

EFFECTIVENESS OF THE CONSTRUCTION MANAGEMENT COURSES

Kevin McArdle, Joseph G. Gunning¹ and John P. Spillane

School of Planning, Architecture and Civil Engineering, David Keir Building, Stranmillis Road, Queen's University Belfast, Belfast, Northern Ireland, BT9 5AG, UK

This research assesses the effectiveness of current MSc. Construction Project Management programmes within the UK and Ireland. A review of published prospectuses is used to create questionnaires for universities, graduates and employers. Responses provide an insight into programme creation and their relative success in addressing the needs of industry and in achieving other educational objectives. Since the majority of learning institutions have attained professional accreditation, it is useful to review these awards and to assess their potential value to both graduates and industry alike. Interviews are conducted with representatives from the main professional accrediting bodies to understand their procedures and rigour in enforcing standards of education and training. The results show that project management education could be further enhanced by the inclusion of more practical learning and that current programmes place greater emphasis on hard skills at the expense of the softer human skills. There is clearly a need for a closer working relationship between academics and practitioners to tackle the perceived gap between theoretical learning and construction practice. Learning institutions can use the findings to improve their programmes and address the education deficiencies identified by the industry, by the professional institutions and by graduates.

Keywords: education, professional accreditation, project management.

INTRODUCTION

In an ever-developing industry such as that of the construction sector, demands are constantly changing, placing new requirements on education providers to create courses that adequately prepare graduates for the workplace. Variable factors such as the economy, technology and environmental awareness continue to dictate the direction of teaching. An investigation was conducted into the content of MSc Construction & Project Management programmes throughout the UK and Ireland, with a view to identifying critical success factors. Communication with industry, academics and graduates from these programmes has identified how these courses have been designed, and examined how reflective they are of the current skills and knowledge areas required for the workplace. The research reviewed the learning environments and accreditation from professional bodies. The need for further

¹ jg.gunning@qub.ac.uk

education and training in construction and project management has been recognised by organisations and professionals globally. Several authors have claimed that the development of the professions deriving from traditional routes is becoming out-dated with the underlying theory of project management becoming obsolete (Koskela and Howell, 2002).

In recent years, greater emphasis has been placed on the quality (Akintoye, *et al.* 2000; Love, *et al.* 2000), value for money (Li, *et al.* 2007) and health & safety (Sawacha, *et al.* 1999; Edwards and Nickolas, 2002) of projects. This has required the establishment of a bespoke role to manage construction projects, leaving architects and engineers to focus on their own design specialisms. The discipline of construction project management has developed, along with recognition of the need for dedicated training in this area.

Postgraduate study has been a popular method of Continuing Professional Development (CPD) for those in the construction industry (Graham and Thomas, 2006). MSc level degrees are delivered as taught programmes or through research. A taught Master's typically includes lectures, coursework, examinations and assigned projects. Most Higher Education Institutions (HEIs) give the option of studying 1 year full-time or 2-3 years part-time, both of which comprise of 180 CATS credits (equivalent to 90 ECTS credits). Curriculum development is influenced by a number of stakeholders; government, construction industry, academia, professional bodies and associations. This research examined all 39 institutes in the UK and Ireland providing construction project management courses at postgraduate level. Each programme was examined to identify content similarities and 25 modules were highlighted. The relative similarity of modules across all the programmes reflects the development and growth of the profession. During the early progression of programmes, institutes tend to deliver a diverse range of modules with little correlation or similitude. This is reflective of a young academic discipline. The general uniformity in current curriculum content suggests that the skill set of a Project Manager has now been successfully characterised, resulting in a generalised programme design. The similarities between courses represent an academic consensus of the knowledge areas and skills required to be an effective project manager.

THE LINK BETWEEN ACADEMIA AND INDUSTRY

The construction industry relies heavily on third level institutes in providing an ample supply of competent construction project management graduates (Love, *et al.* 2003) with industry partners indicating that construction graduates should be proficient at undertaking skilled technical tasks from an early stage (McNamara, *et al.* 1997). However, Chan, *et al.* (2002) indicate that there is a mismatch between academia and the industry, particularly within the UK. Not only are soft skills important in the employability of graduates (McNamara, *et al.* 1997), but also their technical and practical ability. Chileshe and Haupt (2007) argue that there are both positive but also negative aspects associated with this relationship. One of the key findings concludes that academic education is not fulfilling the needs of the industry and thus a void is present between what academia provides and the needs of the industry. Esmi and Ennals (2009) aptly summarise by arguing that there is a core issue in relation to a perceived void between rhetoric and reality in the application of knowledge. It is of fundamental importance that the knowledge gap between what academics are delivering and what the industry requires is identified and corrected promptly. With such a void palpable and pronounced, it is essential, not only for the development of

the sector but for the future employability of UK construction and project management professionals, that this perceived gap between academia and the industry be removed, and that there are an increasingly closer links between the two sectors.

PROJECT MANAGEMENT ASSOCIATIONS

Over the years, various associations such as the Project Management Institute (PMI) have been formed, establishing and publishing their interpretation of project management best practice. These organisations are not strictly concerned with construction management; however, by examining these expert associations, the project management element of construction and project management programmes can be scrutinised. A synthesis of the various bodies of knowledge, codes of practice and other publications from these bodies suggests the following 11 knowledge/skill areas;

- Project Management & Integration - Ensuring proper coordination of all project elements.
- Monitoring & Control - Processes for timely completion of the project.
- Risk & Crisis Management - Highlighting potential risks and mitigating actions taken.
- Human Resource Management & People Skills - effective use of the people involved.
- Communications Management - Timely and appropriate generation, collection, dissemination, storage and ultimate disposition of project information.
- Quality Management - Ensuring that the project will satisfy its purpose(s).
- Information Technology – Implementing the latest in I.T. to aid project delivery.
- Teamwork and Motivation – Getting the most from the project team.
- Procurement – Acquire goods and services to attain project scope.
- Financial & Cost Management – Project completion within the approved budget.
- Scope Management – Ensuring that the project includes all the work required and only the work required to complete the project successfully.

Project management consists of a number of interlinked processes directed towards a particular result, namely the defining, planning, executing, controlling and delivering of a project (Schwalbe, 2009). The review of project management association literature has highlighted that these five process groups provide a framework for understanding project management in general and one that is applicable to any industry. HEIs generally ensure that their project management modules include most or all of the above areas in order to provide a holistic view of the discipline.

Professional Accreditation

Learning institutions aspire to provide courses which will prepare their students adequately for industry. To demonstrate their commitment to delivering programmes to the necessary standard, many education providers seek professional accreditation. Such accreditation tends to govern many university programmes, and these organisations establish their own standards upon which to judge education provision. Such accreditation is an important accolade and can be a powerful marketing tool for universities. Table 1 provides a summary of the core knowledge areas which have been established by the three primary professional bodies from which accreditation in

the discipline of project management is generally sought within the UK and Ireland. These are the accreditation requirements of CIOB (2010), RICS (2011) and APM (2011), from which organisations further information is available.

Table 1: Primary Knowledge Areas of the CIOB, RICS and APM

CIOB Educational Framework	RICS – APC Competencies	APM – BoK
Construction Technology	Conduct, Rules, Ethics and Professional Practice	Project/Programme/Portfolio Management
Construction Economics	Sustainability & Client Care	Project Success and Benefits Management
Construction Law and Dispute Resolution	Communication and Negotiation	Stakeholder Management
Risk Management	Risk & Health and Safety	Project Management Plan
Research Methods	Accounting Principles and Procedures	Project Risk Management
Health and Safety	Business Planning	Project Quality & Value Management
Professional Ethics	Conflict Avoidance, Management and Dispute Resolution Procedures	Health, Safety and Environmental Management Systems
Sustainability and the Environment	Data Management	Scope & Change Management
Project Management	Managing People & Team Working	Scheduling & Resource Management
Construction Contracts and Procurement	Contract Practice	Budgeting and Cost Management
Project Planning, Monitoring and Control	Procurement and Tendering	Earned Value Management
Cost & Quality Management	Programming and Planning	Information Management and Reporting
Construction Life Cycle	Construction Technology and Environmental Services Leadership & Project Administration Project Process and Procedures	Issue Management

Many similarities can be observed between their assessment criteria, which primarily incorporate report based assessments coupled with university visits and module review. Higher Education Institutes are faced with the decision of which accreditation path to take. Each accrediting body stipulates similar knowledge areas, making them more difficult to differentiate. The value associated with each award is dependent on the reputation of the awarding body; in this case the institutions are all internationally recognised and established, and so are attractive to potential MSc students.

RESEARCH METHODS

This particular investigation involved examining 1) the attitudes and responses of new graduates and people in industry regarding how effective current MSc. courses are in developing practical construction and project managers, 2) the approach taken by

academic accrediting bodies to ensure that learning institutions are delivering valuable and relevant programmes, and 3) assessing how HEI's are creating and developing their courses to suit the needs of industry.

In order to acquire the relevant information to assist in the deduction of a reasoned conclusion, it was essential to obtain information from industry professionals and graduates alike. In order to achieve this, a mixed methods approach was adopted in the form of both qualitative and quantitative data collection using a desk based literature review, semi-structured interviews and respondent specific questionnaire survey. This method of data collection was chosen due to the large number of respondents which were hoped to be surveyed from academics, industry and graduates. It was decided to conduct interviews with representatives of the three professional bodies to ascertain their viewpoints on the research topic. The interview process was semi-structured to ensure that the interviewee had the freedom to discuss the matter at hand while also providing the interviewer with a certain amount of control over proceedings, although not introducing a level of bias. Each interview was recorded and the resulting transcripts analysed using Cognitive (Mind) Mapping to ascertain and link the key points noted within each interview. Bespoke questionnaires were designed for each of these groups to elicit data to satisfy the research requirements and assessed accordingly. From the qualitative data collection, a number of key areas of consideration were included in the questionnaire; Bodies of Knowledge, renewal, accreditation and assessment. Questionnaires were circulated to 39 course directors, 180 industry practitioners and 120 graduates - with respectively 6, 25 and 31 questionnaires returned.

DATA ANALYSIS & FINDINGS

Academic Questionnaire

From the returned data it was clear that the HEIs take inconsistent approaches to course development, updating and assessment. Some universities take a very proactive approach in the identification of current issues to include in their curriculum, while others map in accordance with the learning outcomes outlined by accrediting bodies. The survey indicated that major internal reviews of curriculum content occur every 4 to 5 years. Academics indicated that they are mainly restricted by time in programme development. Other factors highlighted included;

- Modular delivery –broader teaching and collaboration is necessary; however modular design does not completely suit this approach
- Financing –postgraduate programmes are more expensive to run in comparison to undergraduate courses. Financial constraints limit the options available to course directors, with only 8 HEIs offering a wide range of optional modules
- Staffing –Lack of breadth of expertise impedes the development of modules in emerging subject areas

The majority of the institutions investigated do not require prior industrial experience of construction industry processes as a prerequisite for acceptance onto the programme. The research suggests that this limited practical experience needs to be acknowledged by HEIs and addressed accordingly. In many respects, the learning needs of experienced, mature students differ from those with limited exposure to industry practice, so programme design should try to incorporate means of satisfying these varying requirements within a single course.

Graduate Questionnaire

Out of the 31 respondents to questionnaires, 87% were male, and the average age was 26.5 years. The results revealed general dissatisfaction with programmes with common criticisms including;

- Majority of skills necessary for project managers are acquired in the workplace
- Insufficient practical assignments and the perceived limited industrial experience of many academic staff
- The academic process is too far removed from the construction industry, with too much emphasis placed on reports and research
- Students are not prepared to a level adequate for immediate employment, however knowledge gained may become of greater value as career develops

There was a general view from graduate respondents that they regarded MSc programmes as vocational training rather than as an educational experience for its own sake. If it is true, as Skinner (1984) suggests, that “education is what remains when what has been learnt has been forgotten”, this focus on job training may be considered short-sighted. However, younger graduates would claim that they cannot afford a longer term view in the current recession. The respondents suggested that programmes could be improved through the inclusion of; regular field studies, site visits, industry professionals delivering lectures relevant to current practice and modules covering building information modelling and supply chain management. To supplement the findings, graduates were asked to rank a series of statements based on the Likert scale where 1-Strongly Disagree runs up to 5-Strongly Agree;

Table 2: Graduate questionnaire factors and results

Statement	Mean Score	Rank
Placement or industrial practice alongside academic teaching would be more beneficial	4.581	1
Courses providing optional modules to facilitate specialisation would be advantageous	4.029	2
Masters programmes have been developed which use a single common project as a reference for all modules; this would be a beneficial teaching method	3.677	3
More emphasis should be put on the development of soft skills	3.516	4
Dissertation/thesis production and topic selection can prove greatly beneficial to a student’s future career	3.355	5
Online MSc's and distance learning programmes have been created that allow project managers to remain in employment and mobile, this is a good innovation	2.968	6
International fieldtrips should be made compulsory on programmes	2.170	7
Education providers are offering what is necessary to deal with construction projects in today's environment	2.581	8

Industry Questionnaire

Industry respondents revealed that graduates are insufficiently trained in the areas of programme management, competent use of CAD, “real world” knowledge and experience, business acumen (in so far as this can be taught), people skills, communication and negotiation skills, on-site methods and construction processes,

and current building regulations. The respondents stressed the importance of placements and actual industry experience. It is suggested that graduates, by definition, are knowledgeable in the theory of their subject area; however, they often lack the confidence to apply that knowledge to real life situations. This may only be developed over time, as they gain experience. Employers want experienced graduates. This raises the issue of whether or not students should be allowed onto MSc courses without post graduate industrial experience. If employers are unwilling to take on inexperienced employees due to training costs, why do learning institutions still continue to supply this type of postgraduate-qualified person to the industry?

The industrialist and graduate respondents were both asked to rate on a 5-Point Likert Scale, the identified modules from all institutions in order of their current importance and relevance. This provides HEIs with the opportunity to assess and highlight the inclusion and importance weighting of the various modules are perceived by both construction industry employers and graduates;

Based on factor analysis of these results, a correlation coefficient of 0.78 emerges, indicating that there is a very high positive correlation between the order of importance and relevance attributed by both employers and graduates (the closer the figure to 1, the higher the correlation – results in excess of 0.7 indicate very high correlation). The survey clearly demonstrates which modules are most applicable in today's industry. They give an indication of the knowledge areas necessary to operate in the workplace. Less popular topics could make room for the deficient areas which have been previously identified.

The low rating by employers of the subject of Construction Law is rather surprising, and the high importance of Value Management to employers but not to graduates is particularly striking. Perhaps the most unexpected outcome was the positioning of International Construction at the very bottom of the priorities of both groups. Teixeira, *et al.* (2006) have highlighted the importance of knowledge of international markets and practices in an economic recession, so this outcome reflects an inappropriately parochial viewpoint.

Interviews

CIOB – The education framework, which is central to CIOB accreditation, is created by academics and practitioners, who form a Review Group to monitor the framework and convene to update and amend its content. Online technology permits regular tweaks opposed to the long-term overhauls, previously associated with traditional hard copy format. A concerning issue is that major amendments to the framework will only be implemented in accredited programmes when reassessment is due after 5 years of the initial award. Thus, it is suggested that annual reviews would maintain standards and should be employed.

APM – APM accreditation has been described as an exercise of alignment with the breadth and depth aspects of the APM Five Dimensions of Professionalism. It is the APM BoK which influences curriculum design; this document is updated more frequently than any other accrediting body's guidance material (every two years). In theory this ensures that learning institutes are delivering the latest in industry practice, helping to reduce the gap between academia and industry.

RICS – The RICS accrediting procedure appears on the surface to be the most meticulous of the three awards. Five quality principles are used to assess student selection, innovation, teaching quality, curriculum and graduate output. The Assessment of Professional Competence pathways are devised by the RICS Project

Management Professional Group; details of changes are available 24/7 on the RICS website. However, RICS appear to have accredited some programmes without completion of their first cohorts. The partnerships between RICS and many HEIs might be viewed as cosy relationships which do not encourage serious criticism but promote easy acceptance/re-accreditation processes.

Table 3: Employer & graduate module review - results in order of importance and relevance

Module	Rank Employee	Rank Graduate
Project Planning and Scope Management	5	1
Time Management	2	2
Risk Management	4	3
Procurement and Contract Administration	7	4
Estimating, Purchasing and Cost Control	3	5
Construction Technology	1	6
Construction Law	18	7
Quality Management	9	8
Sustainable Construction	8	9
Safety Management	10	10
Resource Management	14	11
ICT for Construction Management	13	12
Group Project	15	13
Communication Management	11	14
Management Theory and Management Practice	19	15
Human Resource Management	24	16
Construction Economics	17	17
Computer Aided Architectural Visualisation	12	18
Facilities Management	20	19
Design Management	16	20
Value Management	6	21
Corporate Strategy Management	23	22
Research Methods	22	23
Innovation & Entrepreneurship	21	24
International Construction	25	25

CONCLUSIONS

This research was conducted to identify how effective current construction project management courses are in preparing students for industry. The investigation found that programmes in the UK and Ireland are somewhat lacking, with significant gaps between the education provided and the requirements of the construction industry. Project management education should instil a set of skills that can be applied anywhere, contextualized, conveyed via proficient soft skills and that can prepare

students to be life-long learners. These skills must include skills in research – which are required for all true learning to take place. This study concludes that the majority of institutions overlook soft skills, possibly because they are very difficult to measure and to teach. Some people instinctively have soft skills and others learn and develop these through experience. Thirty nine programmes were investigated in the study, all delivering relatively similar curriculum options. The research found that accreditation is the key driver behind course content, with the majority of universities attaining such awards. CIOB and RICS awards are considered to have more inherent value to students than APM, due to their closer links with the construction industry.

It is accepted that the sample size of respondents was limited, but the responses were consistent enough to provide a reliable indication of the views of MSc graduates and industry employers in UK and Ireland. In the ongoing debate about whether HEIs should be providing education or training, (as in CNBR in 2010), this survey verdict was that the two are not incompatible, and that “learning by doing” on practical construction industry-linked assignments is the way forward for project management education. Jimenez, *et al.* (2011) have strongly advocated the inclusion of relevant case studies in teaching and learning of construction practice.

The professional project manager’s capacity to function effectively and efficiently within today’s dynamic complex projects requires certain skills including; adaptive leadership, reflective learning, a proactive mindset, superior communication and relationship management skills. Education also needs to prepare students for the dynamic nature of real life projects and environments that project managers, clients, contractors and others have to deal with on a routine basis. This cannot be taught solely within a classroom environment. The need for more practical learning has been highlighted in previous studies, and by graduates and employers. Entrants to MSc programmes without practical experience or thorough understanding of construction activities are unlikely to develop these fully within the traditional confines of a university programme.

Construction projects are fundamentally different from what they were 20 years ago, but not very much beyond IT-related processes has changed in what young project managers are being taught. Current project management education is considered by many employers and graduates alike to be composed of specific, circumscribed, learning packages aimed primarily at gaining and maintaining professional accreditation. In order to avoid what Veblen (1899) has referred to as the “conspicuous uselessness of education”, many MSc programmes need to be more industry-based, with practical learning at the core to aid with application and understanding. It is those in the industry who are best placed to determine the knowledge requirements of a project manager, so they should have a greater role in the shaping of education and in the setting of course content and learning approach.

REFERENCES

- Akintoye, A., McIntosh, G. and Fitzgerald, E. (2000) “A Survey of Supply Chain Collaboration and Management in the UK Construction Industry” *European Journal of Purchasing & Supply Management*, 6 (3-4) 159-168.
- APM (2011) “*Academic Accreditation*”, available at: <http://www.apm.org.uk/acadaccreditation>, accessed on 12/01/2012.
- Chan, P., Puybaraud, M. and Kaka, A. (2002) “Construction Training: A Linkage to Productivity Improvements” 18th Annual ARCOM Conference, 2002, University of Northumbria 2-4 September.

- Chileshe, N. and Haupt, T. C. (2007) "Industry and Academia Perceptions of Construction Management Education: The Case of South Africa" *Journal for Education in the Built Environment*, **2** (2) 85-114
- CIOB (2010) "The CIOB Education Framework for Masters Degree Programmes", available at: <http://www.ciob.org.uk>, accessed on 12/01/2012.
- Edwards, D. J. and Nickolas, J. (2002) "The State of Health and Safety in the UK Construction Industry with a Focus on Plant Operators" *Structural Survey*, **20** (2) 78-87.
- Esmi, R. and Ennals, R. (2009) "Knowledge Management in Construction Companies in the UK" *Artificial Intelligence and Society*, **24**, (2) 197-203.
- Graham, B. and Thomas, K. (2006) "Knowledge Management in Irish Construction: The Role of CPD Accreditation" *Proceedings of the 22nd Annual ARCOM Conference*, 4-6 September 2006, Birmingham, pp. 1015-1024.
- Jimenez, J Pellicer, E & Yepes, V. (2011) "Teaching & Learning Using a Case Study" *Camino de Versa 46022*, Elsevier, Spain
- Koskela, L. J. and Howell, G. (2002) "The Underlying Theory of Project Management is Obsolete" *The PMI Research Conference*, June 2002, Seattle, Washington.
- Li, B., Akintoye, A., Edwards, P. J. and Hardcastle, C. (2005) "Critical success factors for PPP/PFI projects in the UK construction industry" *Construction Management and Economics*, **23** (5) 459-471.
- Love, P. E. D., Li, H., Irani, Z. and Faniran, O. (2000) "Total quality management and the learning organization: a dialogue for change in construction" *Construction Management and Economics*, **18** (3) 321-331.
- Love, P. E. D., Smith, J., Georgiou, J., Baccarini, D. and Davis, P. (2003) "Building a Symbiotic Relationship between Academia and Industry: Expectations and Observations of Construction Management Graduates" *Proceedings of the 28th Annual Conference of the Australasian Universities' Building Educators Association*, Geelong, Victoria, Australia, 9th-11th July, pp. 109-116.
- McNamara, E. T., Howarth, T. A. P., Hill, C. J. and Stoneman, G. R. W. (1997) "Mentoring construction graduates: bridging the gap between academia and industry" *Proceedings of the 13th Annual ARCOM Conference*, 15-17 September 1997, King's College, Cambridge.
- RICS (2011) "RICS Accreditation", available at: <http://www.ricscourses.org/Pages/Accreditation.aspx>, accessed on 12/01/2012.
- Sawacha, E., Naoum, S. and Fong, D. (1999) "Factors Affecting Safety Performance on Construction Sites" *International Journal of Project Management*, **17** (5) 309-315.
- Skinner, B. F. (1964) "Education in 1984" New Scientist: UK.
- Teixera, J and Pires, B. (2006) "Training Needs in Construction Management in Portugal" *International Congress on Project Engineering*, Valencia, Spain.
- Veblen, T. (1899) "The Theory of the Leisure Class" UK: Published in 2005 by Penguin Books.