Higher (University) Apprenticeships in engineering technology: SME employer model

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Abstract

This project developed a model for collaboration between higher education and small to medium sized enterprises. The scheme presented a variation of the Higher Apprenticeship model, offering employers the opportunity to work with undergraduate engineering students on short-term projects whilst training was undertaken through a university-led programme of activities. Collaboration was encouraged by managing the perceived areas of risk (namely the application process, preparatory training and managed mentoring), allowing the employer the freedom to focus on the project activities.

Feedback from the participants was used as a basis for enhancements to the curriculum and the continued development of the project.

Keywords: Short-term placements, SMEs, Higher Apprenticeships, employability

Background

Established as the Borough Polytechnic Institute in 1892, London South Bank University (LSBU) has focused on providing professional opportunities for all who can benefit for well over a century. This pilot continued in the same vein by aiming to provide small to medium sized enterprise (SME) employers with students who have recently acquired valuable skills as part of their academic studies along with an ability to solve “real-world” problems with a degree of autonomy. The students would equally benefit by developing their understanding of possible future career paths whilst gaining valuable employment experience.

The issue of the employability of graduates has received much attention from the media, employers and government agencies, highlighting the importance it plays in improving economic growth (Yorke, 2006).

With the aim of enhancing the curriculum, courses were chosen where the take-up of placement opportunities needed addressing. These courses (namely the BSc (Hons) Mechanical Engineering Design (MED) and BSc (Hons) Computer Aided Design (CAD)) had an even balance of theoretical and project-oriented modules.

Whilst accepting Yorke’s view that merely providing work experience does not ensure the necessary skills to guarantee success in future employment, the considerable positive benefits to all stakeholders involved in work placements, as discussed by Brown and Ahmed (2009), concur with the experiences of academics at LSBU, particularly for courses where the ethos of placements is firmly embedded in the curriculum.

Several of the initial employer discussions for this pilot highlighted that previous experiences of training schemes had left a negative impression. There was also concern about the cost in terms of lost productivity hours (related to supervision) and the fear of an imposed rigid structure. The observations of Aslin et al. (1995), that the responsibility of “proving the worth” and developing the
partnership lies with the academic team, were a consistent theme in the early stages of this project.

**Rationale**

The aims of the project were achieved by identifying SMEs with short-term engineering projects that could be undertaken by five appropriately skilled students during the summer recess period. The placements would run over two summers, enabling the students to experience different roles. An NVQ scheme was selected to run in parallel with the placement programme, with training and support provided by the support tutor and an NVQ assessor. This methodology would be tested and the lessons learnt disseminated to help inform policy and support for this type of learning model.

Whilst developing the template for working with SMEs, it was noted that many issues were linked to the uncertain economic climate. With highly skilled staff undertaking tightly defined tasks within limited margins, some felt there was little room to accommodate a training programme. Several SMEs had been involved in some capacity with further education (FE), but collaborations with higher education (HE) were relatively unknown. This was overcome by focusing the initial contact on developing an understanding with the employer and identifying a definite need for the placement in relation to their business.

There was concern that the fast-paced, lean structure of the SME environment might not be suited to the type of schemes successfully employed in larger organisations such as Airbus (SEMTA, 2008a). However, it was hoped that the evidence-gathering process associated with the NVQ would be flexible enough to fit into the wide range of environments that might be encountered. The degree of uncertainty amongst the participating groups was similar to that reported by Graham (1993) in a similar implementation of NVQ-type assessment. A “light touch” approach was subsequently taken in both the initial meetings and interim communications.

Both the skills management workshop and the initial meetings with the employers were used to develop an understanding of the scheme, whilst emphasising the urgent need to acclimatise to their environment. Based on a self-assessment of their working environment, the students were given responsibility for selecting the NVQ modules.

**The approach**

Determining a valid and immediate employer need was considered central to the success of the project. Clearly, this could only work if the employers were sufficiently convinced that the training element would not be a burden on their day-to-day operations and that the proposed students would be a valuable asset for the period of the placement. These objectives were broadly achieved by splitting the activities into areas discussed below.

**Engagement with employers:** It was recognised from the outset that, due to the highly specialised nature of each enterprise, finding a group of employers in the SME sector would be challenging. The sector skills council SEMTA, with significant experience of working with a broad and diverse range of employers, was able to provide advice on successful schemes such as the Airbus Higher Apprenticeship programme and highlight the type of skills which would be valuable to prospective partners. They also advised on ways in which the lessons learnt from large scale projects were scalable to smaller schemes.

With respect to identifying the partner employers, a template for commonality was proposed, with the ideal partner fulfilling the following requirements:

- Technology-focused, utilising procedures and processes that could be aligned with existing programmes at LSBU
- Sufficiently structured to provide appropriate supervision and a meaningful programme for the period of the placement
- A clearly identified need (ideally a role for the student or a project) whereby a sufficiently skilled individual would be able to add value to the company business
Appropriate health and safety measures in place in line with guidance from the LSBU Employability and Careers Service team.

The resulting identification process was the result of lengthy research, numerous telephone calls and previous contacts. During this process the following observations were made:

- SMEs contacted were keen on the idea that students would be interviewed and matched to their needs by the university, as this was seen as a resource-intensive process with a high risk of recruiting the wrong type of student
- A recurrent theme amongst employers was the perceived lack of employment skills and awareness of “the world of work”; they liked the idea of students attending a skills management workshop in advance of the placement, as well as them being on courses with a high practical component
- A three-month placement was easier to commit to for a defined short-term project.

In terms of maintaining flexibility for the scheme, it was agreed that the employers would pay an allowance to cover the students’ travel and subsistence. This also made it possible for them to discuss the duration of the project in terms of work hours. It should be noted that the participating employers were able to go beyond minimum expectations and agreed competitive pay packages.

Initial conversations with the prospective employers revealed much in terms of their expectations. The most common requests were:

- The student would need to be sufficiently independent to follow instructions without the need for very closely monitored supervision
- The student would need to be an excellent communicator, being work-aware and ideally with previous employment experience (experience in the same sector was not required; however, the discipline instilled in all employees was considered vital)
- The scheme should not negatively impact on their business.

These requests became key considerations when selecting the students, as each employer was given the opportunity to scrutinise the selected candidates’ CVs and interview them in order to determine suitability.

The four participating companies were:

1. **Bromfield Precision Engineering**: Specialist in the CNC machining of precision components and systems for a wide range of manufacturing industries. This was a joint collaboration with its sister company, the Movie Camera Support Company, which designs, manufactures and supplies a range of precision parts and systems for professional optical applications

2. **Kesslers International**: Leading specialist designer and manufacturer of point of purchase displays and merchandising solutions. The company employs a highly skilled professional team of 250 personnel and has experience of supporting a variety of work-based training programmes

3. **A1 Technologies**: Supplier of highly affordable, entry-level 3D digital technologies to educational and industrial organisations across the world. Working with disciplines in design, engineering and manufacturing, the company has a philosophy of integrating these technologies to provide a complete solution (Two students were placed here.)

4. **CBC Consulting**: Independent mechanical and electrical consulting engineers with a specialist in-house sustainability consultancy. The company provides a comprehensive range of sustainable mechanical and electrical engineering and energy assessment services and is proactive about promoting opportunities for women in engineering.

As the cohort of participating students had already been identified, the selection process focused on a written application which was intended to tease out a range of qualities in the applicants that would be valuable to the employer.

Three students were selected from the BSc (Hons) MED and two from the BSc (Hons) CAD. The target cohort (level 5 full-time undergraduates) had just completed two relatively complex design
projects, so there was an expectation that they would be ready to apply this knowledge in a work-based environment.

The initial training was preparatory, with the following series of workshops and seminars being implemented before the interviews and in advance of the actual placements:

*Management skills workshop:* Run by the Careers and Development team at LSBU to develop the candidates’ understanding of what employers expect in terms of business etiquette, communication and levels of responsibility. This was also a good opportunity to manage the students' expectations of the pilot programme and gauge their opinions of the scheme from the outset.

*CV preparation and “mock” interviews:* As the intention was to match each of the five students to an employer, they would need to undergo an interview to confirm their suitability and discuss with the employer the nature of the roles. It was critical that their CVs clearly communicated the required information, whilst being appropriately presented.

*Training:* A key objective of the training aspect of the scheme was to provide a series of evidence-based competencies that could be assessed in the workplace. The level of these acquired skills was set at level four to allow the candidates to reflect on their academic studies, recognise the relevant “real-world” scenario and demonstrate appropriate competency. It was felt that the NVQ programme structure would provide sufficient flexibility for students in different roles, in consultation with the assessor, to select a framework of modules that matched their own role. Colleagues at SEMTA had undertaken a comprehensive study of Higher Apprenticeships in engineering and technology (SEMTA, 2008b). Elements of the model proposed therein were adopted for this scheme. The qualification being sought as part of the pilot was the EAL NVQ Level 4 in Engineering Leadership. It was anticipated that the participants would achieve this award at the end of the second placement.

With respect to developing an individual learning and assessment plan in agreement with all stakeholders, the initial plan stated that an LSBU academic would take on the role of assessor for the scheme; however, the registration and training required within the timescale of the project made this impractical. The alternative approach saw the outsourcing of the NVQ training and assessment element to a service provider. IPS International was selected because of the company’s in-depth knowledge of traditional apprenticeship programmes as well as its familiarity with evidence gathering and the “in-job” assessment typified by the NVQ programmes. A two-hour workshop was run by IPS International which outlined the ethos of work-based assessment, methods of evidence acquisition and the reflective nature of the NVQ scheme.

**Assessment**

At the outset, assessment of student progress would be measured against attainment of agreed NVQ modules during the first cycle of the project. This element of the scheme did not work as anticipated because of the shorter than expected duration of the placements. The focus of the assessment thus reverted back to the experiences of the students and employers at the end of the placement terms, with comparisons being made with their expectations at the outset of the scheme.

Students were asked about their expectations of the scheme during the preparatory skills management workshop. An exit interview was held with each student to determine their views on the placement, the preparation for the scheme and the NVQ.

In the initial interview, employers were briefed about the framework of the pilot and the expected outcomes. An exit interview was held to compare this to their actual experiences of the scheme. The responses are explored in the *Evaluation* and *Discussion* sections of this case study.
Evaluation

Methodology

The project was scheduled to run in two cycles in order to give each student the opportunity to experience a broader work experience. This made the evidence-gathering process required by the NVQ less obtrusive in terms of daily operations. This approach would also allow the feedback to inform the setup and implementation of the second placement for each student. To this end, it was important to get the most direct feedback possible from all of the stakeholders.

Neither a paper-based evaluation questionnaire nor lengthy interviews would elicit sufficiently critical opinions of the project, so each of the students had an informal face-to-face interview (Figure 1 outlines the questions used) and a series of employer interviews were conducted via telephone, with the focus being on five key questions (see Figure 2). The student interviews were held first to help put the placement into context and avoid background questions being asked in the employer interviews.

Due to the small sample size, a quantitative approach was not adopted. As the length of the placements and the environments were somewhat variable, caution was exercised when determining a correlation between the respective students’ experiences.

Student feedback

All of the students felt that they were given a degree of autonomy in their respective roles.

The variation in length of the placements meant that those on longer projects felt more able to adjust to the work environment. The perceived value of the experience also varied depending on the roles, but a common theme was a greater appreciation of the need to communicate effectively, prioritise personal tasks and manage time.

The students responded positively to working in different environments, emphasising that they had a better idea of what they wanted to do after graduation and, in some cases, were considering new directions. The experience left them with a greater sense of urgency with respect to their final year studies, in particular the planning of the final year project.

They felt that the technological aspects of their degree programmes had prepared them sufficiently well to deal with the projects and commented on how much of the work observed was underpinned by taught principles.

The students responded positively to the workshop sessions, commenting on the difference between their perceptions of their readiness and the adjustments that needed to be made. They were satisfied with the level of support and communication, particularly in the early phases of the project, but felt that the actual placements should have been confirmed earlier.

The group responded well to the online communication used in the NVQ assessment process, but were less comfortable with the evidence-gathering process. They felt forced to prioritise their work-based objectives over the NVQ to ensure that the placement was successful. This did not seem to match their expectations of degree level study, with some commenting that course-based training might work better.

In terms of the benefits, their overriding view was an understanding of greater professionalism and the role of effective communication. All of the students commented on their sense of pride in completing a variety of valuable tasks.

Employer feedback

In general, it was felt that the students fitted well into the organisations and demonstrated a willingness to learn; however, it was noted that there was a need to change their mindset from being students to becoming employees in terms of focus and time-managed delivery.

The responses to adding value varied according to the type of role, but the range of comments highlighted the confidence in the students’ abilities, particularly where opportunities were taken to modify and develop roles as a result of the students’ input.
The employers understood the role of the NVQ, but did not feel that the structure suited their mode of operation. Several felt that an initial briefing meeting for the NVQ, well in advance of student involvement, might have helped them to better integrate this into the placement activities.

The employers were positive about the scheme and the added value to the student. Some felt that the programme would be improved by extending the length of the placement. There were several comments advocating an industry perspective as part of the degree programme to help prepare students for the work environment.

**Post-placement student questionnaire**

**Part A: The placement**
1. Summarise your roles and responsibilities as defined by your immediate line manager at the placement company.
2. How autonomous were you in your designated role?
3. Was the period of time sufficient for you to gain a reasonable employment experience?
4. What aspects of the placement did you find most valuable?
5. Did the experience change your outlook with respect to:
   a. Your continued studies?
   b. Your future direction in engineering/employment?
6. Did your LSBU Course prepare you for the placement?
   a. If ‘Yes’, which subjects did you find the most relevant
   b. If ‘No’, what would have helped you more?
7. How did your experience help in the following areas:
   a. Organisational qualities?
   b. Communication with others?
8. Reflecting on the experience as a whole, what did you feel you got from the scheme compared to your initial expectations?

**Part B: The training programme**
1. LSBU organised the following preparatory workshops:
   - CV workshops
   - Management skills
   - Interview workshops
   - Introduction to the NVQ
   Which of these did you take advantage of and how did they help?
2. How would you describe the level of support and communication provided by LSBU throughout the scheme?
3. What are your expectations for the next phase of the project with respect to:
   a. Training?
   b. Employment experience?

**Part C: The NVQ**
1. How valuable did you find the NVQ during the placement?
2. How much support/communication did you have with the NVQ mentor/assessor?
3. How did you manage the NVQ evidence-gathering process?

**Figure 1. Post-placement student questionnaire**

**Post-placement employer questionnaire**
1. How well did the student fit into your organisation?
2. Were they able to add some value in terms of the tasks they completed?
3. Did you feel that the student was sufficiently work-ready?
4. What advice might you offer us in making the scheme better for you and the students?
5. What was your opinion of:
   a. The NVQ element?
   b. The scheme overall?

**Figure 2. Post-placement employer questionnaire**
Discussion, summary

The biggest challenge for this project was securing the placements. The economic climate has caused companies to look at staffing efficiencies, with implications for the investment in training programmes (Neild, 2008).

Several of the companies contacted were concerned that the responsibility for the student would fall entirely on their shoulders. Further discussion highlighted that, whilst many were keen to see an influx of skilled staff, general opinion was that educational programmes seemed to leave students ill-prepared for work. This led to genuine surprise that these students could add value to their organisations. Many of the SMEs contacted had been exposed to training schemes through FE but had had little or no contact with HE. In many cases, this proved to be a barrier that could only be overcome by developing confidence through longer-term partnerships between the organisations. This is in line with the observations of Aslin (1995).

To improve the student experience, a travel zone for each student was defined, only selecting companies within reasonable commuting distance that matched their skill set. This limited the search to Greater London, which seemed to have a concentration of SMEs which were more accurately defined as “micro enterprises” (i.e. less than ten employees and a turnover or balance sheet of two million Euros (European Commission, 2005)). This did not automatically rule out any organisation, but added additional challenges with respect to their structure and working environment. Of the four project SME employers, one could be classified as a micro enterprise, although it should be noted that its provision of support to the project was excellent and it received very positive student feedback.

The process of recruiting a permanent employee is costly, but this is balanced by the benefit of finding the “right person” for the job. The risks were seen as being far too great for a short-term project undertaken by an “unskilled” trainee. The model proposed here sought to remove these concerns by managing the selection and matching process for the role. Whilst the companies preferred this approach, the students felt somewhat alienated from the process. In future, students will be involved in the process of finding an employer that fits the project criteria and matches their individual skill set.

The difficulties in securing employers impacted on the duration of some of the placements, so it was difficult to judge whether extending the project duration beyond three months was necessary, although the more design-oriented projects coped well with this limit, with one employer extending the duration of the placement. This flexible approach was welcomed and in keeping with the spirit of the programme.

The NVQ programme did not work as well as anticipated. Feedback from all participants showed that this needed to be embedded at a much earlier stage, so consideration will be given to whether preparatory work can be integrated into the curriculum. Despite the structure of the modules and the closely managed relationship between the assessor and the students, employers felt that it was disjointed and un-associated with their work; students similarly found it an unfamiliar system and did not feel able to dedicate sufficient time to the evidence-gathering process. While this may be linked to the duration of the placements, the evidence of this study seems to support the observations of Ollin (2003), who questions the suitability of the NVQ framework for professional development. There is clearly a need for supplementary training; however, this needs to be explored in the context of the SME’s needs as well as those of the student.

It has been observed that there is a marked difference in the approach of the returning students when compared to their peers. Their experiences have had a positive influence on the second cohort who now consider this an ideal way to gain experience without impacting on the overall length of their study programme.

Further development

The second cycle of the project is well under way for the initial group, with many of the recommendations implemented. Work is ongoing to create a hub for closer collaboration with
appropriately aligned SMEs. Progress on both aspects will be documented for further dissemination.

References


SEMTA (2008a) Engineering a bright future for Airbus, Watford, SEMTA.

SEMTA (2008b) The Higher Apprenticeship in Engineering and Technology, Watford, SEMTA.


Further reading/bibliography


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