more difficult if we had complete distance-learning, because you don’t get experience of mixing with the other students.’ However, the model moved to one on-campus day per month in third and fourth year, which was compounded by 18 months of online learning impelled by the pandemic. This was a difficult time for the apprentices. Studying online made it more difficult to stay engaged with the material and each other and keeping up with their studies was more difficult without a day per week out of the work environment. The three nominal days of self-directed study per month had to compete with workloads which had snowballed during the pandemic. Jack struggled to ringfence his study time while taking on a new role and in a more complicated (working from home) context: ‘in that situation, balancing your work life and everything else you’ve got going on, I think it’s a big ask of individuals to finish working in front of a laptop all day and say “You’re expected to open the laptop up and read for three hours.” Whereas that three hours was part of your week on a weekly basis.’

Missing collaboration

The missing collaboration theme highlights elements where the interaction is lacking or ineffective, according to the apprentices’ narratives. Most elements of this have been described within the interactions above, such as emails which should have included apprentices being sent to their employers alone or mentors not becoming involved in identifying suitable fourth year projects. Across the interview data, the most prominent negatives for the apprentices were the move down to one day contact per month described above (compounded by the pandemic, which apprentices recognised as beyond the university’s control) and the professional practice modules.

The professional practice activities were mandated by the frameworks which govern the content of the degree apprenticeships and were designed to record and reify the work-based learning. They centred on reflective diaries completed by the apprentice and learning agreements agreed in meetings between each apprentice, their workplace mentor, and university tutor. (For a discussion of diarying / journalling in this context, see Rausch, 2014.) While one or two apprentices found value in the reflective diary process, most struggled to integrate it into their learning and found themselves recording events in their work life without benefiting from it. Becky was tactful about this: ‘I don’t know if writing the professional practice reflective logs were hugely effective. Sometimes it kind of felt like I was just basically writing what I’d done in my week — a lot of the stuff was kind of business as usual... I would forget for weeks on end and then you’d be sitting writing up six weeks work in one go.’ Martin was more blunt: ‘But in terms of learning from them, the

professional practice modules, let's face it nobody really likes them. No one understood what it was.' A couple of interviewees, including Sophie, did find the process useful: 'By third year I remember thinking this is actually really useful as an exercise: just going back through work you've done and finding bits that you didn't think about before or looking at negative, or what felt like negative, situations and actually finding a lot of positives.' The apprentices' experience of the professional practice modules highlights the role of another partner in the collaboration: the organisation asked by the government to manage the processes around the degree, including the frameworks which guide the curriculum. This finding could usefully open a discussion among Skills Development Scotland / the Scottish Funding Council (who manage degree apprenticeships in Scotland), the educational institutions involved, and representatives of the employers and apprentices. This could surface what all the parties need from the professional practice modules, what they are each putting in, and what they are currently getting out.

Conclusions and limitations

The findings of this longitudinal study inform models of effective collaboration in work-based learning, identifying where the collaboration parties are supporting progress and where they could do more to facilitate the apprentices' learning and also benefit from the degree programme. The interactions identified highlight the importance to the apprentices of: identifying meaningful links between their study and their day-to-day work; active support from employers, in terms of flexibility and pro-active mentors; and the collaboration between the apprentices themselves (including its facilitation by the university).

The links between apprentices' study and work require ongoing collaboration between employers and universities around the curriculum; lecturers, work colleagues, and other apprentices can also help by contextualising theoretical concepts to actual work contexts. Ideally, employers can offer apprentices some variety in their roles, especially in the first two years, to align with their studies. Managers and mentors' active involvement in the fourth year applied project is helpful to both the apprentice and potentially their organisation. Professional practice activities, such as learning agreements and reflective diaries, also have potential to surface this integration, but may need a different implementation in order to be engaging.

The challenge of managing the workload falls mostly on the apprentices. Employers can help by offering spare worktime, but this is not possible for all apprentices or throughout the four years. Universities also need to be aware of the apprentices' schedules. The apprentices interviewed in this study felt that it would be more helpful if one on-campus day per week was mandated throughout the four years, ring-fencing study time. This would also facilitate the apprentices' within-cohort collaboration and friendships, which are clearly important to their wellbeing, studies, and careers.

The elements of work-based learning that are discussed above are closely aligned to those described by Fuller and Unwin (2004). However, rather than learning environments influenced by the employers' approach, the focus on collaboration emphasises the agency and responsibility of all parties. The interviews also reveal apprentices reacting quite differently to apparently similar contexts. Hearing from the same interviewees four years later, consistent personalities seem to come through in their approaches to engaging with

learning. However, life events taking place between the interviews also influenced the apprentices' engagement over time, such as the energy they could make available to learning and collaboration. The second interviews took place during the second year of the Covid-19 pandemic. University activities (teaching, assessment, and support) had been online for over a year and most of the apprentices were working from home. Many had experienced a huge rise in the volume and complexity of their work, especially those responsible for solving their colleagues' technology issues in the largely novel, working from home context. However, others had faced redundancy when their jobs were threatened by precipitous drops in custom. Meanwhile, their home-working conditions varied widely (Taylor-Smith and Fabian, 2021).

While the pandemic situation highlights the limits of Fuller and Unwin's approach, it is also a limitation of the research, given the move to working and studying from home in the apprentices' third and fourth year and its impact on the collaborations described here. The nature of the collaborations and integration of work and study may also be quite different outside of computing subjects. Interviewees were all volunteers, so perhaps more likely to be engaged, though they were clearly keen to give feedback around what they experienced as positive or negative aspects. The specific contexts of the university department and its approach and also of the degree apprenticeship implementation in Scotland (unique in the UK) are also important factors.

As this study solely uses data gathered from apprentices, a case study methodology may provide a more comprehensive picture. Case studies of different subjects and different models of teaching and work-based learning would further the generalisability of any conclusions.

Degree apprenticeships in Scotland have so far been well-received (Emms *et al.* 2021). As these opportunities are extended to more people, in more diverse contexts, informing effective collaborations increases the likelihood of meaningful, sustainable, and inclusive experiences for apprentices, employers, and universities (SD8, United Nations, 2015).

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