Work-based learning: learning and working linked through management of projects

Karen Gallagher, William Haine and Mark Hodgkinson
Engineering Academy
Derby College

Abstract
As part of on-going curriculum development, the Engineering Academy at Derby College reviewed its teaching strategies for work-based learning (WBL) to develop new pedagogic approaches based on a project module. Earlier work had suggested that a bank of WBL project proposals be developed in conjunction with major employers as a way of engaging employers to provide input into curriculum delivery and assessment. The project engaged with a number of employers, directly with business centres/departments and via training departments to discuss the viability of developing projects for our foundation degree learners. In addition, staff and student views were sought on how to improve the project module’s delivery and link it to other units within the programme. A small project team was organised to carry out this work and engage with staff, students and employers. The initial engagements were not entirely successful, but the overall delivery approach and philosophy on project generation has been changed, based on feedback received from staff and students.

Keywords: Engineering; Work-based learning; Project module; Employer Engagement; Project Generation

Background
The target group were first and second year foundation degree students on the FdEng Integrated Engineering programme. This is a franchised part-time programme from Sheffield Hallam University, delivered at Derby College, and has been developed in association with employers, in particular Rolls Royce plc. Derby College has extensive employer links, working with over 1000 companies and offering a variety of standard and bespoke programmes. Consequently, the projects are mainly obtained from companies such as Rolls Royce plc, Bombardier and Severn Trent plc, whose employees attend the programme.

The student population was mainly below the age of 22 and previously studying a mix of A-levels and BTEC National Diplomas or Certificates. The majority were participants in a Higher Level Apprenticeship programme. This programme is delivered over two years; one day per week with a common year one and predetermined pathways followed in year two.

The learning and teaching methods appropriate to the modules within the programme are varied, but individually specified for each module. In general terms, the teaching strategies employed in the programme involve a balanced mix of lectures, problem-solving tutorials and seminars, project and laboratory work, independent study and work-based learning (WBL). The total study time for a 20 credit module is typically 200 hours, consisting of timetabled class contact through lectures, tutorials, seminars, etc., with the remainder being delivered by student-centred, directed study.

The course team helped to develop the programme in conjunction with Rolls Royce plc and Sheffield Hallam University and continued to review the delivery in order to enhance the students’ learning opportunities. This revealed some dissatisfaction with the delivery of the project module. The staff identified a number of problems:
- Large amount of time wasted by students in finalising/selecting a viable project
- Students lacked skills to manage the project selection and completion efficiently
- Predominance of projects that have low value for students and employers
- Uninspiring availability of good quality projects suitable for delivery within the curriculum.

Feedback from students had indicated the same problem areas. The external examiner’s report in July 2010 had suggested that a bank of potential project proposals developed in conjunction with major employers would alleviate some of the students concerns. The programme team agreed to develop the project module further, but the STEM project enabled these plans to be progressed much more quickly.

**Rationale**

The course team and coordinator were highly motivated to respond to feedback from staff, students and the external examiner in relation to the project module. After an analysis of student feedback and staff discussions, the team proposed the notion that the efficacy of the project module would be increased through the development of a model of project-generation. It was hypothesised that this would reduce the administrative burden of project work for students, link employers to their students’ academic studies through identification of real world projects and deliver actual business benefits. However, this required engagement from employers in the development of suitable projects and would subsequently necessitate liaison between curriculum staff and students’ business managers. It was assumed that employers would be contactable and able to be engaged in the development of suitable projects. Further work would then be needed to develop an administrative mechanism to share these project opportunities with students.

Additionally, the course team was encouraged to consider whether WBL could be developed through the project and, specifically, if the project could be used as a tool for integration of the different modules across the FdEng Integrated Engineering programme. Activities and tools to engage both academic staff and students in integrating ideas across the programme were to be produced and tested, with the project module acting as a source of interdisciplinary investigation. According Entwistle, N. J. & Ramsden, P. (1983) this should develop deeper learning, as opposed to surface learning. The programme team was engaged in this development through team meetings and staff development activities.

Such a project would lead to a number of benefits, as follows:

- Reduce administrative burden for students when selecting projects
- Increase the quality of projects
- Link employers to projects and students’ studies
- Link students’ project studies to employment
- Develop projects that lead to actual benefits for employers.

Furthermore, the development of the project module would enhance students’ appreciation of WBL by demonstrating how academic subjects link with practical applications in different settings.

WBL students that are fully employed are generally very motivated and prepared to work hard in order to fit studying into lives already busy with the demands of the workplace, home and possibly a family.

Higher Education (HE) WBL takes account of the existing knowledge and expertise of the students and can be the most time-effective HE study route. Key benefits of WBL within the context of this project are that it:

- combines education and development for the ‘real world’
- offers networking opportunities, as peers will also be employed
facilitates cross-disciplinary working, spanning subjects and industry sectors
supports reflective practice and self-analysis
offers innovative methods of learning, teaching and assessment

WBL offers the ideal partnership with foundation degrees; schemes usually offer a skeleton structure which can be ‘fleshed out’ in ways that are flexible to meet the individual requirements of the learner or the industry in which they are based. Once the foundation degree has been achieved, progression can be accelerated to full honours degree with multiple step on/off points.

The approach
The approach taken was based on the following assumptions/beliefs:

- Employers would benefit from the development of suitable work-based project activity
- Successful WBL requires the involvement of the employer in the development of suitable activity
- The project module is appropriate as a vehicle to enhance WBL and would be an ideal vehicle to engage learners in the development of higher level and transferable skills in a holistic manner.

The project team devised a number of stages which constituted the approach to be taken.

Stage 1
The first stage was to undertake a literature review of WBL and project learning. This revealed a number of interesting points:

- There are a variety of definitions of WBL, from the very narrow to the very broad
- There are a number of different approaches to the delivery of WBL being used by institutions
- WBL is considered to have varying degrees of success in terms of delivery, as indicated by staff and students.

The literature review also revealed the importance of project learning specifically:

- There are varied types and approaches to the delivery of project modules
- The importance of clear assessment in the project module
- The importance of employer involvement
- The importance of student motivation.

This review was initially thought to be able to provide tactical teaching approaches to the project by identifying good practice and problems experienced by other institutions. Further data was gathered from staff and students and, together with information from the literature review, would help to develop new approaches to delivery of WBL through a project module (see ‘Rationale’).

The review definitely supported the view that employers were key to the development of good quality projects and thus the second stage of the project revolved around engaging with employers to gauge interest in collaborating on the development of a project bank and its dissemination to students.

Stage 2
This involved the project officer, the course coordinator and other staff on the FdEng programme visiting employers as part of project visits and organising specific visits to employers. This approach would then influence stage 3 in the development of a model of project-generation and refinement of the delivery of WBL.

The employer meetings had three objectives:
1. Convince employers of the benefits of providing good quality projects to students
2. Engage commitment from the employer to provide suitable projects
3. Identification of suitable contacts to champion (and thus action) the development of suitable projects and liaises with college staff to publicise these projects.

Stage 2 was unsuccessful in that employer engagement was very limited and few specific meetings took place. The reasons for this lack of engagement were:

- lack of commitment from employers in confirming meetings
- reticence on the part of those employer contacts to commit themselves or their departments
- employer views that projects were not their remit but the college’s, leading to a negative view of the benefits of meeting with the project coordinator

Stage 3

This involved engagement with students and investigating how the previous year’s students had successfully developed projects. After the feedback from employers, this stage was started earlier than planned. The initial analysis seemed to indicate that the more active the student, the more successful the project selection and quality.

Stage 3 was refined to include the development of students as a means of sourcing projects. This was combined with a further attempt to engage employers.

Stage 4

Stage 4 was developed based on the feedback from the further employer meetings and the refinement of developing a bottom-up approach. This approach was developed out of necessity, as the timing of stage 2 and 3 was around late June/July 2010 and thus the opportunity to test the feasibility of using students as a source of projects was only available in September/October of 2011.

Stage 4 was the development of the model of project-generation and refinement of WBL delivery through it. This included feedback directly from students and the external examiner. This formed part of course discussion by the staff about the project and the FdEng and the decision was reached to delay the overt development of the project module as a tool of integration within the FdEng Integrated Engineering programme. The team felt that there were a number of reasons:

- Workload already heavy
- The approach seemed contravened
- Should be student-led and not lecture-led to have impact
- Could be focused on project session.

Consequently, this aspect of the project was de-emphasised; however, the importance of the students in terms of generating projects and support for each other to encourage their motivation was identified as an area of development to enhance the project module.

Stage 5

Stage 5 involved the curriculum team meeting to discuss how to make changes to the delivery of the project module to be implemented in September 2011. This involved an analysis of the feedback from employers and students and considerations of different approaches. A definitive approach was developed and reviewed over the autumn term via informal feedback from staff and students.
Assessment

The project module has two assessment methods for each year. The assessment in each year is slightly different as the aims become more specialised as the students progress.

In year one, the students investigate an engineering topic. The overall aim is to allow them to develop research, networking and communication skills. A more in-depth knowledge of their own industry and job role is also developed. The Investigative Project culminates in a short presentation to their peers and a project report which is written and formatted in an appropriate style.

The year two project requires a slightly different approach. There is, of course, a report to be produced, but no presentation is required in the normal sense. As is common in HE, the project assessment in terms of communication is split between a viva voce and poster presentation.

The viva provides the assessing staff with a chance to investigate the depth of knowledge and learning acquired by the student. It has been very useful in judging the actual outcome of the project and overall effort made by the student in question.

The poster presentation gives the students a chance to communicate their findings to their peers in a professional but informal environment. It is assessed by staff on an individual basis by checking whether the student can communicate their project to non-experts.

This method was devised during the validation process and was heavily influenced by the previous experiences of our partner, Sheffield Hallam University, and a desire to link the project development to the top-up degree.

Evaluation

Feedback from employers:

The project team undertook five visits within three companies, leading to four informal interviews. The employers fed back that they were unable to assist in the direct development of a bank of projects. An analysis of employer feedback revealed that the important point is the nature of the students’ situations and the nature of the employers’ commercial activity. The nature of the projects and work undertaken by the students was identified as operational (e.g. maintenance and bespoke reworking of products, systems or process). This was an unanticipated factor and had a major impact on the future approach to employer engagement.

One Company within a large international business adopted a different approach to engaging with the tutoring staff via a project visit to ensure that the students’ work activity was appropriate for them to complete the project successfully. This was noted as the exception and not the norm.

Informal feedback identified time and cost constraints as reasons not to develop a bank of projects. In addition, cultural issues were a barrier. It was identified by one mentor that a prescribed top-down approach to project selection for his tutees would be considered an imposition and not supported.

The student perspective was obtained through questionnaires and informal tutorial discussion groups during the project module sessions. This activity was not as well-completed as hoped; however, feedback indicated that the length of time taken to select the project decreased and the nature of project selection was heavily affected by the students’ motivation and employer input. Surprisingly, the most important unconsidered discovery was the attitude of staff towards the project module. This was considered to be a ‘softer’ session with little input, but at one of the meetings/training sessions for the foundation degree programme a discussion about the curriculum and input from other sessions delivered by the Higher Education Academy Engineering Subject Centre led to a re-think of the module.

Discussion, summary

The project has been successful in developing an alternative approach to employer engagement and project-generation in a WBL module. As a consequence of this project and the review of the
project module over the two years, changes have been made to the module’s delivery and management.

This year has seen staff delivering the project module in year one being given direction on an agreed input into the delivery sessions with emphasis on the development of project management skills to help students manage their projects effectively in the first and, in particular, the second year (for example, the need to network with contacts and influential people has been discussed as a way of progressing a project). This has been linked to time management and aspects of engineering design in terms of developing a design brief. Discussion has taken place with students about the need to identify realistic projects and this requires consideration of a number of ideas and active progressing of the project. This links to project management in terms of developing plans and monitoring activity in a progressive manner and developing a proactive attitude. This has helped students to obtain projects quicker. As at the end of November 2011, all students have successfully identified a feasible and worthwhile project. This compares favourably to 2010, when at the same stage in the programme 60% of students had still not successfully identified a feasible and worthwhile project. This supports the adoption of the bottom up approach (i.e. the student acts as a means of generating projects). The team felt that this approach was logically valid for the following reasons:

- The student already has contacts in the business and has local knowledge, thus making them the best-placed person to engage with the employer
- Students have a vested interest in selecting a quality project that will motivate them to actively and proactively engage with their employer
- During the process of identifying a suitable and worthwhile project the students will develop transferable and employability skills. This development can be encouraged and refined as the project is completed as part of the process
- Students can develop networking and negotiating skills as part of the project-generation.

However, the team identified the need to equip the students with skills to ensure that they are competent to undertake engagement with their employer to successfully identify and select a worthwhile project. Furthermore, this can be linked to further study in terms of the skills needed to work independently and successfully when completing the final (degree) year dissertation.

The team rejected the top-down approach based on negative feedback from employers in terms of the top-down approach to employer engagement. The project team encountered resistance and cultural inertia from employers. Meetings organised solely to discuss this were organised but postponed owing to ‘heavy workloads’. When they were finally arranged, feedback indicated that there were different attitudes within organisations, with the training department being very optimistic but individual departments taking the perspective that the college would provide the learning experience. A quote from one employer illustrates this attitude: “Projects are what they do at college”. This was highlighted in stage 2 as discussed above under ‘The approach’.

The project changed, as described above. The lack of progress with employer engagement was disheartening to the project team and seemed to contradict the logic of the top-down approach. Furthermore, the good links with employers were not resulting in effective engagement with the relevant decision-makers and influential personnel. The reluctance of employer personnel to commit to the collaboration was negative and unproductive.

After consultation with students, in project sessions and informally, a student-centred, bottom-up approach was discussed by staff, based on the views expressed above. This has led to a new approach to project module delivery in years two and one for the current academic year and feedback is positive from both staff and students.

The approach taken to WBL has been developed with much more emphasis on the student being at the centre. Changes to the way in which the project module is delivered are meeting some resistance from new students, who are requesting “time just to get on with the project”; however, a structure of project sessions with input to support students has been devised.
Sessions on project management, networking and negotiating have been delivered. Students are reporting that they are more prepared and staff have indicated that students are more focused on the project selection. The project team therefore feels able to propose a model of project-generation which is based on a bottom-up approach and the notion of support for students to travel from the original project module assessment to the successful completion of a project that has meaning and benefits for both student and employer.

**Further development**

The implementation and further refinement of the project-generation model will be undertaken; however, perseverance with investigating a top-down model would be useful if funding was available to pursue such an approach.

The team is actively working on further refinement of the FdEng and will continue to review the changes made and report the impact of such activity at relevant meetings and quality enhancement review events.

**References**


This work is licensed under a Creative Commons Attribution-NoDerivs 3.0 Unported License

Publication Date: 02/04/2012