Electro-Mechanical Engineer Degree Level Apprenticeships: An initial reflection on improving distance-learner engagement and motivation

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SUMMARY

This concept paper discusses the proposed implementation of learning supports via motivational scaffolding as method for improving engagement and motivation of Electro-Mechanical Engineering degree-level apprentices at the University of Nottingham. The paper focuses on a block-release programme where a large proportion of learning occurs online asynchronously. These apprentices have generally entered degree-level study from background vastly different from typical undergraduate students. Combined with the management of their normal job with their university study, there is a step-change in mind set required to be successful on the programme. Anecdotal feedback has previously suggested that around half of the apprentices on the programme found it challenging to settle into a successful work pattern within the first 6 weeks of the programme.

The proposed intervention aims to provide learners with the environment to learn and excel rather than spending time finding the study materials, or working out what is required of them. The intervention was developed in conjunction with a focus group of apprentices and a scoping survey released to all cohorts on the programme. The success of the intervention will be evaluated over the next academic year through further feedback surveys, focus group discussions and comparison of grades and engagement of online content.

INTRODUCTION

The Electro-Mechanical Engineer Degree-Level Apprenticeship was launched in 2021 to up-skill the engineering sector workforce. Apprentice learners on the programme may have vastly different backgrounds from typical undergraduate students and may have been in employment for several years before taking the decision to study for a degree. They may have also had unfavourable learning experiences at school which negatively impact on their decision to take forward learning to a higher level. Learners study in block-release style, attending university for 4 one-week periods across an academic year, whilst working in engineering jobs. The Degree Apprentice Standard states they complete a minimum of 6 hours a week of "off-the-job" hours (Institute for Apprenticeships and Technical Education, 2020), often structured around the asynchronous delivery of teaching content through online virtual learning platforms – amounting to the learners being termed "distance learners".

Learning materials (lectures, worksheets, tutorials etc.) are released asynchronously, and the learners are required to manage their university work alongside their jobs to ensure they keep up to date – meaning they take a higher responsibility for their own learning compared to typical undergraduate students. Anecdotal evidence from Tri-Partite Reviews (12-weekly meetings between the Apprentice, employer, and tutor) has indicated that settling into a successful work pattern to manage the university workload was an issue for around 50% of the cohort in the first 12 weeks of the program. In addition, evidence from the analysis of a reflective piece of work set to the cohort revealed that the learners were very engaged and enjoyed the in-person teaching blocks; but struggled with managing and engaging with the asynchronous content. As such, this concept paper seeks to outline a proposed intervention for the engagement and motivation of apprentices for distance learning.

LITERATURE REVIEW

Distance learning is not a new concept, Sherry's review article from 1995 highlights several issues in distance learning (Sherry, 1995), many of which have not changed in the past 25 years, including the engagement and motivation of distance learners. The COIVD-19 pandemic brought a step-change to distance learning, online teaching, and asynchronous delivery of content, with Higher Education providers being forced to transform formally delivered academic content into online (distance learning) formats. As a result of the pandemic, and the resulting shift, literature published at the time suggest methods of successful asynchronous delivery (Schneider and Council, 2021, Behera et al., 2022). A strong theme across the literature is the need to shorten lectures for online delivery. Gewin discusses tips for teaching online including "Don't convert your entire lecture to video" (Gewin, 2020) and Manasrah et al. determining that for a mechanical engineering course an ideal length of video was between

6 and 10 minutes (Manasrah et al., 2021). It was also suggested that one of the best methods to increase student engagement was to deliver the content via 'live' lectures or seminars through the means of video conferencing (Young et al., 2020). Whilst these aspects are important, they are not 100% mappable to a degree apprenticeship program. Much of the literature surrounding the COVID-19 pandemic changes focus on learners participating in the program with 100% time for study, rather than part-time or as with the apprenticeship, during a job. Often, there is an element of 'head-space' required when setting out on a new task (Rubinstein et al., 2001), resulting in any task set to the apprentices taking the task length plus the 'head-space' time to switch from their job to focus fully on the university task. In addition, suggestions of timetabled 'live' lectures/seminars delivered via a video conferencing platform are not feasible with the apprentice's work schedule. When considering engagement and motivation for distance learners it may therefore be more appropriate to assess true distance learning programmes such as those delivered by The Open University. The Open University have courses which check and prepare their learners for distance learning. Reviewing their "Am I ready to be a distance learner?" (The Open University, 2019) course, there are elements of 'readiness' that match the situation of the apprentices including, time management, digital skills and learning contextualisation.

CONTEXT: THE ENGINEERING EDUCATION PROBLEM AND INTERVENTION

Consolidating feedback, and conversations with apprentices, it is apparent that there is a disconnect between the typical asynchronous delivery of academic content, and the working/learning style of Degree Apprentice students with technical (engineering) jobs. In conversation with the apprentices surrounding their backgrounds there were a number of observations made. Many apprentices have come through non-conventional entry routes to the program, and many did not particularly enjoy or engage well at school – hence choosing a route straight into the workplace (rather than an undergraduate degree). Their typical work styles amount to a task list which must be completed by a set time, with jobs allocated by the employer depending on workload rather than a project-based allocation. Finally, these work tasks typically follow a consistent format, with apprentices having one focused skill set, rather than a broad range of different tasks.

As such, it could be perceived that the work associated with university/academic tasks is a step-change for the apprentices required to move from their roles at work to being a distance learner on a degree-level course. Combined with the 'head-space' time required to switch tasks (Rubinstein et al., 2001) there is a somewhat overwhelming quantity of hurdles the apprentices must overcome into order to even learn the required content. Including, learning how to learn (many coming from non-conventional entry routes); learning where to find the

content and what needs to be completed (digital skills); completing the activities/assessments alongside performing the tasks for their job (time management). It is proposed that these barriers to learning may be lowered through the use of motivational scaffolding (Tuckman, 2007, Winnips, 2003) and learning supports embedded into the virtual learning environment.

DESCRIPTION OF INTERVENTION / PRACTICE

The proposed intervention aims to incorporate the following elements as embedded learning supports into Moodle (the virtual learning environment) to create motivational scaffolding for the learners (Gormley et al., 2012, Tuckman, 2007). To help teach better time management and set correct expectations for a piece of work, apprentices will be given an indication of the minimum and maximum time to spend on activities. As suggested by Tabak and Winnips, the apprentices will be given explicit instructions of expectations for initial tasks, leading towards more open-ended briefs as the module progresses (Tabak, 2004, Winnips, 2003), allowing learners to learn how to approach tasks correctly. An easy to navigate Moodle page will also assist the apprentices to focus on the content rather than finding the content. To further promote motivation for the apprentices, clear explanation of the need to study the topics presented will be given, helping to breakdown the learner/authority barrier that many apprentices have manifested from undesirable experiences in school.

Ensuring the apprentices have engagement with their module and their peers is also of key important. Building on The Contributing Student (Collis and Moonen, 2001) and Engagement Theory (Kearsley and Shneiderman, 1998), the use of 'virtual' discussion via Moodle Forums and creating asynchronous collaboration tasks such as the use of Moodle Wikis will help to enhance their experience.

Finally, in order to help the apprentices adjust from their typical work roles of set tasks, "Moodle Activity Completion Tracking" will be enabled (Kirklady et al., 2021) to provide the learners with a virtual checklist of activities to mimic job sheets in the workplace (Tuckman et al., 2008). Tracking also provides an element of 'gamification' as it shows progress tracking through the module (Kapp, 2012), which may help to engage the learners in a competitive manner.

These learning supports will be piloted on two different modules, a first-year Mechanics and Design module with 25 apprentices, and a second-year module Materials and Manufacturing with 33 apprentices.

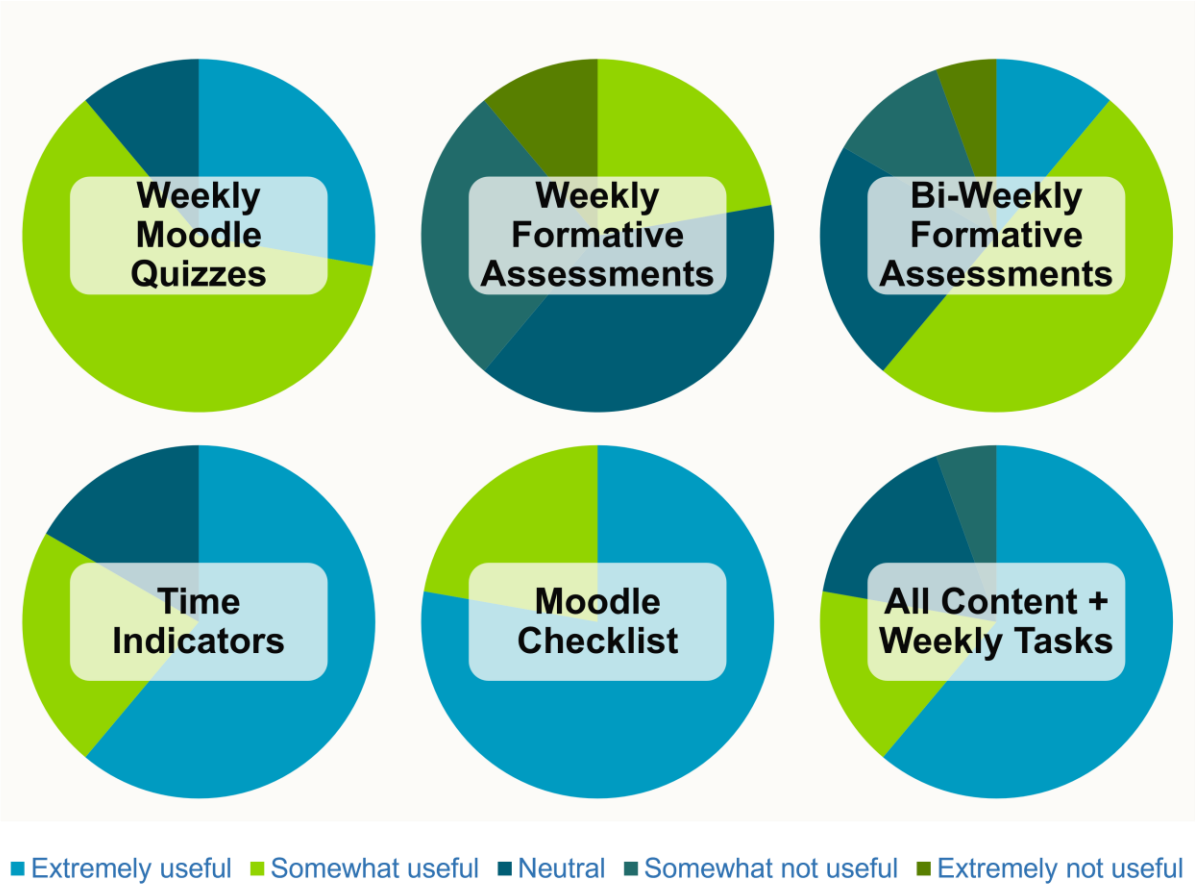
EVALUATION OF INTERVENTION / PRACTICE

The learning supports will be implemented in the next academic year and evaluated through four methods:

1. Collection of anecdotal feedback from apprentices throughout the upcoming academic year via the quarterly tri-partite reviews as well as from "Student Voice" sessions. These reviews follow an official feedback form and are used as evidence for programme performance.
2. Targeted feedback surveys to evaluate specific learning supports.
3. Focus group discussions to evaluate effectiveness of teaching across all modules.
4. Comparison of engagement of Moodle logs and the quality of work presented in assessments.

An initial scoping survey was presented to the apprentices to establish which suggestions they felt would be useful. The results were then used to determine the proposed intervention. A Likert scale (Likert, 1932) was used to establish the potential usefulness of six proposed elements to be incorporated into Moodle, the results are shown in Figure 1. The hypothesis was that these can be used alongside other learning supports to enhance the engagement and motivation of the learners.

Figure 1 Results of scoping survey given to current apprentices to evaluate potential scaffold learning supports to be incorporated into Moodle



DISCUSSION

The use of motivational scaffolding to increase learner engagement and motivation is key for these learners. Reviewing the scoping survey (Figure 1) there was a clear positive response to trying "Time Indicators", "Moodle Checklists", and "Weekly Moodle Quizzes". A suggestion had been made during the focus group discussion to have all of the content released at the beginning of a module and then have weekly indicators of what to complete. The suggestion was generally well received in the scoping survey with only 6% responding negatively to the suggestion. The suggestion of formative assessments was less well received, although in group discussions it has been requested. However, it is unclear if the use of the word "formative" is understood correctly in the context of the scoping survey and requires further investigation.

The success of the intervention will be determined through observation and monitoring of the coming academic year. If student feedback of the modules improves, if grades improve, and if asynchronous engagement increases then the intervention will have been successful.

An element of this intervention that has not be fully explored is the analysis of the additional workload for teaching staff to implement all of these suggestions, particularly with the formative assessment elements. It may be that an incremental approach is required to take a module that has low engagement for distance learners, through to an effective implementation of these suggestions.

CONCLUSIONS & RECOMMENDATIONS

There is growing evidence that apprentices on the Electro-Mechanical Engineer Degree-Level Apprenticeship conducted through block-release learning, have challenges with respect to engagement of the distance learning element of asynchronous study. The proposed intervention of learning supports as motivational scaffolding shows promise in the initial scoping survey. The learning supports will allow the apprentices to fully engage with their asynchronous learning, allowing them to excel in the programme. The success of this intervention will be evaluated over the next academic year through surveys, focus groups and comparison of engagement.

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