Barriers to effective higher and degree-level apprenticeships: a systematic literature review and future research agenda

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ABSTRACT

Purpose

The literature concerning higher- and degree-level apprenticeships (HDAs) in the post-levy era (2017-) is sparse and fragmented. Therefore, the purpose of this paper is to contribute to the international landscape of higher education work-based learning by identifying barriers to effective HDA programmes and outlining a future research agenda to address these.

Design/methodology/approach

This study employs a systematic literature review methodology to explore barriers in HDAs. Adhering to PRISMA 2020 guidelines, the review follows a three-stage process to develop the sample. A meticulously designed search strategy uses targeted queries on the SCOPUS database, focusing on terms related to HDAs and their challenges. Inclusion criteria is set to papers from 2017-2024, covering book chapters and peer-reviewed journals in the English language. Articles were cross-checked with the Chartered Association of Business Schools (CABS) database, which refines the total to 68 papers. Data from these sources is then extracted and tabulated for qualitative content analysis.

Findings

The systematic literature review of 68 manuscripts finds challenges are faced by apprentices, employers, and training providers alike. This includes, but is not limited to, ethnically correlated performance, stigma, careers advice, job design, mentoring practices, and the incorporation of technology. Two additional themes of pedagogy/andragogy and policy emerge.

Originality/value

Based on the analysis, the paper suggests an extensive portfolio of future research focused on collaborative practices. If addressed, this yields the power to influence future legislation and subsequent implementation.

KEYWORDS
Degree apprenticeship; higher apprenticeship; work-based learning; work-integrated learning; barriers; systematic literature review

Introduction

Higher and degree-level apprenticeships (HDAs) have the potential to disrupt traditional approaches to university study and significantly transform the role of universities and employers (Fabian *et al.,* 2022). The United Kingdom (UK) introduced HDAs in 2014, providing an equal opportunity for students preferring a non-traditional route to undertake undergraduate or postgraduate degrees (Mulkeen *et al.,* 2019). Apprentices are considered employees rather than students, and HDAs provide them an alternative entry route to many professional occupations including banking, business consultancy and solicitors among others (Casey *et al.*, 2024). Although the aim of HDAs is to boost UK industry productivity, challenges such as skills gaps and productivity lag were identified in 2015, informing the national improvement of apprenticeships (Hughes and Saieva, 2019). This led the UK government to introduce the Apprenticeship Levy in 2017, to increase the pressure on training providers, including higher education institutions (HEIs), to deliver sustainable HDAs and achieve 3 million apprentices by 2020 (Baker, 2019; Horackova *et al.,* 2024). The new introduction informs employers with an annual pay bill of more than £3 million to pay the levy at a rate of 0.5% of their annual pay bill each month (HM Revenue and Customs 2022). On the other hand, non-levy employers benefit from 95% funded apprenticeship training by the government (Department for Education, 2024).

Previous studies have attempted to investigate the barriers and challenges of HDAs. For example, Lillis and Varetto (2020) identified bureaucracy as a main challenge to the development of viable degree apprenticeships for regulated healthcare professionals in UK. On the other hand, the lack of customisation and consistent approach to work-integrated learning presents a challenge for the quality of curriculum design and pedagogy across HDA programmes (Lillis and Bravenboer, 2020). The involvement of professional bodies in police degree apprenticeships was identified as a barrier for evidence-based policing and the improvement of the professional practice (Pepper *et al.,* 2022). From an employer perspective, Rowle (2019) identified the need for employer-led curriculum design, the need for apprentice resilience building strategies, and the need for time and space for reflective practice as challenges to improve HDAs. On the other hand, the need for employer-led recruitment processes, the need for careful management of expectations, and the need for retention strategies were the challenges identified from a provider perspective (Rowe *et al.,* 2017). In the United States, curricular and instructional design elements were highlighted as major barriers to promote retention, completion, and career development of apprentices (Gallup, 2023).

Although previous literature advanced the knowledge on the challenges and barriers that hinder the development and sustainability of HDAs, these studies are fragmented and limited to a specific country or to the perspective of one of the stakeholders involved in the delivery and management of HDAs. Therefore, this review study aims to comprehensively investigate the multifaceted barriers and challenges that hinder the development, implementation, and effectiveness of HDAs. By synthesising the existing literature and drawing insights from diverse perspectives—including regulatory, educational, employer, and provider viewpoints—the study aims to identify and analyse the key barriers that impact the quality and sustainability of HDA programmes.

Our systematic literature review addresses the limitations of previous studies and considers the challenges and barriers of HDAs in different countries, including the perspective of employers, apprentices, and providers (Fabian *et al.,* 2022). This multi-stakeholder approach is critical and provides a more nuanced understanding of the HDA challenges and barriers after the introduction of the Apprenticeship Levy in 2017, outlining a future research agenda for academics, policy makers and practitioners to sustain the future success of HDAs (Horackova

et al., 2024; Mulkeen *et al.,* 2019). Our systemic literature review is organised as follows. First, we detail the methodology of the systematic literature review followed by the presentation of key findings. Finally, we provide suggestions and recommendations for future research.

Methodology

We employed a systematic literature review methodology for the following reasons. In the context of reviewing literature on employability, this approach is essential because the conceptualisation of barriers to HDA education remains inconclusive (Casey *et al.,* 2024; Fabian *et al.,* 2022) across the fields of business and education (Gallup, 2024). In addition, literature on graduate employability and career development has limited practical implications because it fails to address the challenges in HDA education (Felce, 2019; Pepper *et al.,* 2022).

This structured literature review methodology follows a systematic approach to identify, analyse, and synthesise the existing scholarly literature on the challenges and barriers in HDAs. We employed a three-stage process to develop the final sample for analysis, adhering to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines (Page *et al.,* 2021), as outlined below.

Development of search strategy

The literature search process was meticulously designed to ensure a comprehensive review of studies pertinent to the topic of apprenticeships, particularly focusing on higher or degree apprenticeships and the various challenges or barriers associated with them. The strategy employed a carefully formulated search string that served as a targeted query for SCOPUS database (Hart and Rodgers, 2023).

Initial search and data collection

The initial search was performed in SCOPUS database to ensure a comprehensive collection of data. The use of terms 'higher' and 'degree' alongside 'apprenticeship' aims to capture literature specifically dealing with advanced levels of apprenticeships, which are typically associated with higher education (HE) qualifications or involve a degree component. By incorporating 'barriers' or 'challenges' into the search string, the query was structured to specifically fetch studies that discuss the obstacles or difficulties faced within these apprenticeship programmes. This includes a range of issues from funding and access to quality training, to institutional and regulatory challenges.

Inclusion and exclusion criteria

To refine these results and improve relevance, the following inclusion and exclusion criteria were applied sequentially:

Date range: book chapters and journal articles published from 2017 to 2024 were included to align with significant reforms in the UK's apprenticeship system, which began in 2017 with the introduction of the Apprenticeship Levy and new standards aimed at enhancing the quality and structure of apprenticeships (Baker, 2019; Horackova *et al.,* 2024).

Reviewed and published journal articles: only book chapters and journal articles were considered to focus on peer-reviewed, scholarly work (Hart and Rodgers, 2023).

Language: The search was limited to articles published in English (Hart and Rodgers, 2023), which further refined the results to 118.

To ensure the quality and relevance of the sources, the journal articles amongst the remaining 118 results were cross-checked against the Chartered Association of Business Schools (CABS) database. This step was crucial for including only high-quality academic journals in the field of business and management studies. This verification process yielded 37 articles that matched the criteria. Of the total 31 book chapters and 37 articles, relevant data such as study objectives, methodologies, findings, and conclusions were extracted. This data was tabulated to facilitate qualitative content analysis.
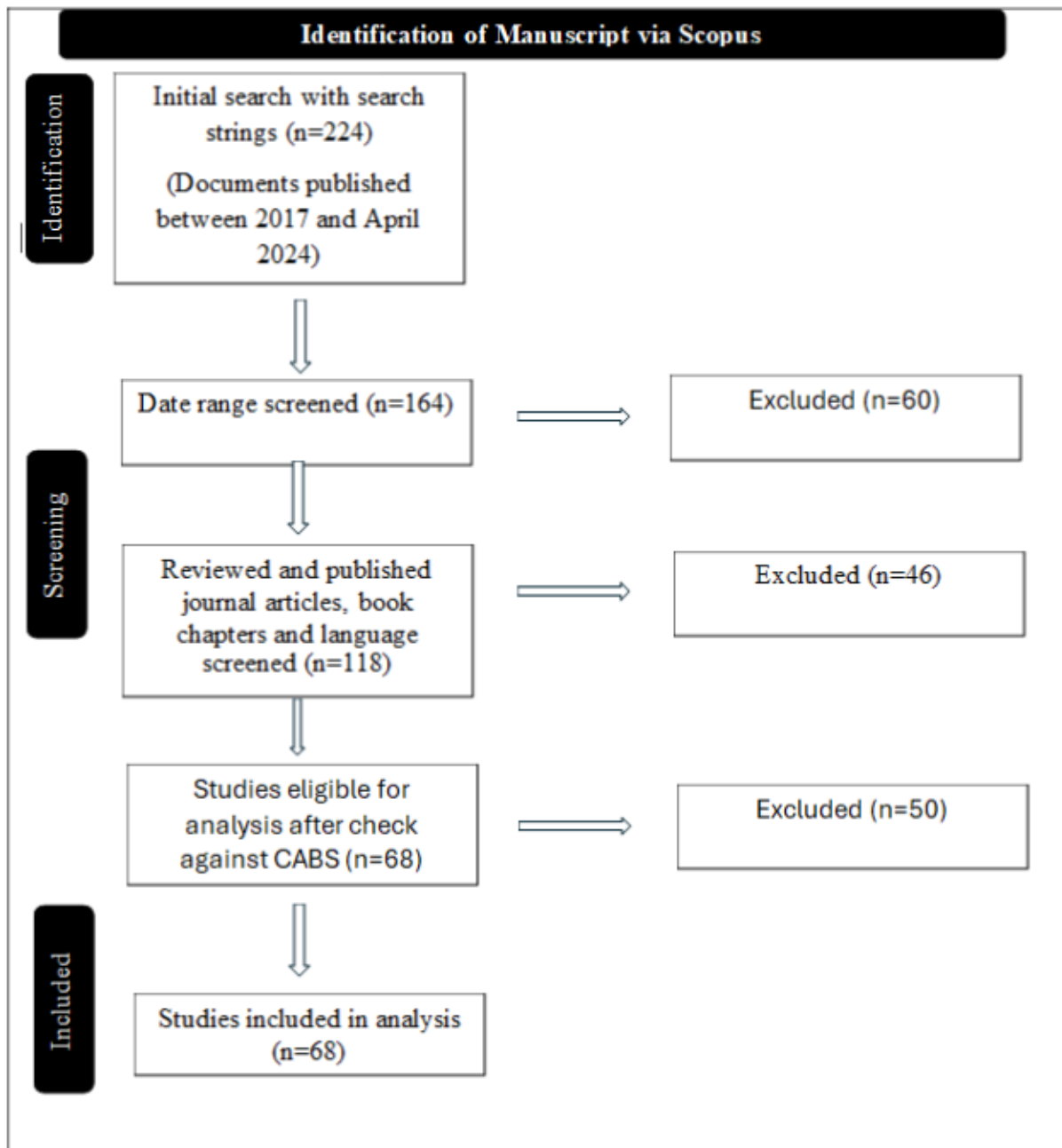
Search outcomes

Fig. 1. Systematic literature review protocols and results (adapted from Hart and Rodgers 2023)

The extracted data was then synthesised to identify common themes, gaps in the literature, and areas for future research. This synthesis involved comparing study outcomes, discussing discrepancies, and identifying overarching trends and challenges in the field of HDAs.

Limitations of the method

This systematic literature review presents certain limitations in the searching and screening process, which are common in this method (Donald *et al.,* 2024). Firstly, our search was conducted solely in Scopus and cross-checked against the CABS journal list. Secondly, our inclusion criteria restricted the scope to publications from 2017 to 2024, peer-reviewed journal articles, and book chapters published in English. Consequently, future studies might consider different time frames, research databases, search strings, and publication languages. Additionally, literature outside of peer-reviewed articles and book chapters, such as policy papers, which were beyond our search scope, may also be explored. Given the qualitative nature of most of the studies and book chapters that were included in this systematic literature review, statistical tests to identify any asymmetry in the data and publication bias have not been performed. Thus, future researchers may perform a meta-analysis to validate our findings, reducing the impact of publication bias.

Despite these limitations, the criteria we adopted adhered to the guidelines of systematic literature reviews (Page *et al.,* 2021), ensuring that our methodological approach is both replicable and consistent (Hart and Rodgers, 2023).

Articles per year

Figure 2 represents the number of journal articles and book chapters included in the review per year. 2022 has the highest frequency of journal articles and book chapters, representing 11.76% and 14.7% of the total sample respectively. Overall, the distribution shows a broad spread across the years, with 2019, 2020, and 2022 dominating the dataset, while other years have significantly fewer occurrences.
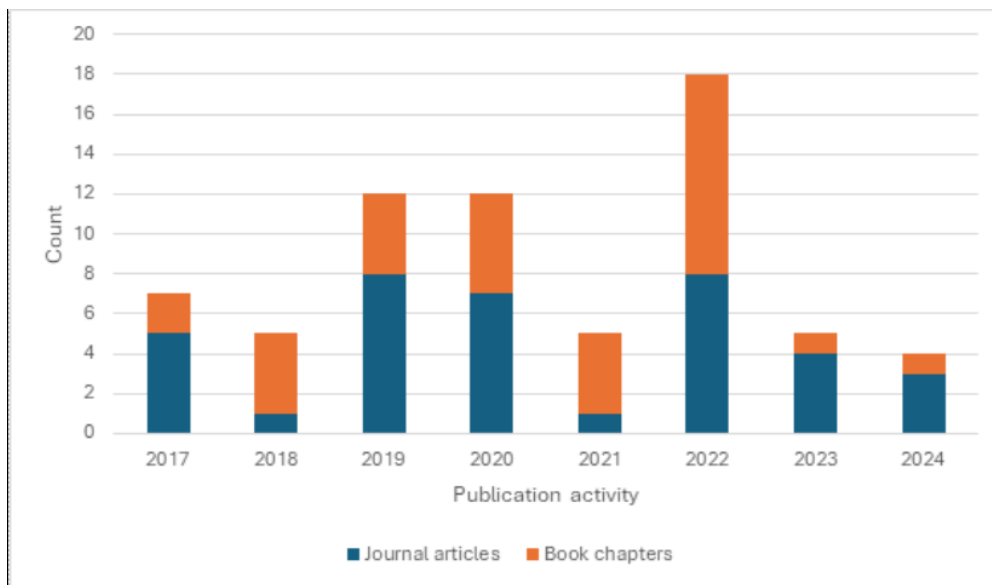

Fig. 2. Number of articles and chapters published per year

Geographical distribution

Figure 3 outlines the number of research articles based on the location of the study. This highlights the largest amount of activity being focused upon the UK context. USA was the second-highest country of reference, after incorporating book chapters. All other countries are limited to less than 2% of the sample size. It is noted that, even in the UK, which produces an approximately 50% of research on this area, effort to identify barriers and challenges associated with higher- and degree-level apprenticeships is low. It is reasonable to argue that the subject matter requires further investigation in both a UK and international context.
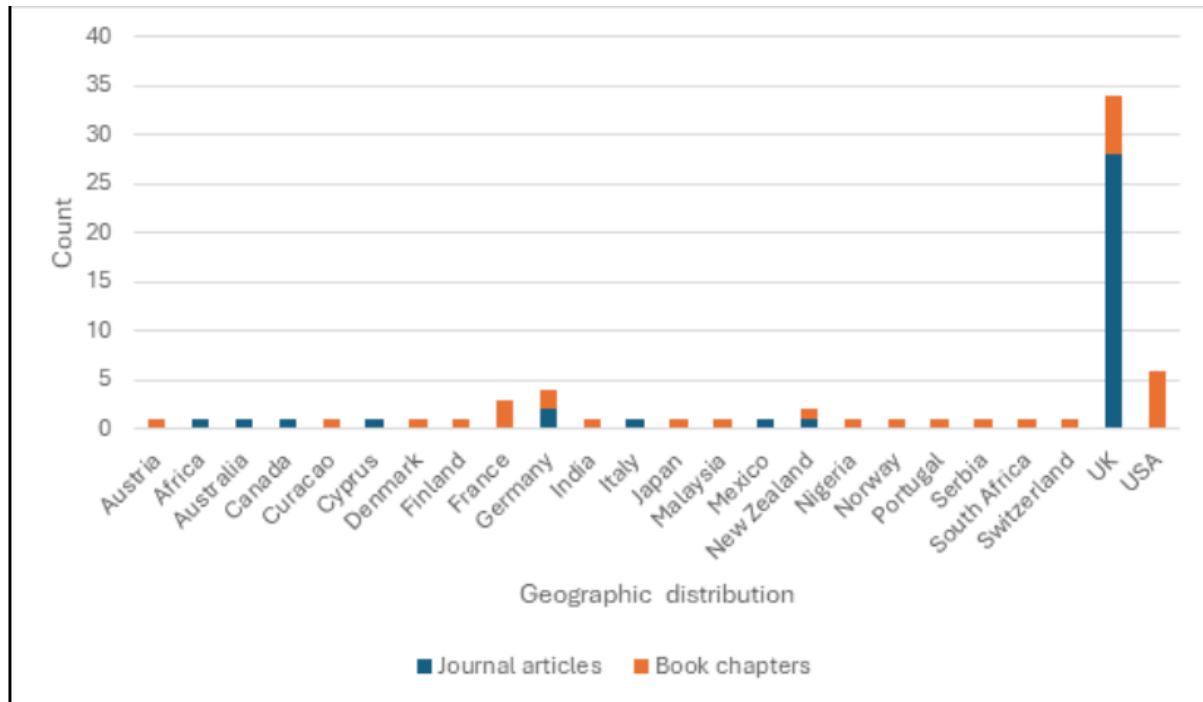
Fig. 3. Geographical distribution

Methodological distribution

Table 1 shows the breakdown of the research methods deployed amongst the records. Desk research accounts for 38.24% of the corpus, much of this book chapters, while case studies make up 25%. This distribution indicates a significant preference for qualitative research methods. The low quantitative focus meant it was not possible to apply statistical testing for publication bias, for example, a funnel plot, due to limited provision of precise sample sizes, therefore no treatment effect (Drucker et al., 2016).

Table 1. Distribution by research methods

Research Methods	Frequency (Journal)	Frequency (Chapter)	Percent
Desk Research	6	20	38.24
Case study	7	10	25.00
Unstructured Interviews	8	0	11.76
Mixed method	3	1	5.88
Survey	3	0	4.41
Opinion piece	3	0	4.41
Action research	2	0	2.94
Focus groups	2	0	2.94
Semi-structured Interviews	2	0	2.94
Secondary data	1	0	1.47
Total	37	31	100

Publication distribution

According to the findings in Table 2, the systematic literature review reveals a diverse range of journals contributing to the study, with 'Higher Education, Skills, and Work-Based Learning' being the most frequently cited, comprising 40.5% of the corpus. This is followed by both the 'Journal of Work-Applied Management' and 'Studies in Higher Education,' each accounting for 10.8%. Other journals, such as the 'Journal of Education and Work' and the 'Journal of Vocational Education and Training,' each contribute 5.4%. This distribution underscores the predominant focus on HE and work-based learning while also incorporating insights from a wide array of fields, reflecting the interdisciplinary nature of the research.

Table 2. Distribution by journals

Journal	Frequency	Percent
Higher Education, Skills, and Work Based Learning	15	40.5
Journal of Work-Applied Management	4	10.8
Studies in Higher Education	4	10.8
Journal of Education and Work	2	5.4
Journal of Vocational Education and Training	2	5.4
Action Learning: Research and Practice	1	2.7
British Journal of Health Care Management	1	2.7
Expert Systems with Applications	1	2.7
International Journal for Research in Vocational Education and Training	1	2.7
International Journal of Training and Development	1	2.7
Journal of Hospitality and Tourism Education	1	2.7
Journal of International Business Education	1	2.7
Journal of Management History	1	2.7
Local Economy	1	2.7
Policing (Oxford)	1	2.7
Total	37	100

Themes of research

Themes of research were identified based on the sources of barriers. The findings in Table 3 highlight key sources of barriers in apprenticeship education. Policy-related challenges are the most prevalent, representing 25% of the total identified sample, encompassing issues such as consistency in delivery and assessment, and strategies that contribute to quality assurance (Hanney and Karagic, 2019). Pedagogical and andragogical issues constitute 22.06% of the challenges, particularly in programme design, which requires commitment from all partners involved (Irons, 2017). Employer and provider challenges are equally distributed, each comprising 19.12% of the total. This consists of challenges such as embedding on-the-job learning within the design of the academic programme, establishing explicit links between theoretical learning and practical application in the working environment, and budget allocation (Minton and Lowe, 2019); in addition to provider involvement in the quality assurance of HDAs and apprentices meeting learning outcomes within limited learning hours (Felce, 2019). This distribution, therefore, indicates that policy is the most significant obstacle.

Table 3. Findings of themes of research

Source of Barriers	Frequency (articles)	Frequency (chapters)	Percent
Policy	8	9	25.00
Pedagogy/andragogy	7	8	22.06
Employer challenges	10	3	19.12
Provider challenges	6	7	19.12
Apprentice challenges	6	4	14.71
Total	37	31	100

Discussion

The systematic literature search concluded 68 papers which related to 5 main themes – apprentice challenges (10 records), employer challenges (13 records), pedagogy or andragogy (15 records), policy (17 records), and provider challenges (13 records).

Apprentice barriers

The analysis found that existing literature focused upon equity, diversity, and inclusion (EDI) and strain. In the case of EDI, socio-economic factors such as economic status, educational status, age, and family structure link to parents' attitudes toward their children's academic performance (Jafari and Imran, 2024; Riley, 2021). In some cases, it was found that Muslim parents play a role in determining the success of their daughter's HE (Chowdhury *et al.,* 2024). In particular, Mutlib (2020) highlights a tendency for British Asian families to focus upon the traditional university route rather than an apprenticeship career path, particularly if the opportunity is with a technical school (Colombari and Neirotti, 2022). Additionally, they find a lack of effective careers information, advice, and guidance (CIAG) to tackle such stigma (Jorgensen, 2018).

Meanwhile in Canada, Beaudry and Perry (2023) and Boehler (2017) suggest indigenous learners from low-income inner-city neighbourhoods' face barriers to education and employment. As an apprenticeship requires both work and study, this means apprentices are particularly impacted. Additionally, they state the apprenticeship market is orientated towards the non-indigenous, preventing significant uptake amongst the indigenous population. In elite graduate professions, some employers widely communicate their attempts to address social mobility using the vehicle of HDAs. However, the meritocracy remains (Casey *et al.,* 2024). Like Mutlib (2020), they refer to the ineffectiveness of the current CIAG regime, stating it is often geared towards the employer's interest rather than the apprentice's. This means apprentices can be misinformed before they start (Bullough, 2019).

Of those individuals that do start an apprenticeship, this analysis found that apprentices could be categorised in two groups: people entering work for the first time ('recruited' apprentices), and adults already in work ('upskill' apprentices). The former group are the true target of HDAs, but the latter make up the majority - vastly experienced individuals who find limited benefits from some of the teaching (Smith, 2023). Upskill apprentices often find their workload has not been reduced to allow for the requirement to undertake 20% of their working hours as off-the-job training (OTJT). Subsequently, they find the requirement 'impossible' to commit to, meaning they experience strain and prioritise work over study (Poole *et al.,* 2023).

Recruited apprentices also experience strain, but for varied reasons. This can be due to low salary, a lack of permanent employment opportunities, and poor mentor-mentee fit meaning a lack of support (Fabian *et al.,* 2022). This is further explored in 'employer challenges.' Strain can also be experienced due to being ill-prepared for the level of study, as Level 2 apprenticeships and T-Levels fail to prepare apprentices for the step up to HDA (Crawford-Lee and Wall, 2018).

Employer barriers

The analysis found that employer barriers tend to surround a disconnect between industry and academia (Watkinson-Miley *et al.,* 2022). A lack of employer collaboration with training providers results in ineffective design of an apprentice's job role (Jacob *et al.*, 2023; Riley, 2021), with some roles being described as 'dubious' (Crawford-Lee and Wall, 2018). In other words, apprentice roles can be oversimplified to prevent cognitive overload, meaning the apprentice's colleagues are left to pick up the slack by making up the productivity shortfall (Miller and Morris, 2020).

A key stakeholder from an employer perspective is the apprentice's workplace mentor (Ait Razouk and Herveou, 2020). Upon starting, an apprentice should be allocated a mentor, often their line manager. The success of mentor intervention can be impacted by several factors, including time and active involvement in the process (Riley, 2021). Minton and Lowe (2019) found that a lack of understanding about the apprenticeship requirements hinders the mentor's active involvement. The mentor rarely has clarity surrounding what their role is beyond mandated tripartite reviews, which typically feature poor commitment and co-ordination (Taylor and Flaherty, 2020). Alongside the employer, the mentor may not have input on the design of the programme upon which their apprentice is enrolled (Quew-Jones and Rowe, 2022). The absence of employer-led curriculum design is a missed opportunity to embed apprentice resilience building strategies, and time and space for reflective practice (Rowe, 2019). Employer-led curriculum design requires buy-in from senior leaders; a culture change towards a learning organisation (Leek, 2020).

Furthermore, there is a lack of collaboration between employers and trailblazer groups who are formed to develop apprenticeship standards (Watkinson-Miley *et al.,* 2022). This results in a lack of relevant apprenticeship standards for apprentices to enrol on and progress

to, which is a contributing factor to levy funds not being fully spent (Hanney and Karagic, 2019). This means apprenticeships are failing to address skills shortages in sectors such as tourism (Guden *et al.,* 2024).

Pedagogy and andragogy

A key apprenticeship pedagogy is the Cognitive Apprenticeship Model (CAM) - an interactive and learner-centric framework promoting active engagement and autonomy (Ostovar-Namaghi *et al.,* 2024), which focuses on linking theory to practice (Williams *et al.,* 2024; Mackay and Cadzow, 2022; Spencer *et al.*, 2022; Ahmad *et al.*, 2022; Parojcic, 2019). Although deployed successfully at Level 2-4, HDAs often fail to align to the principles of the CAM, of which, a key feature is reflection (Colombari and Neirotti, 2022). HDAs experience a lack of focus on, and uptake of reflective activity (Jones and Brook, 2019). This is noted at an individual and group level, as there is a lack of collective, facilitated reflection too (Rowe *et al.,* 2020).

Deployment of the CAM requires appropriate resources. The analysis found that different providers have varied levels of facilities to aid teaching. In some cases, there is a lack of state-of-the-art facilities for challenge-based programmes (Colombari and Neirotti, 2022). In other cases where the facilities are good, Technology-Enhanced Learning (TEL) and Ubiquitous Learning (u-learning) pedagogies can be ineffective. For example, Virtual Reality (VR) can trigger stressful stimuli and high cognitive load (Cardenas-Robledo and Pena-Ayala, 2019).

A symptom of limited resources are workload capacity issues (Irons, 2017). Such issues mean emphasis on a day release model which prevents programme customisation (Lillis and Bravenboer, 2020). Customisation refers to flexible start and submission dates (Rowe *et al.,* 2020). This means, as the HDA market grows, class sizes continue to rise (Colombari and Neirotti, 2022). A lack of flexibility can also be seen in End-Point Assessment Organisations (EPAOs). Flexible assessment policies put into place by EPAOs during the COVID-19 pandemic remain in place to-date, suggesting a lengthy process to return to business-as-usual. Furthermore, EPAOs, some of whom are professional bodies, do not provide enough input into advised teaching practices (Pepper *et al.,* 2022).

Policy

The policy landscape for HDAs is regularly changing and complex (Stalder and Luthi, 2022), since it is subject to HE *and* apprenticeship legislation. Far from being an environment which allows for regulatory innovation (McCann and Stewart, 2024; Tormala-Nita, 2018), it is one which features tension between policymakers and providers (Cheng *et al.,* 2023). Such tensions include policy resulting in disabled HE students being at risk of withdrawal and low outcomes (Shaw, 2021). Combined with rising concerns in the wider HE context such as the application of Artificial Intelligence (AI) (Essien *et al.,* 2024), it is a challenging time to operate HDAs.

This challenging policy environment is difficult for stakeholders to navigate. Frequent political changes mean HDA policy is volatile, uncertain, and complex (Crawford-Lee and Wall, 2018). A feature of this complexity is excessive regulatory terminology and overcomplicated reporting procedures (Taylor and Flaherty, 2020). HDAs can, therefore, be unattractive to any party which must understand and navigate this (Smith, 2023). Of those that do navigate it due to necessity, the dynamics of agency theory may provide some explanation as to how parties coexist as actors (Muldoon *et al.,* 2024).

In some ways, policy is over-restrictive. For example, policy prevents the modularisation of HDA programmes, such as specialist pathways (Li and Pilz, 2017). In some ways, it is under-restrictive. For example, there is a lack of prescribed process for Recognition

of Prior Learning (RPL) (Ansart and Sanseau, 2020). This means apprentices experience inconsistency when their existing qualifications and experience are put forward for advanced standing (Bravenboer *et al.,* 2024). In other ways, policy is unnecessary. This can be seen with End-Point Assessment, which there is no pedagogic need for, and is a bureaucracy to justify regulatory body existence (Lillis and Varetto, 2020).

The bureaucracy results in an overly mechanistic view by policymakers, which stifles innovation and growth (Henrekson and Stenkula, 2024). This results in limited trust in legislation and a missed opportunity for policymakers to engage in direct communication with stakeholders (Xanthaki, 2024; Kim, 2021). This means there is limited bottom-up influence to shape policy (Fassbender, 2022).

Provider barriers

The analysis revealed provider challenges focused upon funding, capacity, and quality. In the case of funding, HDAs are inefficient to deliver in their current state (Irons, 2017). This can be due to carrying out activities which are ineligible for funding. This includes recruitment, which providers cannot be compensated for but are often expected to do by employers (Rowe *et al.,* 2017), especially non-levy-paying SMEs (Riley, 2021). Central services functions which provide support to apprentices and employers are also ineligible for funding (Hughes and Saieva, 2019). Funding challenges are, however, disputed, with HEIs accused of benefitting from 'huge sums' generated by apprenticeships, which they do not profit-share with other stakeholders (Mulkeen *et al.,* 2017).

In relation to capacity, this issue is triggered by HDAs having varied attendance patterns. This often means lecturers duplicating delivery, resulting in being over-capacity (Irons, 2017). As the workload increases, quality decreases. Current over-reliance on standard HE quality structures is not appropriate (Felce, 2019). The failings of the current quality regime are evident in findings that it contributes to ethnically correlated apprentice performance, with white apprentices performing better overall (Saville *et al.,* 2019). This can be due to a lack of appropriate retention and support strategies (Rowe *et al.,* 2017).

Such failings are due to HEIs being new to the apprenticeship quality regime. A regime which Further Education (FE) has mastered (Felce, 2019). Issues such as a lack of links to professional body qualifications and lack of credit mapping systems for such qualifications, are those which could be solved by liaising with experienced FE colleges (Mulkeen *et al.,* 2017). A barrier preventing this from happening is the assumption that designing new quality mechanisms is a low priority (Irons, 2017).

Future research agenda

The systematic literature review highlights the fragmented nature of HDA literature, and a need for a portfolio of research aimed at addressing barriers identified. The portfolio is set out below.

Apprentice Barriers

Further research is needed to explore how parental influences vary across diverse cultural backgrounds and the impact of this on HDA uptake (Chowdhury *et al.,* 2024; Colombari and Neirotti, 2022). More research is required to understand indigenous barriers in regions such as Canada (Beaudry and Perry, 2023), and to develop tailored interventions that can support indigenous populations globally. The intersection of socio-economic status, education, and family structure on HDA success has been touched upon (Jafari and Imran, 2024; Riley, 2021), but detailed longitudinal studies are necessary to understand these dynamics over time.

Furthermore, the role of CIAG needs to be explored through two lenses. Firstly, how mechanisms can be deployed to tackle stigma surrounding HDA routes (Mutlib, 2020). Secondly, the extent to which CIAG is influenced by employer interests (Casey *et al.*, 2024). There is also a need to understand the differences between challenges faced by 'recruited' apprentices and 'upskill' apprentices (Smith, 2023) and struggles to undertake OTJT. Development and testing of interventions to balance work and study commitments can be undertaken (Poole *et al.*, 2023), including how to prepare apprentices for the step-up (Crawford-Lee and Wall, 2018). In the case of recruited apprentices, further research should explore the long-term career trajectories of HDAs, and the effectiveness of policies aimed at improving their financial stability (Fabian *et al.*, 2022),

Employer barriers

Research should focus on successful models of industry-academia partnerships and how case studies with senior leadership buy-in (Leek, 2020) correspond to HDA quality and outcomes (Watkinson-Miley *et al.*, 2022; Riley, 2021; Crawford-Lee and Wall, 2018). Furthermore, there is a need for an evaluation of mentor training programmes, their implementation, and their effect on HDA cognitive load, performance, and satisfaction (Miller and Morris, 2020). There is a need to understand the reflective value of tripartite review meetings, which are mandated by legislation, and how the mentor and training provider representative help build the apprentice's resilience whilst maintaining commitment and motivation (Quew-Jones and Rowe, 2022; Taylor and Flaherty, 2020; Minton and Lowe, 2019; Rowe, 2019). Future research should also explore the relationship between employer collaboration with trailblazer groups to develop and update apprenticeship standards (Watkinson-Miley *et al.*, 2022). Understanding the barriers to trailblazer entry can help ensure effective standards which address skill shortages (Guden *et al.*, 2024), which in turn, can help reduce unspent levy funds (Hanney and Karagic, 2019).

Pedagogy and andragogy

A striking limitation of current HDA research surrounding or incorporating pedagogy is the lack of cross-institutional data. A starting point for future research could be exploration of rising class sizes (Colombari and Neirotti, 2022), workload capacity issues resulting from limited resources (Irons, 2017), and a lack of programme flexibility due to emphasis on the traditional day-release model (Lillis and Bravenboer, 2020), to understand whether this is isolated to *some* providers, or an industry-wide issue which requires policy adjustment. A range of studies surrounding CAM should be undertaken. Not enough is known about CAM alignment with HDAs (Ostover-Namaghi *et al.*, 2024; Colombari and Neirotti, 2022), particularly surrounding embedding of collective reflection (Rowe *et al.*, 2020; Jones and Brook, 2019). CAM studies should also cover TEL and U-Learning strategies, such as VR impact on cognitive load (Cardenas-Robledo and Pena-Ayala, 2019). Data from a range of institutions with varied levels of resources could highlight the impact of variance in provider facilities, such as whether state-of-the-art equipment correlates to improved satisfaction and real-world impact (Williams *et al.*, 2024; Colombari and Neirotti, 2022). As HE evolves with the concept of flexible and 'stackable' degrees (El Galad *et al.*, 2024), an understanding of how HDAs can achieve customisation and flexibility, for example, varied start and submission dates (Rowe *et al.*, 2020; Lillis and Bravenboer, 2020) is needed. This goes beyond cross-institutional borders and will require the input of EPAOs, as professional bodies, to provide sufficient advice regarding teaching practices, particularly given their experiences of implementing flexible assessment policies during the COVID-19 pandemic (Pepper *et al.*, 2022).

Policy

Future research should explore regulatory impact on innovation (McCann and Stewart, 2024), for example, modularisation (Li and Pilz, 2017). It should investigate prescribed RPL processes (or lack of), to establish a standardised RPL framework (Bravenboer *et al.,* 2024). The application of AI and concerns surrounding its use (Essien *et al.,* 2024) could also be explored. A significant future research undertaking suggested by this paper is that which seeks to understand how policy is implemented by providers. Understanding how frontline staff feel about policy, i.e., impact of tension between regulation and institutions (Cheng et al., 2023), excessive regulatory terminology, and overcomplicated reporting procedures (Taylor and Flaherty, 2020). This will answer how severely frontline staff view policy as bureaucracy (Henrekson and Stenkula, 2024; Lillis and Varetto, 2020), how much trust they have in legislators (Xanthaki, 2024), and how much bottom-up influence they perceive themselves to have (Fassbender, 2022). In turn, this can act as a case study exploring the dynamics of principle-agent relationships between policymakers, organisations, and frontline staff (Muldoon *et al.,* 2024).

Provider barriers

A reason for current funding inefficiency is due to training providers conducting activities ineligible for funding (Irons, 2017). However, it is not a simple fix to instruct providers to stop doing such activities. Instead, research must seek to understand *what* and *why.* For example, why do SMEs expect providers to carry out recruitment activities without compensation (Riley, 2021; Rowe *et al.,* 2017)? In addition to recruitment, central service functions are also in ineligible cost - understanding the extent to which they support apprentices can achieve policy recommendations regarding their inclusion as an eligible cost (Hughes and Saieva, 2019). Regarding quality regimes, there is an opportunity for action research which sees HEIs work with FE colleges, as knowledge partners (Macleish, 2021), to establish new quality management systems appropriate for HDAs (Felce, 2019; Mulkeen *et al.,* 2017). After a design and testing phase and subsequent implementation, longitudinal research can they be conducted to understand how the new quality regime ensures support strategies to reduce ethnically correlated HDA performance (Saville *et al.,* 2019; Rowe *et al.,* 2017).

Conclusion

This paper contributes to the international landscape of HE by raising awareness of the barriers preventing effective HDAs. Through a systematic literature review of 68 articles produced in the post-levy era, this paper achieves the identification of barriers faced by apprentices, employers, and training providers. This includes challenges relating to policy and pedagogical or andragogical approaches. An extensive future research agenda is presented, focused upon how collaboration between varied stakeholders can overcome stigma to ensure the HDA route is viewed as a reputable pathway for all, one which is achievable for people of diverse backgrounds. This also includes how employers and training providers work together to develop HDA roles and mentor interventions. Furthermore, how training providers work with a) professional bodies to implement pedagogies incorporating engaging emerging technology, and b) FE colleges to design appropriate quality management systems. This paper calls for academics and practitioners to come together to undertake the future research agenda, which can subsequently influence HDA legislation to reflect the wider HE challenge of flexibility,

including modularisation and stackable degrees, whilst also enhancing the relationship between policymakers and actors to achieve optimal implementation.

Reference List

Ahmad, B., Azmat, F., Colombo, A. and Veltink, G. (2022), "Teaching and learning ICPS: Lessons learned and best practices", in *Digitalization and Control of Industrial Cyber-Physical Systems: Concepts, Technologies and Applications*, Springer, Cham, pp. 297-312.

Ait Razouk, A. and Herveou, A. (2020), "Job quality: A challenge for the effectiveness of higher education apprenticeships", in *The Success of Apprenticeships: Views of Stakeholders on Training and Learning*, Routledge, London, pp. 235-241.

Ansart, S. and Sanseau, P. (2020), "Reflexivity and management apprenticeships", in *The Success of Apprenticeships: Views of Stakeholders on Training and Learning*, Routledge, London, pp. 59-65.

Baker, D. (2019), "Post-levy apprenticeships in the NHS – early findings," *Higher Education Skills and Work-Based Learning*, Vol. 9 No. 2, pp. 189–199.

Beaudry, J. and Perry, A. (2023), "Levelling up: towards decolonising apprenticeship learning," *Journal of Vocational Education and Training*, Vol. 75 No. 2, pp. 219–237.

Boehler, D. (2017), "Supporting vulnerable youth – Austria's active policy of education and work integration with young people at risk", in *The Shifting Global World of Youth and Education*, Springer, Cham, pp. 149-160.

Bravenboer, D.W., Crawford-Lee, M. and Dunn, C. (2024), "Can you credit it? Towards a process for ascribing credit to apprenticeships in England," *Higher Education Skills and Work-Based Learning*.

Bullough, B. (2019), "Barriers to the nurse practitioner movement: Problems of women in a woman's field", in *Organization of Health Workers and Labor Conflict*, Springer, Cham, pp. 127-135.

Campbell, J. and Gillespie, M. (2017), "Gender analysis of spending on the Scottish Modern Apprenticeship programme," *Local Economy*, Vol. 32 No. 5, pp. 420–432.

Cardenas-Robledo, L. and Pena-Ayala, A. (2019), "A holistic self-regulated learning model: A proposal and application in ubiquitous-learning," *Expert Systems with Applications*, Vol. 123 No. 1, pp. 299–314.

Casey, C., Mountford-Zimdars, A. and Hancock, S. (2024), "Player Purist Pragmatist: a comparison of employability strategies in access to the solicitors' profession via alternative degree pathways," *Studies in Higher Education*.

Cheng, Y., Yang, P., Lee, J., Waters, J. and Yeoh, B.S.A. (2023), "Migration governance and higher education during a pandemic: policy (mis)alignments and international postgraduate students' experiences in Singapore and the UK," *Journal of Ethnic and Migration Studies*, Vol. 50 No. 5, pp. 1138–1156.

Chowdhury, A., Mete, J.K., Tandon, M. et al. (2024), "Attitude of Muslim Parents Towards Girls Higher Education in India," *Journal of Higher Education Theory & Practice*, Vol. 24 No. 3, pp. 77–90.

Colombari, R. and Neirotti, P. (2022), "Closing the middle-skills gap widened by digitalisation: how technical universities can contribute through Challenge-Based Learning," *Studies in Higher Education*, Vol. 47 No. 8, pp. 1585–1600.

Correia, R., Hossein, S., Seuyoung, K., Arshad, A., Cheetu, S., Rahman, H. and Gravely, E. (2024), *"Challenges and Barriers to Success among Apprentices,"* available at: https://macsphere.mcmaster.ca/handle/11375/29539 (accessed 30 May 2024).

Crawford-Lee, M. and Wall, T. (2018), "Sustainability 2030: a policy perspective from the University Vocational Awards Council," *Higher Education Skills and Work-Based Learning*, Vol. 8 No. 3, pp. 233–242.

Goodman, D. and Kooner-Evans, P. (2024), "Tripartite Relationships Between Students, Employers, and the University: A Conversation About Degree Apprenticeships," *in MacKenzie, B. and Warwick, R. (Eds.), The Impact of a Regional Business School on its Communities, Humanism in Business Series*, Palgrave Macmillan, Cham.

De Villiers, R., Scott-Kennel, J. and Kirstein, M. (2022), "Developing Learning Spaces and Andragogues' Roles: The C-Star Framework of Large Class Engagement," *Journal of International Business Education*, Vol. 17 No. 1, pp. 59–90.

Department for Education (2024), *"Apprenticeship funding,"* available at: https://www.gov.uk/government/publications/apprenticeship-funding/apprenticeship-funding

Donald, W.E., Baruch, Y. and Ashleigh, M.J. (2024), "Construction and operationalisation of an Employability Capital Growth Model (ECGM) via a systematic literature review (2016–2022)," *Studies in Higher Education*, Vol. 49 No. 1, pp. 1–15.

El Galad, A., Betts, D. and Campbell, N. (2024), "Flexible learning dimensions in higher education: Aligning students' and educators' perspectives for more inclusive practices," *Sec. Higher Education*, Vol. 9 No. 1.

Essien, A., Bukoye, O.T., O'Dea, X. and Kremantzis, M. (2024), "The influence of AI text generators on critical thinking skills in UK business schools," *Studies in Higher Education*, Vol. 49 No. 5, pp. 865–882.

Fabian, K., Taylor-Smith, E., Smith, S., Meharg, D. and Varey, A. (2022), "An exploration of degree apprentice perspectives: a Q methodology study," *Studies in Higher Education*, Vol. 47 No. 7, pp. 1397–1409.

Fassbender, U. (2022), "Collective Skill Formation Regimes in Times of Covid-19: A Governance-Focused Analysis of the German Dual Training System," *International Journal for Research in Vocational Education and Training*, Vol. 9 No. 2, pp. 167–194.

Felce, A. (2019), "Managing the quality of higher education in apprenticeships," *Higher Education Skills and Work-Based Learning*, Vol. 9 No. 2, pp. 141–148.

Gallup, A. (2024), "What We Know About Registered Apprenticeship: A Systematic Review and Synthesis of 30 Years of Empirical Research," *Economic Development Quarterly*, Vol. 38 No. 1, pp. 25–39.

GOV.UK (2024), *"Apprenticeship Levy,"* 5 April, available at: https://www.gov.uk/government/news/key-facts-you-should-know-about-the-apprenticeship-levy.

Guden, N., Akyildiz, A. and Cobanoglu, C. (2024), "Can Advanced Apprenticeship Programs in Higher Education Be the Key for Developing Skills in the Tourism Sector? Evidence from North Cyprus," *Journal of Hospitality and Tourism Education*, Vol. 36 No. 2, pp. 99–112.

Hanney, N. and Karagic, H. (2019), "Responding to the NHS and social care workforce crisis: The enhancement of opportunities through collaborative partnerships," *Higher Education Skills and Work-Based Learning*, Vol. 9 No. 2, pp. 175–188.

Hart, P.F. and Rodgers, W. (2023), "Competition, competitiveness, and competitive advantage in higher education institutions: a systematic literature review," *Studies in Higher Education*, pp. 1–25.

Henrekson, M. and Stenkula, M. (2024), "Bottom-up policies trump top-down missions," *in Moonshots and the New Industrial Policy: Questioning the Mission Economy, pp. 309–331.*

HM Revenue and Customs (2022), *"Pay Apprenticeship Levy,"* available at: https://www.gov.uk/guidance/pay-apprenticeship-levy.

Horackova, C., Bloomfield, S., Pereira, C.R. and Mutwarasibo, F. (2024), "Delivering the Chartered Manager Degree Apprenticeship: what are the challenges and implications for good practice," *Higher Education Skills and Work-Based Learning*.

Hughes, C. and Saieva, G. (2019), "Degree apprenticeships – an opportunity for all?" *Higher Education Skills and Work-Based Learning*, Vol. 9 No. 2, pp. 225–236.

Ibeh, K., Eyong, J. and Amaeshi, K. (2022), "Towards advancing African management scholarship," *Journal of Management History*, Vol. 28 No. 2, pp. 187–198.

Institute for Apprenticeships and Technical Education (2023), *"Annual Report and Accounts for the Year Ended 31 March 2023,"* available at: https://www.instituteforapprenticeships.org/media/s3rf3bd3/ifate-annual-report-2022-23.pdf (accessed 3 July 2023).

Irons, A. (2017), "Reflection on higher degree apprenticeship development," *Higher Education Skills and Work-Based Learning*, Vol. 7 No. 1, pp. 112–122.

Jacob, F., Alberto, A. and Guimaraes, P. (2023), "The internship subject in a CTeSP course", in *Lecture Notes in Educational Technology*, Springer, Singapore, pp. 144-153.

Jafari, S.M., Yousuf, M.I. and Imran, M. (2024), "Impact Of Parents Attitude On The Children Academic Performance," *Onomázein*, Vol. 63, pp. 87–96.

Jones, B. and Brook, C. (2019), "Account of practice: using action learning to develop and educate undergraduate management degree apprentices," *Action Learning: Research and Practice*, Vol. 16 No. 3, pp. 295–303.

Jorgensen, C. (2018), "Reforms and innovations in Nordic vocational education: Improving transitions to employment and to higher education", in *Vocational Education in the Nordic Countries: Learning from Diversity*, Routledge, London, pp. 95-117.

Kim, Y. (2021), "Current challenges and issues for traditional and complementary medicine (T&CM) in Malaysia", in *Chinese Medicine and Transnational Transition during the Modern Era: Commodification, Hybridity, and Segregation*, Routledge, London, pp. 139-164.

Leek, A. (2020), "Police forces as learning organisations: learning through apprenticeships," *Higher Education Skills and Work-Based Learning*, Vol. 10 No. 5, pp. 741–750.

Li, J. and Pilz, M. (2017), "Modularisation in the German VET system: a study of policy implementation," *Journal of Education and Work*, Vol. 30 No. 5, pp. 471–485.

Lillis, F. and Bravenboer, D. (2020), "The best practice in work-integrated pedagogy for degree apprenticeships in a post-viral future," *Higher Education Skills and Work-Based Learning*, Vol. 10 No. 5, pp. 727–739.

Lillis, F. and Varetto, A. (2020), "Changing the course of IfATE: healthier higher and degree apprenticeships for regulated healthcare professionals," *Higher Education Skills and Work-Based Learning*, Vol. 10 No. 5, pp. 799–813.

Mackay, J. and Cadzow, H. (2022), "Developing an engineering degree apprenticeship with a pathway in infrastructure asset management", in *Professional and Practice-based Learning*, Springer, Cham, pp. 279-297.

Macleish, M. (2021), "Careers and education: An overview", in *Handbook of Bioastronautics*, Springer, Cham, pp. 869-881.

McCann, D. and Stewart, A. (2024), "Quality, Formality and the Evolution of International Labour Law: The New ILO Quality Apprenticeships Standard," *Industrial Law Journal*.

Miller, T. and Morris, A. (2020), "Bridging the skills gap: Apprentice assistant practitioners having an impact in mental healthcare services. Part 2. The AAP experience," *British Journal of Health Care Management*, Vol. 14 No. 2, pp. 58–62.

Minton, A. and Lowe, J. (2019), "How are universities supporting employers to facilitate effective 'on the job' learning for apprentices?" *Higher Education Skills and Work-Based Learning*, Vol. 9 No. 2, pp. 200–210.

Muldoon, J., Skorodziyevskiy, V., Gould, A.M. and Joullié, J.-E. (2024), "Agency theory and social entrepreneurship: An axe that needs sharpening," *The International Journal of Entrepreneurship and Innovation*.

Mulkeen, J., Abdou, H., Leigh, J. and Ward, P. (2019), "Degree and Higher Level Apprenticeships: an empirical investigation of stakeholder perceptions of challenges and opportunities," *Studies in Higher Education*, Vol. 44 No. 2, pp. 333–346.

Mutlib, I. (2020), "How employers are rising to the 20% challenge: increasing the uptake of degree apprentices from Black Asian and Minority Ethnic backgrounds," *Higher Education Skills and Work-Based Learning*, Vol. 10 No. 4, pp. 643–649.

Ostovar-Namaghi, S.A., Morady Moghaddam, M. and Veysmorady, K. (2024), "Empowering EFL learners through cognitive apprenticeship: A pathway to success in IELTS speaking proficiency," *Language Teaching Research*.

Page, M.J., Moher, D., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., Shamseer, L., et al. (2021), "PRISMA 2020 Explanation and Elaboration: Updated Guidance and Exemplars for Reporting Systematic Reviews," *British Medical Journal*, Vol. 372 No. 1, p. 71, doi: 10.1136/bmj.n71.

Parojcic, J. (2019), "Experiential education for clinical pharmacists", in *Encyclopedia of Pharmacy Practice and Clinical Pharmacy*, Elsevier, London, pp. 98-109.

Pepper, I., Brown, I. and Stubbs, P. (2022), "A degree of recognition across policing: embedding a degree apprenticeship encompassing work-based research," *Journal of Work-Applied Management*, Vol. 14 No. 1, pp. 35–45.

Poole, R., Cook, F., Sims, S. and Brindley, J. (2023), "Challenges, barriers and strategies for engaging in level 7 apprenticeship studies," *Journal of Education and Work*, Vol. 36 No. 2, pp. 153–168.

Quew-Jones, R. and Rowe, L. (2022), "Enhancing the degree apprenticeship curriculum through work-based manager and mentor intervention," *Journal of Work-Applied Management*, Vol. 14 No. 2, pp. 242–256.

Riley, T. (2021), "The creative industries and degree apprenticeships: the benefits and challenges of adoption for small and micro businesses," *Higher Education Skills and Work-Based Learning*, Vol. 11 No. 1, pp. 1–17.

Rowe, L. (2019), "Educating for the modern world: a report review," *Journal of Work-Applied Management*, Vol. 11 No. 1, pp. 5–16.

Rowe, L., Moore, N. and McKie, P. (2020), "The reflective practitioner: the challenges of supporting public sector senior leaders as they engage in reflective practice," *Higher Education Skills and Work-Based Learning*, Vol. 10 No. 5, pp. 783–798.

Rowe, L., Moss, D., Moore, N. and Perrin, D. (2017), "The challenges of managing degree apprentices in the workplace: A manager's perspective," *Journal of Work-Applied Management*, Vol. 9 No. 2, pp. 185–199.

Saville, K., Birdi, G., Hayes, S., Higson, H. and Eperjesi, F. (2020), "Using strength-based approaches to fulfil academic potential in degree apprenticeships," *Higher Education Skills and Work-Based Learning*, Vol. 10 No. 4, pp. 659–671.

Shaw, A. (2021), "Inclusion of disabled Higher Education students: why are we not there yet?" *International Journal of Inclusive Education*, Vol. 28 No. 6, pp. 820–838.

Smith, E. (2023), "Apprenticeships: The problem of attractiveness and the hindrance of heterogeneity," *International Journal of Training and Development*, Vol. 27 No. 1, pp. 18–38.

Smith, S., Fabian, K., Taylor-Smith, E., Barr, M., Berg, T., Bratton, A., Kolberg, M., Paterson, J. and Zarb, M. (2023), "'They gave me an opportunity and I took it': motivations and concerns of adult apprentices," *Journal of Vocational Education and Training*.

Spencer, T., Parr, S. and Clark, R. (2022), "Making connections between work and study—Maximising the value of degree apprenticeships", in *Lecture Notes in Educational Technology*, Springer, Singapore, pp. 463-476.

Stalder, B. and Luthi, F. (2022), "Enhancing the standing of VET in Switzerland", in *Professional and Practice-based Learning*, Springer, Cham, pp. 247-264.

Taylor, M. and Flaherty, C. (2020), "Nursing associate apprenticeship – a descriptive case study narrative of impact, innovation and quality improvement," *Higher Education Skills and Work-Based Learning*, Vol. 10 No. 5, pp. 751–766.

Tormala-Nita, R. (2018), "Educational reform through sponsored projects in Curacao: Government-sponsored technical and career institutions", in *Postsecondary Education, and the Challenges of Workforce Development, Springer International Handbooks of Education*, Springer, Cham, pp. 653-673.

Watkinson-Miley, C., Cox, C. and Deshpande, M. (2022), "A New Generation of Police Officers: Experiences of Student Officers Undertaking the Police Constable Degree Apprenticeship in One UK Police Force," *Policing (Oxford)*, Vol. 16 No. 1, pp. 122–134.

Williams, C., Minshew, L. and Wolcott, M. (2024), "The cognitive apprenticeship model as a framework for desired precepting qualities to inform preceptor development," *Currents in Pharmacy Teaching and Learning*, Vol. 16 No. 1, pp. 5–16.

Xanthaki, H. (2024), *"Legislative Reform in the EU – The Role of Drafting in Legislative Quality,"* Study for the JURI committee of the European Parliament, IP/C/JURI/IC/2023-044, Faculty of Laws University College London Law Research Paper No. 02/2024, available at SSRN: https://ssrn.com/abstract=4695537.

Author	Year	Type	Journal / book	Title	Theme	Sector	Country	Method	Barriers or Challenges Identified
Guden et al.	2024	Article	Journal of Hospitality and Tourism Education	Can Advanced Apprenticeship Programs in Higher Education Be the Key for Developing Skills in the Tourism Sector? Evidence from North Cyprus	Employer challenges	Tourism	Cyprus	Interviews	Skills shortages in tourism sector Need for learning and assessment in the workplace
Casey et al.	2024	Article	Studies in Higher Education	Player, Purist, Pragmatist: a comparison of employability strategies in access to the solicitors' profession via alternative degree pathways	Apprentice challenges	Law	UK	Interviews	Need to enhance employability amongst apprentices Career support in apprenticeships Meritocracy in elite graduate professions Social mobility in elite graduate professions
Bravenboer et al.	2024	Article	Higher Education, Skills and Work-based Learning	Can you credit it? Towards a process for ascribing credit to apprenticeships in England	Policy	Health and social care	UK	Mixed method	HE-wide confusion about RPL process Lack of prescribed RPL method
McLaughlin and Coleman	2024	Book chapter	Museum Studies for a Post-Pandemic World: Mentoring, Collaborations, and Interactive Knowledge Transfer	The Next Evolution of Museum Studies: Museum Masterclasses in Augmented and Virtual Reality	Provider challenges	N/A	USA	Case study	Cons of Virtual Reality usage Cons of Augmented Reality usage VR/AR inclusivity

				in Times of Transformation, pp. 56–64					
Smith	2023	Article	International Journal of Training and Development	Apprenticeships: The problem of attractiveness and the hindrance of heterogeneity	Policy	N/A	Australia	Desk research	Attractiveness impacted by country policy Need for marketing campaigns to attract high quality
Beaudry and Perry	2023	Article	Journal of Vocational Education and Training	Levelling up: towards decolonising apprenticeship learning	Apprentice challenges	Education	Canada	Interviews	Market-driven nature Indigenous barriers to education indigenous barriers to employment Non-indigenous epistemologies
Poole et al.	2023	Article	Journal of Education and Work	Challenges, barriers and strategies for engaging in level 7 apprenticeship studies	Apprentice challenges	Education	UK	Interviews	OTJ requirement impacts learner journey Study habits impacted by employment workload Study habits impacted by access to OTJ time Conflicting priorities around study, business, personal life 20% commitment impossible

Smith et al.	2023	Article	Journal of Vocational Education and Training	They gave me an opportunity and I took it': motivations and concerns of adult apprentices	Apprentice challenges	N/A	UK	Survey	Adult apprentice starts already in work Adult apprentice starts already experienced Need for advanced entry
Jacob et al.	2023	Book chapter	Lecture Notes in Educational Technology, pp. 144–153	The Internship Subject in a CTeSP Course	Apprentice challenges	Engineering	Portugal	Case study	Apprentices utilised as a company labourer Relationship between provider and employer
Ibeh et al.	2022	Article	Journal of Management History	Towards advancing African management scholarship	Provider challenges	Education	Africa	Opinion piece	Lack of symmetry between curriculum and practice
Fassbender	2022	Article	International Journal for Research in Vocational Education and Training	Collective Skill Formation Regimes in Times of Covid-19: A Governance-Focused Analysis of the German Dual Training System	Policy	Education	Germany	Desk research	Multiplicity of actors involved in training system Limited bottom-up influence
Colombari and Neirotti	2022	Article	Studies in Higher Education	Closing the middle-skills gap widened by digitalization: how technical universities can contribute through Challenge-Based Learning	Pedagogy/andragogy	Engineering	Italy	Action research	Digitalisation competency gap Design of challenge-based programmes Need for state-of-the-art facilities in providers Socio-economic attractiveness of technical schools

									Integration between secondary education and HE
de Villiers et al.	2022	Article	Journal of International Business Education	Developing Learning Spaces and Andragogues' Roles: The C-Star Framework of Large Class Engagement	Pedagogy/andragogy	Education	New Zealand	Action research	Growing class sizes Large class engagement Need for cognitive apprenticeship principles
Fabian et al.	2022	Article	Studies in Higher Education	An exploration of degree apprentice perspectives: a O methodology study	Apprentice challenges	Education	UK	Survey	Need for increased time in work for coursework Risk of boredom at work Risk of mentor issues OTJ time resulting in need to catch up on work activity Upskill candidates not treated as apprentices Risk of prioritising work over study
Quew-Jones and Rowe	2022	Article	Journal of Work-Applied Management	Enhancing the degree apprenticeship curriculum through work-based manager and mentor intervention	Employer challenges	N/A	UK	Survey	Need for clarity of manager/mentor role Need for greater involvement of manager/mentor in design Need for more unplanned experiences

Watkinson-Miley et al.	2022	Article	Policing (Oxford)	A new generation of police officers: experiences of student officers undertaking the police constable degree apprenticeship in one UK police force	Employer challenges	Policing	UK	Focus groups	Disconnect between industry and academia Lack of industry involvement in curriculum design
Pepper et al.	2022	Article	Journal of Work-Applied Management	A degree of recognition across policing: embedding a degree apprenticeship encompassing work-based research	Pedagogy/andragogy	Policing	UK	Desk research	PCDA effective entry route for policing Involvement of professional body in PCDA
Mackay and Cadzow	2022	Book chapter	Professional and Practice-based Learning, 34, pp. 279–297	Developing an Engineering Degree Apprenticeship with a Pathway in Infrastructure Asset Management	Pedagogy/andragogy	Engineering	New Zealand	Case study	Curriculum links to industry Industry engagement and support Quality of employer-led mentoring
Spencer et al.	2022	Book chapter	Lecture Notes in Educational Technology, pp. 463–476	Making Connections Between Work and Study—Maximising the Value of Degree Apprenticeships	Pedagogy/andragogy	N/A	UK	Case study	Integration of practical skills-based elements Fitment of theory to practice Need for more work-based opportunities replacing classroom hours
Takatori	2022	Book chapter	The Routledge Handbook of Landscape	LANDSCAPE DESIGN EDUCATION IN JAPAN: The Meiji,	Pedagogy/andragogy	Construction	Japan	Desk research	Links between different education systems delivering apprenticeships

			Architecture Education, pp. 326–334	Taisho, and Showa Periods					
Ahmad et al.	2022	Book chapter	Digitalization and Control of Industrial Cyber-Physical Systems: Concepts, Technologies and Applications, pp. 297–312	Teaching and learning ICPS: Lessons learned and best practices	Pedagogy/andragogy	Digital	UK	Desk research	Curriculum links to industry Enabling technologies Learning digitalisation
Kimmel et al.	2022	Book chapter	Continuing Engineering Education Handbook, pp. 89–127	Effective Instructional Practices in Continuing Engineering Education	Pedagogy/andragogy	Engineering	USA	Desk research	Socially-isolated nature of remote learning Accessibility of remote learning Need for asynchronous engagement strategies
Deissinger	2022	Book chapter	Professional and Practice-based Learning, 32, pp. 83–101	The Standing of Dual Apprenticeships in Germany: Institutional Stability and Current Challenges	Policy	N/A	Germany	Desk research	Issue of academisation of vocational learning Issue of digitalisation of vocational learning Issue of modernisation of vocational learning
Mkhize	2022	Book chapter	Doctoral Training and Higher Education in Africa, pp. 36–60	The state of doctoral training in South Africa: Current and emerging practices	Policy	N/A	South Africa	Desk research	Accessibility of doctoral training Master-apprenticeship

Author	Year	Type	Source	Title	Challenge	Sector	Country	Method	Findings
									model for doctoral training
Stalder and Luthi	2022	Book chapter	Professional and Practice-based Learning, 32, pp. 247–264	Enhancing the Standing of VET in Switzerland	Policy	N/A	Switzerland	Mixed method	Regular reform of apprenticeship system Limited apprenticeship career development
Antonczak et al.	2022	Book chapter	Industry Practices, Processes and Techniques Adopted in Education: Supporting Innovative Teaching and Learning Practice, pp. 37–52	From Industry to Academia: Case Studies of Innovative Learning Practices in a Digital Context	Provider challenges	N/A	France	Case study	Curriculum links to industry Gap between academia and industry Digital transformation of society not mirrored in teaching
Joyner	2022	Book chapter	Navigating Organized Urology: a Practical Guide, Second Edition, pp. 29–38	The Role of the Educator	Provider challenges	Health and social care	USA	Desk research	Apprenticeship model of teaching unsustainable Use of simulation-based training Resource taken to evaluate apprentice needs
Riley	2021	Article	Higher Education, Skills, and Work Based Learning	The creative industries and degree apprenticeships: the benefits and challenges of adoption for small and micro businesses	Employer challenges	Creative	UK	Unstrucutred Interviews	Poor collaboration Lack of engagement in trailblazer groups SME struggle in recruitment Lack of time for

									mentors to support apprentices
Sarkar	2021	Book chapter	History of Science, Technology, Environment, and Medicine in India, pp. 121–138	Academic engineering and India's colonial encounter: Bengal Engineering College, Sibpur, a historical perspective	Employer challenges	Engineering	India	Desk research	Appropriation of modern technological knowledge
Kuhlee	2021	Book chapter	Quality in Teacher Education and Professional Development: Chinese and German Perspectives, pp. 226–237	Teacher education for the vocational education and training (VET) sector in Germany: Current structures, reforms and challenges	Policy	Education	Germany	Desk research	Different requirements for teachers and trainers, i.e., mixed quality
Kim	2021	Book chapter	Chinese Medicine and Transnational Transition during the Modern Era: Commodification, Hybridity, and Segregation, pp. 139–164	Current Challenges and Issues for Traditional and Complementary Medicine (T&CM) in Malaysia	Policy	Health and social care	Malaysia	Desk research	Links between providers and regulators Division between Higher Education and skills training
Macleish	2021	Book chapter	Handbook of Bioastronautics, pp. 869–881	Careers and Education: An Overview	Provider challenges	Aerospace	USA	Desk research	Knowledge transfer partnerships between agencies Need for outreach programmes delivered by other outlets, e.g., museums
Mutlib	2020	Article	Higher Education, Skills, and Work Based Learning	How employers are rising to the 20% challenge: increasing the uptake of degree	Apprentice challenges	N/A	UK	Opinion piece	Varied ethnic community views of apprenticeships British Asian focus

Author	Year	Type	Journal	Title	Theme	Sector	Country	Method	Findings
				apprentices from Black, Asian and Minority Ethnic backgrounds					on traditional university route
Leek	2020	Article	Higher Education, Skills, and Work Based Learning	Police forces as learning organisations: learning through apprenticeships	Employer challenges	Policing	UK	Case study	Need for employers to be learning organisations Need for employer cultural change Need for increased senior leadership buy-in Need for equality and diversity within curriculum Need for flexibility for apprentices on shift patterns Need for synchronous access Need for asynchronous access Need for dynamic and interactive VLE
Miller and Morris	2020	Article	British Journal of Health Care Management	Bridging the skills gap: Apprentice assistant practitioners having an impact in mental healthcare services. Part 2. The AAP experience	Employer challenges	Health and social care	UK	Mixed method	Impact of apprentices on productivity Impact of apprentices on wider team Effective

Author	Year	Type	Journal	Title	Theme	Sector	Country	Method	Findings
									apprentice role design
Lillis and Bravenboer	2020	Article	Higher Education, Skills, and Work Based Learning	The best practice in work-integrated pedagogy for degree apprenticeships in a post-viral future	Pedagogy/andragogy	Public sector	UK	Semi-structured interviews	Rise in integrated EPAs Criticism of day release model Lack of customisation Rise in COVID-19 flexible assessments
Rowe et al.	2020	Article	Higher Education, Skills, and Work Based Learning	The reflective practitioner: the challenges of supporting public sector senior leaders as they engage in reflective practice	Pedagogy/andragogy	N/A	UK	Interviews	Lack of reflective habits amongst apprentices Lack of collective, facilitated reflection Work pressures for apprentices impact study Home pressures for apprentices impact study Inflexible submission deadlines
Lillis and Varetto	2020	Article	Higher Education, Skills and Work-based Learning	Changing the course of IfATE: healthier higher and degree apprenticeships for regulated healthcare professionals	Policy	Health and social care	UK	Semi-structured interviews	No pedagogical need for EPA Regulatory body bereaucracy to justify themselves
Taylor and Flaherty	2020	Article	Higher Education, Skills, and Work Based Learning	Nursing associate apprenticeship – a descriptive case study	Policy	Health and social care	UK	Case study	Tripartite review poor commitment Tripartite review

				narrative of impact, innovation and quality improvement					poor logistics Excessive regulatory terminology Excessive regulatory reporting procedures
Ait Razouk and Herveou	2020	Book chapter	The Success of Apprenticeships: Views of Stakeholders on Training and Learning, 3, pp. 235–241	Job quality: A challenge for the effectiveness of higher education apprenticeships	Employer challenges	N/A	France	Desk research	Apprentices under-utilised by covering only operational needs Poor apprentice job or role quality Lack of work-based coaching, mentoring, recognition, and caring
Nkamnebe and Ezemba	2020	Book chapter	Advanced Series in Management, 26, pp. 27–38	Entrepreneurship incubation among the nigerian igbos: The igba-boi indigenous model	Pedagogy/andragogy	N/A	Nigeria	Desk research	Under-use of Igbo apprenticeship model
Ansart and Sanseau	2020	Book chapter	The Success of Apprenticeships: Views of Stakeholders on Training and Learning, 3, pp. 59–65	Reflexivity and management apprenticeships	Policy	N/A	France	Desk research	Accreditation of prior experiential learning (APEL) under-utilised Role of APEL in achieving reflexivity
Rafferty	2020	Book chapter	Medicine in the Twentieth Century, pp. 519–530	Nurses	Provider challenges	Health and social care	UK	Desk research	Tension between apprenticeships and higher education
McKellar	2020	Book chapter	Higher Education in the Arab World:	Building a culture of innovation and	Provider challenges	N/A	UK	Desk research	Inability of university sector to

			Building a Culture of Innovation and Entrepreneurship, pp. 95–107	entrepreneurship in universities					engage the business community Lack of business engagement amongst university sector Lack of culture of innovation in university sector
Cardenas-Robledo and Pena-Ayala	2019	Article	Expert Systems with Applications	A holistic self-regulated learning model: A proposal and application in ubiquitous-learning	Pedagogy/andragogy	Education	Mexico	Case study	Technology enhanced learning (TEL) ineffective Ubiquitous-learning (u-learning) ineffective Immersive settings stressful stimuli High cognitive load
Hanney and Karagic	2019	Article	Higher Education, Skills, and Work Based Learning	Responding to the NHS and social care workforce crisis: The enhancement of opportunities through collaborative partnerships	Employer challenges	Health and social care	UK	Case study	Lack of NHS relevant apprenticeship standards Lack of levy spend Lack of apprenticeship flexibility Lack of flexible progression opportunities
Minton and Lowe	2019	Article	Higher Education, Skills, and Work Based Learning	How are universities supporting employers to facilitate effective "on	Employer challenges	N/A	UK	Focus groups	Lack of line manager involvement

Author	Year	Type	Journal	Title	Theme	Subject	Country	Method	Findings
				the job" learning for apprentices?					correlates to low OTJ Lack of line manager engagement in enrolment process Lack of line manager awarness of apprenticeship regulation Employers struggling to release apprentices for OTJ
Rowe	2019	Article	Journal of Work-Applied Management	Educating for the modern world: a report review	Employer challenges	N/A	UK	Desk research	Need for employer-led curriculum design Need for apprentice resilience building strategies Need for time and space for reflective practice
Jones and Brook	2019	Article	Action Learning: Research and Practice	Account of practice: using action learning to develop and educate undergraduate management degree apprentices	Pedagogy/andragogy	N/A	UK	Case study	Lack of provider focus on reflection Lack of uptake of reflective activity
Felce	2019	Article	Higher Education, Skills and Work-based Learning	Managing the quality of higher education in apprenticeships	Provider challenges	Education	UK	Desk research	HEIs new to apprenticeship quality regime Standard HEI quality structure

									alignment with apprenticeship quality Quality Code appropriateness
Hughes and Saieva	2019	Article	Higher Education, Skills and Work-based Learning	Degree apprenticeships - an opportunity for all?	Provider challenges	Education	UK	Case study	Role of central services in apprentice and employer support Common misconceptions preventing applications
Saville et al.	2019	Article	Higher Education, Skills, and Work Based Learning	Using strength-based approaches to fulfil academic potential in degree apprenticeships	Provider challenges	N/A	UK	Mixed method	Ethnically-correlated apprentice performance
Bullough	2019	Book chapter	Organization of Health Workers and Labor Conflict, pp. 127–135	Barriers To The Nurse Practitioner Movement: Problems Of Women In A Woman's Field	Apprentice challenges	Health and social care	USA	Desk research	Attitudes amongst peers towards the apprenticeship route
Parojcic	2019	Book chapter	Encyclopedia of Pharmacy Practice and Clinical Pharmacy, pp. 98–109	Experiential education for clinical pharmacists	Pedagogy/andragogy	Health and social care	Serbia	Desk research	Integration of experiential education with didactic teaching Integration of theory to practice Complex relationships between institutions and industry
Holbery et al.	2019	Book chapter	Facilitating Learning in Practice: A Research-based	Expansive learning	Pedagogy/andragogy	N/A	UK	Desk research	Restrictive-expansive continuum in

Author	Year	Type	Title	Source	Category		Country	Method	Findings
			Approach to Challenges and Solutions, pp. 56–71						apprenticeships Need for more expansive learning such as dialogue, problem solving Need to develop apprentice interpersonal factors such as friendliness
Hytonen and Kovalainen	2019	Book chapter	Digital Work and the Platform Economy: Understanding Tasks, Skills and Capabilities in the New Era, pp. 77–95	Vocational education goes to industry: Future skills at work derive from novel models of cooperation	Provider challenges	N/A	Finland	Desk research	Need for more company-driven education Need for more cooperation amongst educational institutions Need for more novel learning solutions
Crawford-Lee and Wall	2018	Article	Higher Education, Skills, and Work Based Learning	Sustainability 2030: a policy perspective from the University Vocational Awards Council	Policy	N/A	UK	Opinion piece	Volatile, uncertain, complex apprenticeships sector Complexity of apprenticeship sustainability Failure of T-Levels as a route into apprenticeships Dubious apprentice job roles Level 2 apprenticeships not

									a step up from school
Jorgensen	2018	Book chapter	Vocational Education in the Nordic Countries: Learning from Diversity, pp. 95–117	Reforms and innovations in Nordic vocational education: Improving transitions to employment and to higher education	Apprentice challenges	N/A	Denmark	Case study	Challenge of apprentice transition to employment Challenge of progression from other education to higher education
Tormala-Nita	2018	Book chapter	Springer International Handbooks of Education, Part F1627, pp. 653–673	Educational Reform Through Sponsored Projects in Curacao: Government-Sponsored Technical and Career Institutions, Postsecondary Education, and the Challenges of Workforce Development	Policy	N/A	Curacao	Case study	Need for sponsored projects (innovation) to inform policy reform Need for progressive curriculum Need for increased apprenticeship course transferability
Nyen and Tonder	2018	Book chapter	Technical and Vocational Education and Training, 29, pp. 227–241	Development of Vocational Skills Through Integration of Practical Training Periods in School Based Vocational Education in Norway	Policy	N/A	Norway	Case study	Need for more varied ways of integrating practical training periods Need for apprentice integration within communities of practice Changes triggered by Knowledge

									Promotion Reform in 2006
Rowe	2018	Book chapter	Enhancing Employability in Higher Education through Work Based Learning, pp. 51–69	[Managing degree apprenticeships through a work based learning framework: Opportunities and challenges](#)	Policy	N/A	UK	Case study	Impact of political reforms Need for employer-driven pedagogy Successful adaptation of degree to suit apprenticeship
Li and Pilz	2017	Article	Journal of Education and Work	Modularisation in the German VET system: a study of policy implementation	Policy	Education	Germany	Interviews	Lack of modularisation Scepticism around modularisation regulatory environment poor fit for modularisation Need for flexibility and specialism pathways
Irons	2017	Article	Higher Education, Skills, and Work Based Learning	Reflection on higher degree apprenticeship development	Employer challenges	IT	UK	Case study	Challenging attendance patterns Need for varied pedagogic approaches Workload capacity issues for apprenticeship delivery HEI quality processes not designed for apprenticeships

Campbell and Gillespie	2017	Article	Local Economy	Gender analysis of spending on the Scottish Modern Apprenticeship programme	Policy	Education	UK	Secondary data	Substantial gender gap in public investment
Mulkeen et al.	2017	Article	Studies in Higher Education	Degree and Higher Level Apprenticeships: an empirical investigation of stakeholder perceptions of challenges and opportunities	Provider challenges	Education	UK	Interviews	Need for links to professional body qualifications Need for university credit system map to professional qualifications Need for college and university collaboration Need for university profit sharing with other stakeholders
Rowe et al.	2017	Article	Journal of Work-Applied Management	The challenges of managing degree apprentices in the workplace: a manager's perspective	Provider challenges	N/A	UK	Desk research	Need for employer-led recruitment processes Need for careful management of expectations Need for retention strategies Need for increased employer involvement Need for empowering mentoring Need for rigorous apprentice support strategies

Boehler	2017	Book chapter	The Shifting Global World of Youth and Education, pp. 149–160	Supporting vulnerable youth – austria's active policy of education and work integration with young people at risk	Apprentice challenges	N/A	Austria	Case study	Lower recruitment rates amongst immigrants Lower completion rates amongst immigrants
Walzer	2017	Book chapter	New Directions for Computing Education: Embedding Computing Across Disciplines, pp. 143–160	The curricular soundtrack: Designing interdisciplinary music technology degrees through cognitive apprenticeship and situated learning	Employer challenges	Creative	USA	Desk research	Challenge of "degree identity" underpinned by competencies Under-use of cognitive apprenticeship model in higher education Lack of common language between institutions and employers