

Developing a Demand-Led Construction Management Programme in the UK

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UK Higher Education (HE) has been challenged to become more responsive to the needs of employers both in terms of making content more industrially relevant and making delivery more flexible. Through a process of engaging with employers a higher level construction management workforce development need was identified and articulated. As a solution to the problem a new masters level programme linked to work place competence was developed, guided by input from industry and informed by a new vocational mapping mechanism. This paper will reflect on the process of engaging with employers to develop the curriculum. An overview of the process will be given with an insight into what has worked well, what has been a challenge and the lessons learned.

Key Words: Construction management, employer engagement, vocational higher education, mapping

Introduction

Higher education (HE)-industry engagement has been seen by successive UK governments as an important element in addressing the UK skills agenda to increase the performance of the economy. In 2004, the UK Government commissioned an independent review of the long term UK skills needs which was to identify the optimal skills mix in 2020 to maximize economic growth, productivity and social justice. The Leitch Review's main recommendations do not provide a 'blueprint' of how the UK can become a world leader in skills (Leitch, 2006). Instead they set out areas for consideration that will provide a framework for the UK realizing its ambitions. Leitch's key recommendations (and messages) that have the potential to impact on the HE system (Leitch, 2006) include:

A rebalancing of the priorities for HE institutions to make available relevant, flexible and responsive provision that meets the high skill needs of employers and their staff [pp. 68]

The premise is that industry and higher education can both benefit by working together and stand to gain through the contribution of the other. Indeed, both the Lambert Review of Business-University Collaboration (Lambert, 2003) and the White Papers on skills (DfES, 2003, 2005) highlight the need for collaboration and closer working relationships. The need for fundamental change through more integrated working, embodying a partnership approach with the construction industry is evident in *Constructing the Team* (Latham, 1994), *Rethinking Construction* and *Accelerating Change* (Egan 1998, 2002).

This begs the question of how can HE institutions best expand the nature and extent of demand-led, flexible and responsive provision? The growing importance of skills priorities and provision from higher education was recognized recently in both in the strategies of the Department for Innovation, Universities and Skills (2007) and HEFCE (2007).

UK Academic and Vocational Awards

The UK educational landscape comprises of traditional academic qualifications awarded by HE institutions such as bachelor degrees, master degrees and doctorates and vocational awards such as National Vocational Qualifications (NVQs). NVQs are based upon National Occupational Standards (NOSs) and are recognized by UK industry as defining minimum levels of competency for particular occupations. NOSs describe the minimum competencies which apply to a job role in the form of statements which relate to performance and understanding (in addition to the evidence required to demonstrate these). NOSs are developed by representatives of each occupational area. Traditionally, there has been very little synergy between the academic and vocational

qualifications and this created two separate systems with different assessment strategies, philosophies, lengths and levels of study. NVQs have no fixed length and require the learner to collect evidence of performance and understanding in a portfolio before submitting for assessment. Many of the large construction companies in the UK employ trained NVQ assessors and programmes resulting in an NVQ award can be found in many further education colleges. NVQs cover a range of sectors and have 5 levels. Level 2 is the accepted minimum standard of competence for craft roles within the UK construction industry. Table 1 gives the level descriptor for each of the NVQ levels.

Table 1. UK NVQ level descriptors taken from the Construction Industry Council Construction Management NVQ Level 5.

NVQ Level	Descriptor
5	Competence which involves the application of a significant range of fundamental principles across a wide and often unpredictable variety of contexts. Very substantial personal autonomy and often significant responsibility for the work of others and for the allocation of substantial resources feature strongly, as do personal accountabilities for analysis and diagnosis, design, planning, execution and evaluation.
4	Competence which involves the application of knowledge in a broad range of complex technical or professional work activities performed in a wide range of contexts and with a substantial degree of personal responsibility and autonomy. Responsibility for the work of others and the allocation of resources is often present.
3	Competence which involves the application of knowledge in a broad range of varied work activities performed in a wide variety of contexts, most of which are complex and non-routine. There is considerable responsibility and autonomy, and control or guidance of others is often required.
2	Competence which involves the application of knowledge in a significant of varied work activities, performed in a variety of contexts. Some of the activities are complex or non-routine, and there is some individual responsibility or autonomy. Collaboration with others, perhaps through membership of a work group or team, may often be a requirement.
1	Competence which involves the application of knowledge in the performance of a range of varied work activities, most of which may be routine and predictable.

Individual learners who study both academic and vocational awards are at risk of duplicating learning. This is due to some of the vocationally relevant understanding and academically relevant application appearing in both academic and vocational awards. The industrial importance of NVQs, particularly at higher levels, has recently increased due to the introduction of the ConstructionSkills Certification Scheme (CSCS) cards.

ConstructionSkills is one of 25 Sector Skills Councils (SSCs) which are Government recognized, industry-focused bodies established to address the development of skills and training within economically or strategically important sectors. An appropriate CSCS card is required to practice on most public sector funded projects and is rapidly becoming required by many of the large private contracting companies within the UK. The objective of CSCS cards is to improve quality and reduce accidents within the construction industry. They are acquired by completing an appropriate level NVQ and the correct level of health and safety training. In some occupations professional membership provides a route to acquiring a card. CSCS cards are available in three categories; craft and operative, construction related occupations and technical, supervisory and management. Within the technical, supervisory and management category there are three levels of card available (gold, platinum and black). In order to obtain a black card an individual must attain a related NVQ level 5.

Triggered by the current Government agenda and in response to the Leitch report, this paper describes activity whereby employers, ConstructionSkills and other interested stakeholders were brought together to diagnose a higher level construction management skills need. Once diagnosed, the need was explored and articulated and a new masters level programme developed in response. The industry engagement which surrounded the programme development is described and the impact of the engagement on the resulting programme is discussed. In order to develop the new programme a mechanism to link or 'map' vocational and academic requirements was established and the role of construction manager interrogated to ensure that the curriculum of the new programme would be suitable for industry's needs. The delivery of the programme was designed with

the employers to minimize disruption to the workforce. This will be presented along with some ideas on how the programme may develop in the future and how the lessons learned can inform future 'demand-led' initiatives.

Aims & Objectives

The new programme was to respond to the following industrial need, articulated by a senior training manager of a large UK based construction company:

"We would be interested in looking at some form of HE input into a scheme to assist managers in moving from Platinum CSCS/Chartership to Black CSCS status (i.e. the Site Manager to Project Manager, Senior Quantity Surveyors to Commercial Manager) transition.

Current education provision, be it degree or [professional] qualifications provides the underpinning knowledge for Level 3 and 4 NVQs that lead to Gold and Platinum CSCS cards but the transition to more senior positions tends to be more experiential and less structured.

In these CSCS days Project Managers, and their equivalents, will need to obtain a Level 5 NVQ and I would like to look at some form of modular training/education scheme, mapped to the NVQ outcomes that could provide the underpinning knowledge for managers to then translate into on-site practice to demonstrate competence for their NVQ Level 5.

I would envisage that the content of this training/education would be found in a new variant of a postgraduate qualification [providing the underpinning knowledge and understanding] such as an MSc in Construction Management and so it would be a case of mapping those to the NVQ L5 standards. I further envisage a scheme being delivered in modules such as block release or online [delivery] and assessment to gain ... accreditation towards an academic postgraduate award - such as a certificate or diploma - being an option."

In order to satisfy this need the programme need have a suitably designed curriculum to map to the knowledge and understanding components of the NVQ Level 5 in construction management and be delivered in such a way as to be accessible for practicing managers.

Method

The method is described in two sections. The first describes the industry engagement surrounding the programme development and the second will focus on the linking of vocational and academic qualifications and exploration of the construction management job role relating to curriculum.

Industry Engagement

The fundamental need was first identified through a HE-industry forum exploring how HE and industry could work more closely together. The forum included representatives from the School and industry as well as other stakeholders who had an interest in promoting industry-education relations such as ConstructionSkills. During an employer presentation the need which is described in the aims and objectives section was presented.

The initial HE-industry forum was followed by a series of smaller, informal meetings between the company driving the programme development and the School. These meetings allowed more time for the School to develop a deeper understanding of the industrial problem and for a business case and plan to be put in place. The School secured funds from the Higher Level Skills Pathfinder which is a Higher Education Funding Council for England project managed and administered by the North West Universities Association. The funds allowed a development project to be established to further explore the industrial partners' needs and develop a higher level skills solution.

One method which applied throughout the whole of the engagement was to work with a small focused group of employers at the School to create and develop ideas for curriculum and delivery. These ideas were then taken to meetings outside of the School where a larger numbers of employers were present to test them against a wider sample group. This approach was very successful at judging the wider industrial relevance of the programme and preventing programme development based on the needs of a single or small group of employers.

Once development funding had been secured a steering group was formed to oversee the development of the programme. The steering group comprised of 4 large employers, representatives from the School (including the Head of School and project team) and other stakeholders such as a representatives from ConstructionSkills and the North West Universities Association. The steering group acted as an excellent platform to diagnose how provision could be aligned to the employers needs particularly with respect to curriculum development and delivery mode. Three steering group meetings were held at key stages throughout the programme development. The aim was to target the engagement in order to make it as efficient as possible (i.e. use the minimum amount of employer time for maximum impact). The first steering group meeting addressed the project goals and curriculum needs. The second steering group approved the curriculum development including vocational to academic mapping mechanism described below and set the mode for delivery. The final meeting established the fees for the programmes and gave final approval of the structure before the programme entered the institutions validation process. The steering group was consulted on each aspect of the programme development including the development of the mapping process which formed the basis of the content of the qualifications. Their input shaped programme structure, delivery mode, contact time, programme fees and programme content.

When decisions were needed to be made quickly employers were available ‘off-line’ by telephone and e-mail to input and comment on each decision.

Programme Development Process

Two main activities supported the programme development process. The first was the development of a mapping mechanism which allowed the writing of an academic programme based on a framework created from vocational NOSs. The second was the scoping of the construction management job role using a skills survey carried out on the current practising workforce of two of the steering group members.

Mapping mechanism

NVQs are very structured, carefully described qualifications. They are formed of core and optional modules each of which comprises of sub-units. Each sub-unit is described by ‘knowledge and understanding’ and ‘performance and process’ evidence requirements which are both linked to performance criteria. The evidence requirements and performance criteria are further described by both a depth and range of knowledge. Table 2 shows the level descriptors which describe the depth of knowledge required within an NVQ qualification.

Table 2. NVQ knowledge level descriptors

Knowledge Level	Descriptor
Evaluation	“ Know how and why to weigh up ideas and make a judgement ” – the highest level of understanding which requires the ability to consider the values, qualities and significance of subject matter from an authoritative point of view, so that decisions and judgements about something can be made.
Synthesis	“ Know how and why to bring together in order that something can be decided or acted upon ” – which requires the ability to draw together and relate different aspects of knowledge. This level is often needed on more substantial topics/subjects, normally so that a plan to do, or organise or recommend something can be made.
Analysis	“ Know how and why to examine information in order to understand, explain or predict ” – which requires the ability to examine the topic/subject matter for a purpose
Application	“ Know how to “ – which requires the ability to apply an understanding of the topic/subject i.e knowing how to do something
Understanding	“ Know what and why ” – the lowest level which requires only basic comprehension of a topic/subject.

If each evidence requirement is considered to be a small learning outcome then it would not be unusual for a typical NVQ qualification to contain 300 to 400 of these learning outcomes. This compares to between 30 and 40 in a typical masters degree qualification of 180 credits. Credit refers to the credit awarded in the UK HE system for a section of learning which takes approximately 10 hours to complete. These 10 hours are not all contact time and, among others, can be made up of guided learning and assessment driven learning. The learning outcomes in higher education are broad and challenge a learner to think beyond current practice whereas NVQ learning elements are firmly grounded in current practice and industry need.

The aim of this programme was to provide the underpinning knowledge and understanding for the NVQ qualification. Because the performance and process evidence would be acquired and assessed by the companies in the workplace these could be discounted and did not need to appear in the programme. Each of the knowledge and understanding evidence requirements were then written as mini-learning outcomes keeping the performance criteria in mind. This created a series of over 300 mini-learning outcomes, far too many to consider basing an academic qualification upon. The next step was to consider the level descriptors presented in table 2. Since the lower two levels, understanding and application, cannot be recognised as describing masters level study they were filtered out. After the filtering step each of the 16 NVQ modules were described by approximately 15 learning outcomes. Still a large number but far more manageable than pre-filtering. These learning outcomes were arranged in two different ways, firstly in level of knowledge which provided a hierarchy of depth of knowledge and secondly into the categories of knowledge, application, innovation and transferable skills. Once arranged in this way common learning outcomes were grouped together to form learning packages which in turn formed modules. Traditional HE learning outcomes were then authored based upon the collection of mini-learning outcomes generated from the NVQ. It is important to note that when the programme material was being written the range of knowledge was used as reference guide to form the syllabus. All of the mini-learning outcomes removed in the filtering step are present in the range; meaning that although they were filtered out they were not excluded.

Once the mapping was complete four 30 credit masters level modules were each described by 8 – 10 learning outcomes. Although slightly longer than traditional learning outcomes they were not so different to cause problems in either validation or creation of the programme material.

Skills survey. A simple skills survey was design in order to confirm that the content of the NVQ was appropriate as the basis of the qualification. For each sub-unit within the NVQ current practising construction managers were asked to rate on a scale of 1-5 how often they used that skill in their job function. They were then asked to rate on a scale of 1-5 if they thought they possessed the required level of knowledge and understanding to support the application of that skill. Finally, they were asked where they obtained their knowledge from. There was an opportunity at the end of the questionnaire to list any skill areas that were missing. 30 responses were received from current practising construction managers from 2 large contracting construction companies.

In order to provide a base line for comparison the training managers from the companies filled in an ideal response for each type of construction manager. This then provided both a base line for developing the programme and for comparing the skills sets of the current workforce.

Across the entire range of knowledge areas, when asked if they possessed sufficient knowledge to apply a skill in the workplace, the average response from the practicing construction managers was 3.8 out of 5, with only 12 of the 64 areas scoring less than an average of 3.5 and none falling below 3. This indicates that on average the managers felt they had a good level of knowledge across the skills areas investigated. Without exception, the managers always scored highly in possessing knowledge and understanding if they thought that the skills area was part of their day to day job. Given this type of self-evaluation of level of knowledge there could be a tendency, particularly in confident people, to score themselves highly on all the skills areas.

More telling was the response when asked how often on a scale of 1-5 a skill is applied in the workplace. Respondents were allowed to give their own job role and following this the data was categorised into project directors, project managers or coordinators, design managers and commercial managers. When analysed and compared to the ideal responses generated by the employer it became clear from the data that for some roles there were differences between the employers expectations and actual workplace activity. This was particularly true in the case of commercial managers; health and safety managers; design managers together with budgeting and finance managers.

This study was enough to convince the employers that the programme had merit beyond simply allowing access to the black CSCS card and was actually addressing knowledge gaps in their workforce. This was brought into focus when the above findings were placed in context with the responses to the final question of where did you acquire the knowledge and understanding? Respondents selected from experience, coaching, academic qualification, NVQ and other. On average 83 % of the knowledge came from either experience or mentoring. One employer summed the results of this survey as *having a group of managers who believe their role is one thing, when in fact it is another, but despite this they are convinced that they can do everything when in fact they have been tested on very little*. This was judged by the employers involved in the development of the programme to be a significant risk.

The results of the skills survey helped further articulate the need for the programme and focus the development of the curriculum. This approach is now being used to help inform the development of other new programmes within the School.

The skills survey will form the basis of an employer curriculum review. On completion of the programme learners will be asked to complete a modified skills survey. This will allow the School and employers to judge if the programme curriculum is supply the correct levels of knowledge in the right areas.

The Programme

The programme comprises of four 30 credit NVQ mapped modules each broken down into six 5 credit learning packages. The four modules are project management, procurement, people management and finance and risk management. These four modules (120 credits) form a postgraduate diploma (PgDip) in construction management which when supplemented with a 30 credit practice project and 30 credit industry problem give the full masters degree in construction management. The materials for the programme were authored using a ‘buddy’ approach. An industrial practitioner was ‘buddied up’ with an academic to ensure that material was both of sufficient quality and industrial relevance. The material is developed based upon the learning outcomes generated through the mapping process to ensure that all of the elements for the NVQ are covered. Figure 1 shows the structure of the programme.

YEAR	1			2			3		
SEMESTER	1	2	3	1	2	3	1	2	3
Full-time (September start)	A B	C D	G	A B	C D	G	A B	C D	G
Full-time (February start)		C D		A B	G				
Part-time (September start)	A	C		B	D	[E]	[F]		
Part-time (February start)		C		A	D		B	[E]	[F]

Legend

A Finance & risk management (30 credits)

B Procurement (30 credits)

C Project management (30 credits)

D People management (30 credits)

[E] Workplace project (30 credits)

[F] Industrial project (30 credits)

G Dissertation (60 credits)

Figure 1. Programme structure. Three separate intakes of the Full-time September start are shown.

The programme is available full-time, part-time and distance learning. Unusually for the UK, the programme is delivered over 3 semesters (i.e. over the summer) meaning that the PgDip can be achieved part-time in just over a year. Part-time learners study using an interactive virtual learning environment (VLE) through which they have interactive tutorials every week. In addition to the online tutorials, learners attend the campus for a one day induction to the programme and 3 days of workshops per module. The amount of contact time for the programme was negotiated with the employers involved in the programme development.

For the learners studying part-time and practicing in industry module assessment is driven by their workplace experience. Assessment is based upon the reflection on workplace activity. Learning which takes place is contextualised within their practice while at the same time ensuring that the learning adds value to the workplace.

The programme is now fully operational and had an intake in both March and September 2008 with 25 students on the programme. The first cohort will graduate with postgraduate diplomas in the summer of 2009. There is already significant interest in the February 2009 intake. The first cohort of 10 learners comprised of 8 who came from traditional graduate programmes and 2 who gained entry onto the programme through accreditation of prior experiential learning (APeL).

In a straw poll conducted in one of the part-time module workshops all of the students expressed that without this programme they would have reached the end of their continued professional development and would not have known what to do next in order to progress onto become construction managers.

Although the driver for the industrial partners to be involved in this project was to develop an academic award to support the attainment of NVQ level 5 in construction management to facilitate acquirement of a black CSCS card the skills survey illuminated another reason why they should be involved.

Conclusion/Summary

Through a process of engaging with industry, developing a mechanism to link vocational and academic learning and investigating the skills and knowledge requirements of practising construction managers a new masters level programme has been developed which leads to either a PgDip or MSc in construction management. The programme supports the attainment of an NVQ Level 5 in construction management by providing the underpinning knowledge and understanding which in turn supports the attainment of a black CSCS card(and badge to practice).

The process of industry engagement has fed into each aspect of the programme development which has created an award in which the curriculum is relevant to industry and the mode of study aligned to the needs of the workforce.

The programme currently has 25 learners enrolled and the first cohort will graduate in the summer of 2009. The first programme review will take place at the end of 2008 and will involve the employers who contributed to the development of the programme.

References

- Construction Industry Council Construction Management NVQ Level 5 is available at www.cic.org.uk.
- Department for Innovation, Universities and Skills, (2007), World Class Skills: implementing the Leitch review of skills in England, TSO, London.
- DfES, (2003), The Future of Higher Education, White Paper, Department for Education and Skills, London.
- DfES, (2005), Skills: Getting on in business, getting on at work, White Paper', Department for Education and Skills, London.
- Egan, J. (1998), Rethinking Construction, Department of Environment, Transport and Regions (DETR), UK.
- Egan, J (2002) Accelerating Change: a report by the Strategic Forum for Construction (Chaired by Sir John Egan), Strategic Forum for Construction, London.
- HEFCE, (2007), HEFCE Strategic Plan 2006 –11 (Updated April 2007), HEFCE, Bristol.
- Lambert, R. (2003), Lambert Review of Business-University Collaboration, HMSO, Norwich.
- Latham, M. (1994), Constructing the Team. Joint Review of the Procurement and Contractual Arrangements in the UK Construction Industry, HMSO, London.
- Leitch, S (2006) Review of Skills, Prosperity for all in the global economy – World Class Skills, HMSO, Norwich.

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