RESEARCH DIRECTIONS

Implementing Work-Based Assessments in a Level 7 Data Analytics Digital Degree Apprenticeship: Challenges and Lessons for HEIs

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Abstract

This paper explores the incorporation of work-based learning in the Digital and Technology Solutions Specialist (DTSS) Master's degree apprenticeship programme in a London-based Higher Education Institution. Specifically, innovative work-based assessments are introduced aimed at utilising workplace resources while meeting academic requirements. Challenges highlighted include balancing academic requirements and business needs as well as supporting learners, employers and academic staff in embracing and implementing the work-based nature of the assessments without compromising academic standards and quality of learning. Lessons are drawn for higher education institutions that consider introducing similar programmes.

Introduction

Work-based learning (WBL) elements are necessary in degree apprenticeship provisions since they allow learners to articulate an awareness of the contextual circumstances in which declarative knowledge and procedural skills, usually taught in university programmes, can be appropriately applied. Although the goal of mainstream degree programmes is a set of graduate attributes (competencies) that would subsequently be moulded into an occupational role following graduate employment, the end goal of an apprenticeship programme is fully comprehensive occupational competence at the point of graduation. WBL offers apprentices' employers an opportunity to flexibly contextualise the provider's curriculum to align with their business needs and ensure an influx of new knowledge and skills into the organisation. Designing and delivering WBL, however, comes with certain challenges, most notably balancing academic learning and assessment requirements with employers' business needs, and supporting learners to achieve ambitious targets related to both.

In this paper we share innovative work-based assessment (WBA) practices introduced in the context of a Digital and Technology Solutions Specialist (DTSS) (i.e. data analytics specialism) Master's degree apprenticeship programme at a London-based Higher Education Institution (HEI). WBA practices leverage the synoptic assessment structure of a pre-existing MSc. in Data Science and Analytics (DSA) and evolve it in the context of bespoke WBA mapped to the level 7 DTSS apprenticeship standard, Knowledge, Skills and Behaviours (KSB). As the two programmes run in parallel, teaching sessions and seminars and laboratories activities are shared between them. However, apprentices complete separate WBAs utilising employer resources and context. The teaching sessions and their respective study blocks constructively align with assessments for the MSc. programme and the DTSS.

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Challenges for the programme delivery team includes a) balancing similarities and differences between the two programmes while simultaneously complying with relevant regulations (e.g. Ofsted), b) supporting apprentices in developing meaningful connections between teaching and learning sessions and their workplace contexts, thus integrating off-the-job learning with on-the-job impact and c) supporting employers to customise the curriculum to their business needs through a WBA strategy.

Degree Apprenticeships as a Work-Based Learning model in Higher Education Institutions

According to the UK Quality Code for Higher Education, WBL involves learning through work, learning for work or learning at work (QAA, 2018). It is distinguished from work-related or simulated learning that has not been formulated with an employer to address a workforce need. WBL benefits an organisation's employees by developing their knowledge, skills and professional behaviours (KSBs) and the employer organisation as it helps meet relevant workforce development needs (QAA, 2018).

WBL at universities has predominantly taken two forms: programmes designed to meet the needs of those with significant professional experience (i.e., executive programmes) studying part-time, and more recently, work-integrated degrees for younger learners seeking access to professional roles (Bravenboer, 2016). Retrospectively, industry employers have been influencing higher education curricula through direct liaison with universities or professional bodies (Hordern, 2014). Nevertheless, curriculum development has primarily remained under the control of the HEIs, which has led to insufficient outcomes of the graduates having the skills that employers argue are imperative (Shadbolt, 2016; Wakeham, 2016; Smith et al., 2021). A new approach to matching graduates' skills and employers' needs through WBL is introduced by the UK government via the degree apprenticeships model (Smith et al., 2021; BIS., 2016; Lambert., 2016). England was the first to launch degree apprenticeships in 2015 (Smith et al., 2021) in an attempt to bring together the best of higher and vocational education (gov.uk, 2015).

Introducing degree apprenticeships promotes the UK HEI to engage in their design and provision. Degree apprenticeships become increasingly enticing to HEIs because they fit well with their widening participation agendas (Younger et al., 2019). Indeed, degree apprenticeships are perceived as a vehicle for widening participation in higher education and improving social mobility (Welbourn et al., 2019). Significantly, they offer access to higher education for people who would not normally consider attending university. The argument becomes even more compelling when student finances come into play. Degree apprenticeship programmes are funded through the apprenticeship levy, where learners graduate with zero debt and have been paid a salary throughout their studies.

Given the validity of the arguments above for levels 6 and 7, at level 7, the pitch is slightly different The discussions regarding the advantages of degree apprenticeship programmes focus on addressing the skill shortages needed to improve the international competitiveness of the UK economy (Welbourn et al., 2019). This places employers in a more central position, foregrounding their needs for higher-level technical skills and personnel with leadership qualities who understand occupational aspects such as, professional, regulatory, and strategic landscapes.

Additionally, level 7 apprenticeships are perceived as a method for employers to improve employee retention rates (Umberger & Harrison, 2023). Overall, a variety of benefits emerge for HEIs to add degree apprenticeships to their programme portfolios at level 7. However, the employer's needs are in a prominently more central place. Nonetheless, HEIs should still be involved in developing apprenticeship standards and designing innovative curricula that utilise WBL approaches (Bravenboer, 2016).

Opportunities and challenges in delivering WBL via degree apprenticeship programmes

HEIs have observed two approaches to degree apprenticeship design and delivery: firstly, to

mirror the actions of other HEIs, and secondly, to be innovative and distinctive in their approaches. (Welbourn et al., 2019). Both have advantages and disadvantages. The first offers legitimacy on choices for organisational and policy changes necessary to provide degree apprenticeship programmes. However, it does not help develop competitive and distinctive propositions, and many providers tend to repeat the mistakes of others. The second carries a lot of upfront risk, but the end product, if successful, could easily become a benchmark in the sector. Below, we discuss the challenges faced by HEIs when designing and delivering degree apprenticeship programmes.

Although collaborating with industry employers could be seen as an opportunity to expand the scope of already existing university-Industry partnerships, some HEIs feel that collaboration for degree apprenticeships is externally coerced and a point of pressure on HEIs to become more industry-facing (Welbourn et al., 2019). Furthermore, this type of collaboration adds more challenges to HEIs by exposing gaps for WBL that HEIs are not organisationally and culturally attuned to offer. The demands for fast-tracking new programme approvals, flexibility, adaptability and contextualisation in content and delivery style are a few examples (Welbourn et al., 2019).

Implementation challenges include concerns about the ability of the employers to determine what a course should include (Mulkeen et al., 2017). For example, it has been shown that employer-led qualifications tend to focus more on generic skills rather than knowledge (Bathmaker, 2013). Although these might be collaboratively developed between employers and HEIs the differences between academic learning and on-the-job training persist (Bravenboer, 2016). Moreover, it has been argued that involving employers in curriculum development transfers power over the curriculum to those with potentially no commitment to wider public values and may even threaten the international standing of the UK higher education (Power & Walsh, 2018). Another challenge of introducing degree apprenticeships is that it may be seen as a threat to academic identity, where academics working in delivering such programmes do not comprehensively fit the profile of a ‘proper academic’ (Martin et al., 2020). Finally, existing infrastructures, processes and policies of an HEI may not always be prepared to respond to the nuances of work-based programmes such as degree apprenticeships (Rowe et al., 2016). They lack the flexibility needed in a collaborative provision (Mulkeen et al., 2019), a critical factor in designing and delivering work-based programmes (Carter, 2010; King et al., 2016).

From the employers’ perspective, although they appear to welcome the opportunity to influence the quality of apprenticeships, they are concerned about the levels of additional administration involved (Hogarth et al., 2014). In fact, employers are committed to employee training and upskilling, and they are discouraged by what they perceive as unnecessary administration and the fact that the programme requires employees to be away from the business for a period of time (Mukleen et al., 2019).

As a degree apprentice would experience it, WBL is a process of experimentation and reflection within an occupational community through which they can construct their own professional identity (Hager, 2013; Conway & Foskey, 2015). Interactions within such professional communities are not always linear and predictable. Therefore, it becomes the responsibility and challenge of each apprentice to coordinate and actively pursue their learning flexibly and innovatively (Hager, 2013). This becomes particularly challenging when apprentices are called to balance off-the-job learning, which usually occurs in the form of academic study on the premises and under the rules of a host academic institution, with the practical application of that learning in the workplace to meet business needs. The fact that apprentices need to have a central role in personalising their own learning, means that adequate support from knowledgeable and experienced academic tutors in the HEI, and capable and inspiring workplace mentors becomes essential for successful work-based learning. Workplace mentoring, specifically, is quite crucial in effectively harnessing the potential of work-based learning, especially in a degree apprenticeship setting (Rowe et al., 2017). Examples of how a workplace mentor can assist the apprentice are by helping them to locate relevant learning resources, with

organisational networking and exposure of the apprentice to middle and senior management and help to construct the links between employer-relevant business operations, strategic objectives and the knowledge, skills and behaviours outlined in the apprenticeship standard.

Methodological Approach

Research design

The research conducted for this article follows a case study approach (Yin, 2002) in combination with a form of action research which aims to improve academic practice through reflections on pedagogical approaches and how these are implemented institutionally (Gibbs et al., 2017). Our research approach is implemented by applying a reflective auto-ethnographic lens (Star, 2010) into a community of academic practice where the authors are active participants. This community of practice includes academic practitioners (academic staff members), degree apprentices and employers, as they work within a specific organisational, institutional and regulatory environment. This case study focuses on a community of practitioners involved in designing and delivering a level 7 degree apprenticeship programme in a London-based university. The apprenticeship standard in question is Digital & Technology Solutions Specialist (data analytics). Although the community of practice is much broader, this paper focuses on a) academic staff members, b) apprentices/learners, and c) employers.

We explore the following research questions:

- How has the case study HEI shifted their course designs towards WBL?
- How does the case study HEI support learners pursuing WBL in their respective employer organisations?
- How does the case study HEI support employers in embracing the academic perspective into their work environment and achieving the required flexibility and customisation?
- How does the case study HEI support academics in adapting to the needs of the apprenticeship programme?

Analysis process

The three authors constructed the empirical account through a series of reflective meetings. In these meetings, as shown in **Table 1**, we discussed different phases of the development of the DTSS programme, raising issues and emerging themes in relation to these phases and available material that would help us construct a critical reflection of our practice experience and link it to broader cultural, organisational and institutional contexts.

Meeting topic	Issues/Themes	Relevant material
Curriculum design	• Introduction of separate bespoke work-based assessments	• Study block descriptors • Assessment block descriptors
Curriculum design	• Mapping to standard	• Apprenticeship standard • Programme approval documentation • Industry accreditation documents • Assessment block descriptors • Study block descriptors
Assessment details	• Mapping KSBs to workable LOs • Integrate content from study blocks with workplace resources and employer objectives.	• Assessment briefs, marking schemes, internal and external review documents, • Workplace datasets and business problems • Quality assurance
Marking and feedback	• Feedback balanced to respond both to LOs and KSBs • Utilise feedback for future assessments • Feedback on how the business can benefit	• Feedback forms • Tripartite review discussions • Quality assurance process
Apprentice support	• Accessing employer resources • Suitability of datasets/resources • Confidentiality and data protection • Additional time spent on the above	• Initial proposal by apprentice • Datasets • Draft report
Employer support	• Understanding the balance between academic requirements and business needs • Identifying areas for contribution • Communicating with apprentices outside tripartite review meetings	• Employer engagement and onboarding to the programme • Tripartite progress reviews • Mentor handbook
Academic staff support	• Buying into the programme • Balance between treating all students the same way while acknowledging DA requirements and offering the necessary support • Workload implications	• Training on degree apprenticeships • Training on the regulatory framework (Ofsted, ESFA, OfS etc.) • Training on safeguarding • Peer review of teaching and learning • Assessment briefs

Table 1 Authors' Meetings and Relevant Materials

These reflective meetings allowed the authors to analyse and collate their own experiences, both with academic programme delivery and professional practice in an industry context, and they allowed themselves to be led by the social setting as they engaged in confessional, self-reflexive discussions (Schultze, 2000). During those meetings, the authors could also counterbalance each other's biases on how they each experienced the process and ensure a consistent, commonly accepted auto-ethnographic account of the case. It is worth stating that some of the above reflections were done as part of the department's ongoing quality assurance (QA) processes. For instance, part of the module review QA process evaluated the suitability of specific assessment methods in a work-based context.

Case study description

Design

In this case study, the decision was made primarily to deliver WBL through the

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programme assessments. The reason for this emerged from the need to keep teaching activities; lectures, laboratories, and seminars untouched and not contextualised into a specific employer setting because they are shared with non-apprenticeship students in a DSA Master's programme. Therefore, the curriculum design team decided to protect the integrity of the teaching aspects of the programme while creating space for contextualisation and WBL through relevant coursework assessments.

A distinct approach to WBL through assessments was made possible by the integrated programme assessment framework, which has been developed by the case study HEI (Harvey et al., 2018). This allows programme teams to separate assessment activities from teaching and assess across several modules. The apprenticeship programme spans two academic years. The first year is technical topics, and the second is business focused. This paper focuses on two modules: A) a technical module from the first year and B) a business-focused module from the second year. **Figure 1** shows the first assessment A (Fundamentals of Data Analytics) of two modules covering the entire analytical pipeline (data handling, analysis and reporting).

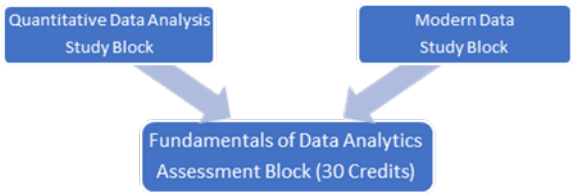

Figure 1 Assessment (A)

The equivalent assessment A task for the main MSc. cohort is an authentic assessment which reflects typical work-based tasks beyond the academic setting. The apprentices' assessment task, assessment A is aligned with the latter, but it was modified for the apprentices by mapping it to relevant KSBs from the apprenticeship standard. The work-based aspect is that apprentices are responsible for identifying an operational or business problem relevant to their employer and locating and securing access to a relevant dataset. The main task involved in assessment A is to design and implement data analysis methods to generate valuable insights from a dataset. The approach applied must be justified, and a reflection on the impact that this analysis will have on the employer's business must be added. Consequently, the apprentices are expected to engage critically with the relevant literature.

The second assessment (assessment B) includes a business-focused assessment from the programme's second year. Assessment B is an integrated assessment (**Figure 2**) exploring issues around innovation, leadership and governance and drawing on two associated study blocks that cover Ethics and Governance of Digital Systems and Digital Innovation and Strategy.

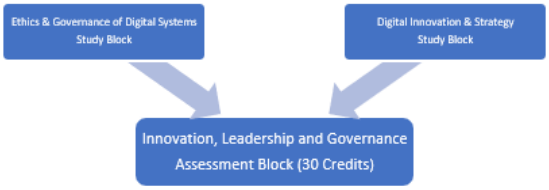

Figure 2 Assessment B

In this assessment, apprentices propose a digital transformation plan to their employer to improve a business or operational process or practice. The assessment calls on the apprentices to critically review existing academic literature and explore workplace challenges. Moreover, apprentices must reflectively explain how they will lead this plan in practice and how it might fit with the employer's existing business strategy. Apprentices also must evaluate the digital transformation plan from a legal, regulatory, and ethical perspective. This non-technical task deviates from day-to-day data analytics and encourages the apprentices to consider their employer as a strategic entity within their business environment. The aim of assessment B is also to develop the apprentices as leaders in their field of specialism, as professionals who can take ownership of specific digital transformation initiatives within their organisation and implement them.

Design challenges: Messing with the 'constructive alignment'

Introducing separate, integrated WBA for one of the cohorts sharing teaching and learning activities disrupts a standardised and widely

accepted constructive alignment between teaching activities, learning outcomes and assessment activities. Indeed, the separation between study blocks and assessment blocks initially dismantles the integration of what should be learned, how it should be learned and how learning will be demonstrated. This, therefore, requires an effort from the programme delivery team so that the standard teaching activities are constructively and simultaneously aligned to the learning objectives and assessment activities of all the programmes involved. This effort was mitigated by building on an assessment that was already designed to be authentic although not specific to a particular domain.

WBL implementation

From the point of view of the teaching team, there was an initial scepticism founded on the prospect of increased workload to support a WBA, accompanied by a concern about disrupting the well-established delivery arrangements of the standard MSc cohort. Eventually, the boundaries of the WBA were agreed upon, and consensus was reached among members of the teaching team regarding their shape, form and scope. In this way, the teaching team was assured that a new programme with work-based learning requirements would not mean a major disruption in how they organised and delivered their teaching. Beyond reaching a consensus, the assessments were embedded in existing quality assurance mechanisms (module review, external examination, exam panels and boards, etc.), guiding the academic team members through the assessment process.

Another incentive for academic staff, all research active and interested in industry collaborations, was the potential connection and networking opportunities with employers to explore opportunities for additional future collaborative projects (for example through Innovate UK and Knowledge-Transfer Partnerships).

Finally, relevant training was offered to members of the teaching team. Hence, they understood the requirements of apprenticeship provision (i.e. Ofsted inspections, ESFA requirements and funding rules, safeguarding training and Prevent duty). Several academic staff saw this additional training as a professional development opportunity and stepped forward to be involved in the apprenticeship provision (for example as designated safeguarding officers).

From the point of view of the employers, the bespoke WBA became a support mechanism for employers to make the most of the new knowledge and skills flowing into their organisation in a form that they could absorb more easily. Certainly, any new WBA brief was an opportunity for apprentices to introduce a new approach, tool, and mindset within their employer that could be used to drive digital transformation. Tripartite progress review meetings with the apprentices and the employers helped with contextualisation. Support from the programme director and the academic team was offered to explain the academic requirements and inform choices on what could be achieved within the scope of an assessment and what could be explored later.

From the learners' perspective, the main challenge is to navigate the tensions between business and academic requirements. It is often the case that apprentices will prioritise work over academic study. However, in an integrated degree apprenticeship, focusing on work-related tasks contributes to academic achievement as long as the work tasks are incorporated into an assessment framework. Supportive meetings with apprentices to discuss the business context and suitability of employer resources are essential. Discussion of the academic requirements is also quite useful to determine the scope of the WBA. Often, apprentices have more ambitious plans for certain pieces of assessment. However, those ambitions may not always be necessary to achieve a high assessment grade. In such cases, apprentices are advised to do what is enough for a high grade in the assessment and continue the work outside of the WBA framework. Employers in the programme provide feedback that WBA offers significant insights into their working practices and constitutes a catalyst for digital transformation. Apprentices are also supported through regular catch-ups with the programme director, during tripartite progress reviews, and during teaching laboratory sessions with members of the academic team. WBAs are also useful for the professional development of the apprentices. Indeed, achieving them well has

allowed learners to pursue promotions while still on the programme and, generally, organisational acceptance from colleagues and line managers.

Practical lessons and conclusions

In this paper, the authors set out to share the lessons learned from introducing bespoke integrated assessments geared towards WBL to support deploying a DTSS MSc apprenticeship programme. This programme was designed to share its teaching blocks and follow the structure of a pre-existing MSc programme in Data Science and Analytics that had been running successfully for several years. We presented here two representative assessment blocks (i.e., technical and business-focused) to explore and articulate the lessons learnt.

The case study HEI highlighted the shift in design towards WBL in three themes, 1) how the design supports learners, 2) how the design supports employers, and finally, 3) what support is needed for academics to adapt to this type of programme.

1) Learner support is essential to ensure maximum benefit from the WBL. The case study HEI introduced several supportive meetings, which, together with the frequent tripartite progress reviews, ensured WBL was beneficial for all parties. Supportive meetings and progress reviews, specifically, helped learners to a) find a balance between the academic requirements of the assessments and the needs of their employer's business; b) link WBL to their professional development and seek promotions; c) manage potential 'scope creep' and offer periodic opportunity of rebalancing work on the assessments to meet learning outcomes (i.e. KSBs).

2) Employer support is also crucial for successful WBL. The case study HEI became a value-adding mechanism, not only in the sense of facilitating the inflow of new KSBs into the workplace, but also in offering a new mindset for digital transformation. Through the tripartite relationship, HEIs should help employers realise the potential WBL could have for their organisation in the future (Basit et al., 2015). Moreover, support to understand the academic perspective and requirements to support the apprentices' learning journey is essential. Formal paperwork completed for initial assessments and tripartite progress reviews as the learner progresses in the programme further ensures the commitment from the employer to the degree completion.

3) WBL is not achieved instantly and without cost. Curriculum design choices need to be made to accommodate it. In the case study HEI, the curriculum WBL was introduced through separate assessments to minimise disruption to the successful on-campus teaching and learning activities shared with other MSc programmes. Additional support is, however, needed to maintain the constructive alignment between teaching and assessment activities.

WBL requires the support of engaged teaching staff. It is, therefore, essential to adopt a participatory approach to curriculum development and delivery. Incentives and assurances for staff and their workload concerns have helped in the case study HEI. This included training on safeguarding staff's professional development and opportunities to engage with industry partners to explore future research collaborations (Rybnicek & Königsgruber, 2019).

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