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

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Abstract

Purpose: The partnership which underpins degree apprenticeships is a tripartite collaboration between apprentices, employers, and universities. This study investigated the lived experiences and reflections of the apprentices at the centre, to inform effective collaboration.

Methodology: A qualitative, longitudinal study, spanning four years, in which thirteen apprentices studying apprenticeship degrees at a Scottish university were interviewed in their first and final years about their experiences of the apprenticeship (26 interviews). Data was analysed via a framework matrix, which focused on the collaborations between the apprentice, employer, and university, also surfacing changes between the apprentices' first and final year.

Findings: The tripartite collaboration is logistical but also, like learning, social. Apprentices require interest and support from their employers and colleagues to promote meaningful integration between their work and studies. Further, collaboration *between* apprentices extends from peer support into meaningful friendships and feeds into their work, as well as their studies. The university plays a key role in facilitating these essential connections.

Practical implications: Apprenticeships can be highly effective in upskilling the workforce and sharing knowledge and skills between academia and the workplace in both directions, while specifically enabling workers to gain degree qualifications relevant to their roles. Recommendations for future work practices, including collaborations, are made.

Originality: While the tripartite collaboration has been discussed theoretically in the literature, this is the first longitudinal investigation based on the lived experience of cohorts of apprentices, from the start of their degree to the final six months.

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

Introduction

As the UK's first cohorts of degree apprentices graduate, it is timely 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 full-time, including gaining credit for work-based learning. The aim is to deliver work-experienced graduates, with skills aligned to industry needs, especially in sectors which claim a skills gap, such as Information Technology (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 (2017-2021) in Scotland (SDS, 2019) where this study was 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. Degree apprenticeships in Scotland have so far been well-received by all participating stakeholders (Emms *et al.* 2021).

This collaboration also brings challenges. Universities foster traditional 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 and their personal lives, for four years. While much has been written from the point of view of the university (e.g., Basit *et al.* 2015; Billett, 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 build on Fuller and Unwin's well-established model of expansive learning environments (2003).

Literature review

Collaboration in work-based learning

While the term *work-integrated learning*, with its emphasis on the 'intersection and engagement of theoretical and practice learning' (Cooper, Orrel, and Bowden, 2010, p. xiv), describes the implementation of degree apprenticeships (QAA, 2019), the term *work-based learning* is used in this study to reflect that the apprentices are primarily located in the workplace and also the role of employers in initiating the apprenticeships, i.e., by recruiting the apprentices.

Effective work-based learning is a partnership of apprentice, employer, and university (the term *university* is used throughout this paper for the education provider/ degree-awarding body). 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 university, success is ensuring academic standards, leading to progression and award. For the employer, success means that work undertaken meets organisational goals, while the apprentice gains new capability. As such, the tripartite collaboration is highly contextualised and individualised, requiring all partners to engage with ensuring a successful outcome, for example, promoting their self-interests through negotiation (Brennan *et al*., 2006; Wallin *et al.,* 2019). However, this carefully-balanced collaboration, designed to ensure all parties benefit, can become imbalanced in practice. Reeve and Gallacher (2005) identify barriers relating to: employer disengagement from the process; cultural mismatch affecting the ability to negotiate suitable learning outcomes; and university quality assurance processes that are designed for traditional learning. Additional employer-related barriers include the challenge of creating effective learning environments in the workplace (Cortini, 2016); overheads associated with guiding and monitoring apprentices' work (Mikkonen *et al.,* 2017), including potential reduction in productivity for employees who provide mentoring (Mulkeen *et al.*, 2019).

Apprentices, employers (via mentors), and universities (via academic tutors) negotiate work objectives, that attract university credit, which involves aligning workplace objectives and knowledge of practices and projects with academic credit structures, both in terms of category and size. Meanwhile, real-world problems encountered in the workplace, tend to be complex and require transdisciplinary solutions (Garnett, 2016) while work processes are not easily quantifiable, factors which are challenging for degree structures and approval. The apprentices' learning also needs to be recognised and shared with their organisation (moved from tacit to explicit). For example, ideally learning objectives capture ill-defined problems, while reflection offers an opportunity to analyse and reflect on experiences (Wallin *et al.*, 2019), contextualising and consolidating 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 performance appraisals do not take account of university learning, employer expectations of skills do not align with university courses, and reflection (a key element of workplace learning) is viewed negatively (ibid.). 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 (QAA, 2019). Further, quality assurance processes, especially accreditation by professional bodies, increasingly recognise the ways in which work-based learning fulfils learning outcomes (Felce, 2019). Meanwhile, universities are developing the 'complex brokerage skills' (Brennan *et al*., 2006) needed to work with employers and apprentices to agree and implement programmes. These collaborations are essential for meaningful, sustainable, and inclusive experiences for apprentices, employers, and universities (SDG8, United Nations, 2015).

This longitudinal study explored the apprentices' experiences of the effectiveness of the tri-partite collaboration, revealing where the barriers discussed above (cf. Reeve and Gallacher, 2005; Siriwardena *et al.*, 2019) are prescient or unfulfilled, while seeking evidence of success factors. One influential model for effective work-based learning, which frames this study, is

Fuller and Unwin's (2003; 2004) expansive - restrictive continuum, characterising employers' approaches to work-based learning.

Expansive 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, 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).

The model supports the analysis of the apprentices' experience, below, as it illustrates elements of the degree apprenticeship that are important for success or otherwise. The first 'participatory dimension' highlights the importance of the relationships facilitated and strengthened by the apprenticeship, from the apprentices' colleagues supporting their studies to the relationships formed across the cohort, especially through linking them to communities of practice (Lave and Wenger, 1991). The expansive - restrictive characteristics weave the practical elements of the apprenticeship, such as on-campus learning in this context, into more theoretical elements such as learning through reflection. The model further tackles the practicalities of manifesting and recording workplace learning by advocating the 'Reification of workplace curriculum…e.g., through documents, symbols, language, tools' (ibid.), recognising the purpose of learning agreements and reflective diaries, key tools to structure collaboration in support of learning.

However, the expansive - restrictive framework rather ignores 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 (Billett, 2009; Illeris, 2004). The apprentices' different contexts and attitudes, especially over four years which included the disruptions of the Covid-19 pandemic, underly this study. The aim was to derive a rich account of degree apprenticeships, based on the heterogeneous experiences and perspectives of these apprentices (Braun *et al.*, 2021). By taking the longitudinal approach, such an account can capture aspects of organisational learning that lead to sustainable and evolving businesses, such as supporting the apprentices' personal transformations and identity change (Wallin *et al.,* 2019).

Methodology

This qualitative, longitudinal study uses data from interviews with degree apprentices studying towards computing degrees in Scotland. The apprentices were interviewed, in their first and final years, about their experiences of the apprenticeship. Semi-structured interview protocols asked about the apprentices' work-lives, their studies, the integration between the two, and role of supporting actors, such as workplace mentors. 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 *re-uses* interview data gathered in two previous studies. Interviews with first years were conducted face-to-face (in 2018 and 2019) and interviews with final years were conducted online (in 2021 and 2022). All apprentices in these cohorts were invited to volunteer and all apprentices who volunteered were interviewed. From this dataset, thirteen pairs (26 interviews) were identified, where the same apprentice took part in both their first and final year. For context, this includes 10/33 apprentices graduating in 2021 and 2/40 of those graduating in 2022. Interviews were recorded and transcribed. The average length was about 40 minutes. Five interviewees were women and eight men (we asked them), ten were in the 20 to 30 age group and three were over 30. They were all on computing degree programmes, with one day on campus per week for the first two years, then one day per month for third and fourth year. The apprentices all worked in Information Technology companies or IT departments in larger organisations.

While the protocols did not explicitly focus on collaboration, it emerged as a strong theme in the data, prompting this analysis. Further, as the research team had conducted the interviews, they were familiar with the original contexts (Hammersley, 2010). 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. How does this experience change over time?

The Framework Method (Gale *et al*., 2013) was chosen for analysis (within NVivo), so that the research team could easily collaborate: qualitative coding analysis is summarised and charted, by case and category. Interviewees were pseudonymised and each interview became a case. 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*, following Fuller and Unwin's (2003) lead of recording interactions, then seeking to understand them in context. Billett (2009) also distinguishes between what is experienced, 'activities and interactions' and their quality. While most interactions took place in the context of *working together* and could be seen as collaboration, others reveal gaps in cooperation. Thus choosing interactions as the unit of analysis provided a more comprehensive picture.

Coding was inclusive and predominantly deductive, using codes established to identify the parties in an interaction. An inductive code, *missing collaboration*, was recognised to highlight elements of the collaboration that, like infrastructure, become visible when they break down (Star, 1999). The codes identifying interactions were:

- *All parties*: i.e., apprentices, university, and employers/ colleagues.
- *Apprentice and employer*: apprentices and colleagues/ mentor/ line manager, etc.
- *Apprentice and university*: apprentices and university staff (teaching and support).
- *Employer and university*: employer/ mentor and university staff.
- *Among apprentices*: among apprentices.
- *Missing collaboration*: a required element is missing from an interaction.

Once the data was coded, the framework matrix was charted by summarising the coded data, by category, from each transcript and adding example quotes (Gale *et al*., 2013, p.5). To promote validity: drafts of the framework matrix were discussed iteratively with the research team; two pairs of interviews were independently coded and charted by other researchers; matrix rows were revised accordingly.

The findings presented below reflect the patterns found in the framework contents, informed by Fuller and Unwin's work on work-based learning, specifically their model of expansive learning environments (2003, 2004). This investigation of the lived experiences and reflections of the apprentices at the centre of the degree apprenticeship, aims to inform effective 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 levels of workplace responsibility and degree subject. Previous research had revealed the importance of the apprentices' very different contexts on their perceptions of the degree apprenticeship (Fabian *et al.*, 2021; cf. Illeris, 2004), so heterogeneous experience of the collaborations are expected.

Hearing from the same interviewees four years later, consistent personalities come through in their approaches to engaging with learning. Life events taking place between the interviews also influenced the apprentices' engagement over time. The second interviews took place during the Covid-19 pandemic, when university activities had been online for over a year and most of the apprentices were working from home. Many had experienced a huge increase 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. Others had faced redundancy when their jobs were threatened by precipitous drops in custom, including one apprentice who had to find a new employer. Meanwhile, home-working conditions varied widely.

The findings with discussion below are presented according to the collaboration parties. As the data comes from interviews with apprentices, interactions are seen from their perspective, so it is a situated, rather than comprehensive view. Their narratives place apprentices at the centre of the collaboration. Where the collaboration experiences are relevant to relatively few participants, this is indicated below using qualifiers such as 'occasionally' or 'few'.

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 or tutorials, 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.' Many apprentices shared examples of applying 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.' Longitudinally, 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. All apprentices struggled at times to balance the workload and the rest of their lives. Steven loved his work and enjoyed learning, but commented in fourth year: 'So the whole work/life balance I think is wrong…It feels when we do finish this [degree], in a way it will be a relief so you can get your life back together again.' Some 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, 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. It helped to have a strong integration between the apprentices' studies and their day-to-day work, especially for their applied project in final year. Apprentices whose project was not part of their 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 benefited where apprentices applied best practice to the project and savvy line managers and mentors helped to choose projects beneficial to 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.' Managers and mentors' active involvement in the fourth year applied project was helpful to both the apprentice and potentially their organisation. In this context, disengaged mentors could hamper academic achievement (Reeve and Gallacher, 2005).

The links between apprentices' study and work require ongoing collaboration between employers and universities around the curriculum (Brennan *et al.*, 2006); lecturers, work colleagues, and other apprentices helped by contextualising theoretical concepts to actual work contexts. A few apprentices also benefited from opportunities to vary their roles to

align with their studies (Mikkonen *et al*., 2017). Fuller and Unwin advocate the related expansive characteristic: 'Breadth: access to learning fostered by cross-company experiences' (2004, p.7). Professional practice activities, such as learning agreements and reflective diaries, also have potential to surface this integration. Focusing on collaboration emphasises the agency and responsibility of all parties in supporting this integration.

Apprentice 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 lead this 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 first year. Becky's colleague stayed late after work to help her: '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 consulted colleagues across the organisation: '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 final year projects. However, a few missed this opportunity. 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.' 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. Hugh started his project independently, between being made redundant in the pandemic and starting a new job, meaning the project was 'not tied to any work objectives, work projects and I'm doing it in my own time not on work time.' Notably, in first year, some interviewees had not been assigned a workplace mentor at all.

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. Several studies (including Barnett, 2018; Wallin *et al*. 2019) emphasise the need for learner autonomy; however, apprentices were not always able to ring-fence time for work-based learning projects. This finding surfaces a hierarchy of employer demands above both apprentice autonomy and activities which gain academic credit. Most apprentices interviewed in this study felt that it would be 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 (discussed below), which are important to their wellbeing, studies, and careers.

Apprentice 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 learning environments (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 in the first two cohorts 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. […]. 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 lunches for apprentices and their lecturers, at which, Laura noted: '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... actually having some contact, I think, adds to feeling part of the university.'

The missing collaboration 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. This lack of understanding resulted in 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 needed to schedule their university work carefully. 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.' Longitudinally, these problems became less common, as university staff became more familiar with the apprentices' needs and constraints. Though problems still occurred, disappointing Paul in fourth year: 'you're speaking to lecturers and they don't understand your situation in that you're doing a full-time job and you can't just drop to meet their criteria in the same way that undergraduates will.'

Employer and university

According to the interview data, there were few interactions between the university and employers that did not involve the apprentices too. These interactions were mostly out of the view of the apprentices. A few apprentices mentioned collaboration between the employer and university around recruitment. University staff had helped potential employers identify suitable candidates, from their existing workforce or by advertising new posts. This is a noticeable shift: from universities recruiting students to employers recruiting or identifying potential apprentices. One apprentice also mentioned the training session the university provided for mentors.

The missing collaboration coding highlighted a couple of early mistakes where university staff had emailed employers without copying in the apprentices. This was a kind of 'bounded communication' (Fuller and Unwin, 2004) between two of the parties, rather than across the collaboration.

Among apprentices

Peer collaboration among the apprentices was the strongest theme to emerge from 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. Generally, apprentices stuck together and supported each other. 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, 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'd say that the others are the thing that got me through it.' These informal peer collaborations can also provide a kind of non-hierarchical, 'symmetrical instruction' (Tanggaard, 2005), which may also support critical attitudes to workplace or university practices.

The apprentices could also 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 work process, the apprentices shared how it was done in practice. This sharing could also be useful to their careers and organisations. 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 group's computing apprenticeship programmes, with one on-campus day every week for the first two years, is one of many models in use. Most 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. The apprentices were clear that this was problematic for them, and a missed opportunity for deeper collaboration. As noted by Becky, online learning further reduced the apprentices contact with each other.

Missing collaboration

The missing collaboration theme highlights elements where the interaction was lacking or ineffective, according to the apprentices' narratives. 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 final year projects. Across the interview data, from the perspectives of the apprentices, two significant weaknesses of the programme emerged: the reduction in contact time and the professional practice modules, which few apprentices experienced as helping to further the alignment of work and study.

The move from one university day per week in first and second year to one contact day per month in third and fourth year presumed the apprentices would be able to find an average of one study day per week and was designed to give apprentices and their employers more control over their time. In first year, Lewis noted that the absence of apprentices on their university day could be challenging for their colleagues in smaller companies: 'It does have a strain on them, for that one day, because the workload fluctuates immensely here.' However, compounded by the pandemic, the move to one day per month in third year was particularly difficult 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. Jack struggled to ring-fence his study time while taking on a new role and working from home: '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.' Zoe's workload expanded considerably during the pandemic and she struggled to attend online lectures, let alone find study days: 'Because work has been so crazy, it's been crazy trying to fit it all in. Whereas first and second year, you were forced — not forced, allowed — to go to uni one day a week and actually get out of the office. With third and fourth year I've not been to a lot of lectures, especially in fourth year, just simply because it's been too busy at work to just leave for a day.' Fuller and Unwin's framework underscores the importance of time away from the workplace for learning and reflection (2004).

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. These activities included reflective logs completed by the apprentice and learning agreements signed-off in meetings between each apprentice, their workplace mentor, and university tutor (For a discussion of such reflection see Rausch, 2014). In the first year, while one or two apprentices found value in the reflective log 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... I would forget for weeks on end and then you'd be sitting writing up six weeks work in one go.' For most, this struggle continued. Martin was direct: '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 what felt like negative situations and actually finding a lot of positives.' By fourth year, Aidan was evangelical about the benefits of writing reflective journals, persuading his colleagues to take up the practice: 'I just absolutely sang the praises of those and I think a couple of the developers started doing it: an hour in the afternoon on a Friday just noting down what they'd achieved that week and what they found difficult and just helping to orient themselves.' The data revealed a more varied picture of attitudes towards reflective practice than found by Siriwardena *et al.* (2019). Bravenboer (2018) recounts how a financial institution measurably benefited from the reflective practices introduced by their partner university as part of a work-based learning partnership. There are clearly lessons to learn about how to enhance engagement in reflection, especially the role of each partner in supporting reflective practice. The apprentices' experience of the professional practice modules highlights the role of another partner in the collaboration: organisations that implement apprenticeship policy. This finding could usefully open a discussion among those who manage degree apprenticeships, the universities involved, and representatives of the employers and apprentices. It would be useful to identify how the professional practice modules could be better aligned with the interests of all parties, for example, what each currently contributes and how they benefit. These modules should also be at the heart of the knowledge-sharing dynamic between the apprentices' learning, the communities within the workplace, and the enterprise of the organisation (Illeris, 2004).

Table 1 revisits Fuller and Unwin's (2004) expansive –restrictive continuum allowing for a summary of the findings and associated discussion points. It shows the collaborators involved, the nature of their interactions, and alignment with expansive - restrictive themes. Observed examples of expansive (+) and restrictive (-) themes are shown.

Table 1: Interactions aligned to Fuller and Unwin's (2004) expansive learning environments (authors)

Collaborators	Interactions	Expansive - Restrictive theme
All parties	+ Apprentices share knowledge gained at work with university	+ Participation in multiple communities of practice inside and outside the workplace
	+ Apprentices share knowledge gained via university with work colleagues	+ Participation in multiple communities of practice inside and outside the workplace
	+ Apprentices get promoted at work due to additional knowledge gained from university	+ Vision of workplace learning: progression for career
	- Apprentices struggle to balance work and study	- Lack of organisational recognition of, and support for employees as learners
Apprentices and employers	+ Employers support integration between work and study, especially in applied project: + benefit to employer	+ Organisational recognition of, and support for employees as learners
	- No integration between work and study in applied project: - Harder for apprentice	- Lack of organisational recognition of, and support for employees as learners

Collaborators	Interactions	Expansive - Restrictive theme
	- lost opportunity for employer	
	+ Employers let apprentices use work time and space for study where possible/ necessary	+ Organisational recognition of, and support for employees as learners
	+ Work colleagues help with university studies	+Technical skills valued + Participation in multiple communities of practice inside and outside the workplace
Apprentices and university staff	+ Apprentices supply feedback about the course	+ Cross-boundary communication encouraged
	+ University organise lunches to support communication	+ Cross-boundary communication encouraged
	- Lecturers forget apprentices' time constraints	- Narrow: access to learning restricted in terms of tasks/knowledge/location
Employer and university	+ University recruiting employers and employers identifying or recruiting apprentices	+ Access to range of qualifications including knowledge-based VQ
Among apprentices	+ friendship and support, especially around coursework	+ Participation in multiple communities of practice inside and outside the workplace + Workforce development fosters opportunities to extend identity through boundary crossing
	+ bank of knowledge: share work expertise/ approach across organisations	+ Participation in multiple communities of practice inside and outside the workplace + Breadth: access to learning fostered by cross-company experiences
Missing collaboration	- Move to one day contact per month and pandemic move online: • apprentices miss face-to-face contact with each other • apprentices struggle to average one day per week study	+ Planned time off-the-job including for knowledge-based courses, and for reflection - (Years 3 and 4) Virtually all-on-job: limited opportunities for reflection - (Years 3 and 4) Narrow: access to learning restricted in terms of tasks/knowledge/location
	- Reflective diaries not well-implemented or understood by apprentices	- Limited reification of 'workplace curriculum' patchy access to reificatory aspects of practice
	+ Some apprentices understood and appreciated reflective diaries	+ Reification of 'workplace curriculum' highly developed (e.g. through documents, symbols,

Collaborators	Interactions	Expansive - Restrictive theme
		language, tools) and accessible to apprentices
	- University staff email employers without cc'ing apprentices.	- Bounded communication

Limitations

The influence of the pandemic is a limitation of this research. While the pandemic contexts of the apprentices are described above, the impacts on the other collaboration partners (employers and universities) are not considered here.

The nature of the collaborations may also be different outside of computing subjects. The specific context of the university department and its approach and also of the degree apprenticeship implementation in Scotland are also important factors.

Interviewees were all volunteers, so more likely to be engaged, though they were clearly keen to give feedback on both positive and negative aspects. Some collaborations may be missed as the study sought evidence of collaboration in previously collected interview data. Collaborations that would not be visible to the apprentices, including some collaborations between the employer and university, are also missing. In order to provide a more comprehensive picture, a study focusing on the collaboration between workplace mentors and universities is now underway. Case studies of different subject disciplines and different models of teaching and work-based learning would increase the generalisability of any conclusions.

Conclusions and recommendations

The findings of this longitudinal study can inform models of effective collaboration in work-based learning: identifying where the collaboration parties are effective participants and where they could do more to facilitate the apprentices' learning and realise deeper benefits from the programme. The findings highlight the importance to the apprentices of three key factors that affect work-based learning: (1) identifying meaningful links between their study and their day-to-day work; (2) active support from employers, in terms of flexibility and pro-active mentors; and (3) the collaboration between the apprentices themselves, including its facilitation by the university.

This longitudinal study also highlights some of the challenges faced by this collaboration over time: specifically, the difficulty for each party to ring-fence time for learning, as the apprentices become more skilled and valued employees with more responsibilities, even managing projects and teams. Figure 1 summarises the longitudinal developments described by the apprentices.
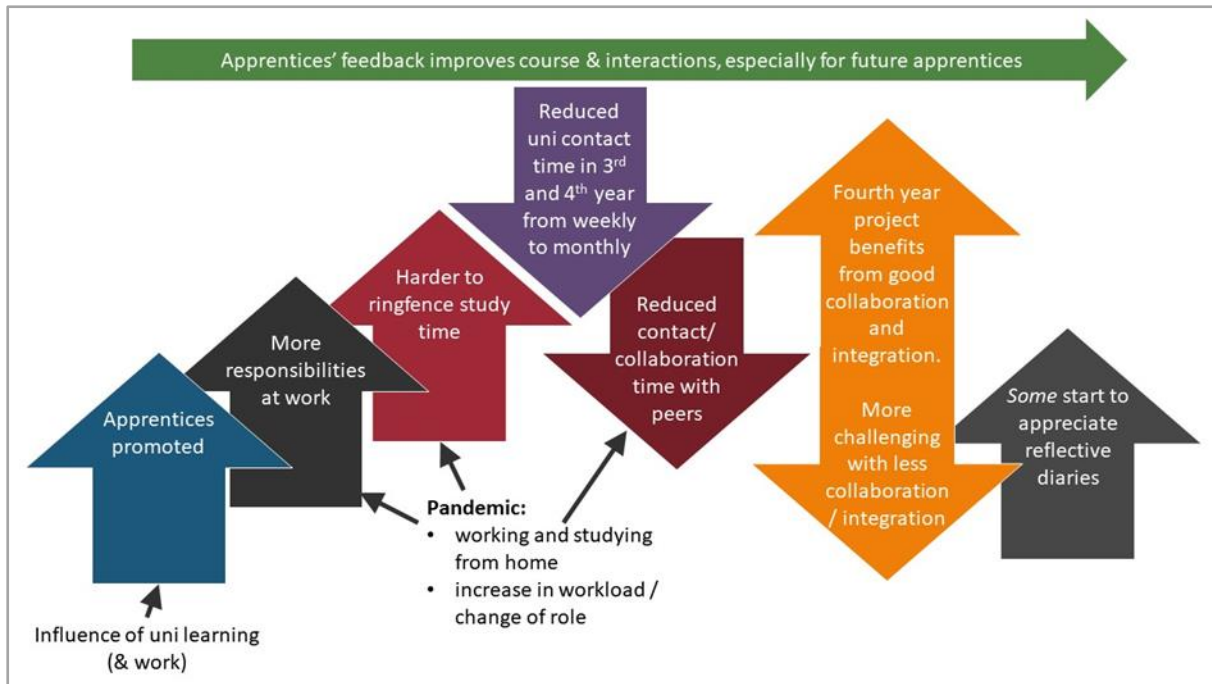
Figure 1: Summary of longitudinal changes from apprentices' perspective (Taylor-Smith)

As these opportunities are extended to more people, in more diverse contexts, this study gave a voice to the apprentices' experience, understood through the expansive - restrictive framework (Fuller and Unwin, 2004), to inform effective collaborations in future work practices, leading to the following recommendations:

- All parties to commit support to protecting time off-the-job for learning, including participation in communities of practice and reflection;
- Improved approaches to reflective practice to increase alignment between work and study;
- Formalising peer support, for example by hosting events to share and further reify outputs such as project presentations — social and technical environments for knowledge-sharing and teamworking (Illeris, 2004);
- Assessment processes should be apprentice-led where possible, overseen by academic staff with a deep understanding of the apprenticeship model.

This study has shown that all collaborators have roles to play in ensuring alignment of work with study to maximise the benefit of the apprenticeship, with employers and universities committing to creating the future workplace and study conditions, plus cross-boundary opportunities, for apprentices to succeed.

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