

DELIVERING CONTINUING PROFESSIONAL DEVELOPMENT FOR CONSTRUCTION MANAGEMENT USING E-LEARNING

John Wall¹ and Vian Ahmed²

1Department of Building Technology, Waterford Institute of Technology, Ireland

2School of Construction and Property Management, University of Salford, UK

The need for continued access and provision to continuing professional development (CPD) has been recognised by the construction sector. Accessing formal CPD opportunities, while working full-time in the construction industry, is a challenging undertaking. In attempting to strike a balance between learning, the technologies available to deliver learning and the issues that educational institutions must address it is clear that the formulation of a strategic framework will assist in the development of any CPD programme aimed at the needs of construction professionals. This research addresses these issues in the context of CPD in the construction industry. This strategic framework attempts to strike a balance between learners in industry and educational institutions who offer CPD opportunities, through a balanced approach that integrates both traditional delivery mechanisms, in conjunction with e-learning. The results of an initial analysis of a CPD programme in Ireland delivered using e-learning technologies are presented. The lessons learned from this will be integrated into the development of a European resource for the construction industry funded by the European Union.

Keywords: CPD, e-learning, framework, learning, styles

INTRODUCTION

The application and use of information and communication technology (ICT) has brought about considerable changes to many industries in changing the way people create and exchange information. For professionals working in the construction industry, with a laptop and an Internet connection, information is instantly available. It is well recognised that there is a need for continuing professional development (CPD) and lifelong learning opportunities aimed at construction professionals. However lifelong learning programmes aimed at construction managers in the workplace must be suited to their particular needs. The rate of change in the construction industry, coupled with the speed of technological advances is redefining both educational institutions and the role of the educator in educational institutions. The rapid evolution of technology and the advent of the Internet has facilitated the growth of online learning and training in both the business and academic worlds through the provision of alternative modes for reaching new audiences and accessing lifelong learning opportunities (Bartley and Golek, 2004). Key to facilitating this to address learning needs in the construction industry is deploying a strategic framework that facilitates deploying CPD using ICT, while working within the restraints that typically exist in higher education. With the growth of e-learning in education and learning settings tutors and teachers are required to develop and teach online modules

with respect to the areas of course management and design, delivery method, student communication media, creation of an engaging learning environment, assessment, and use of new technologies (Vrasidas and Zembylas, 2004; Kosak *et al.*, 2004). However often times staff are asked to develop programmes without the skills or support required (Berge, 1998; Vrasidas and Zembylas, 2004).

CPD IN CONSTRUCTION

Due to issues such as professional competency, regulatory requirements and health and safety legislation requirements most of the professional bodies have persuaded their membership to accept the requirements for CPD programmes (Becher, 1999). It is widely recognised that much of the professional development of a professional in the construction industry takes place through on-the-job training. This can be classified as informal CPD. However, this can be supplemented by formal CPD, as outlined:

- Training courses, both internal and external
- Post-graduate academic studies such as diplomas and masters
- Attending appropriate technical lectures, as typically organised by professional institutions
- Significant involvement in the work of a learned institution, e.g. presentation of a technical paper or the preparation of a report
- Participation in technical conferences or study visits
- Special exam leave.

Typically acceptable CPD learning includes 35 hours of recognised activity or 100 points of CPD learning with a recommendation that 50% of the professional's CPD be structured i.e. classroom or lecture setting (source: various professional institutions). Lifelong learning programmes aimed at people in the workplace must be suited to their particular needs (Davey *et al.*, 2004). For people in the construction industry, the ability to use ICT fluently and confidently is essential in performing their roles in a busy workplace. Thomas (1995) suggested that CPD is well supported and regarded by members of a profession when:

- Active and enthusiastic collaboration takes place between the providers, professional bodies, individual professionals and their employers
- The providers act in a professional way
- There is an environment that encourages and facilitates access to CPD.

However, the conditions for delivering lifelong successfully in the construction industry using technology have not been comprehensively defined.

TECHNOLOGY IN LEARNING FOR CPD

There are a wide variety of technologies, ranging from print medium to the Internet, can be used as primary or supportive delivery systems for distance education programs. Technologies failing to deliver, costs growing exponentially, teaching remains untransformed, staff support not adequate, time release to develop material not considered, management and systems disputes are all issues that can contribute to the failure of any e-learning initiative (Latchem, 2005). Derntl and Motschnig-Pitrik

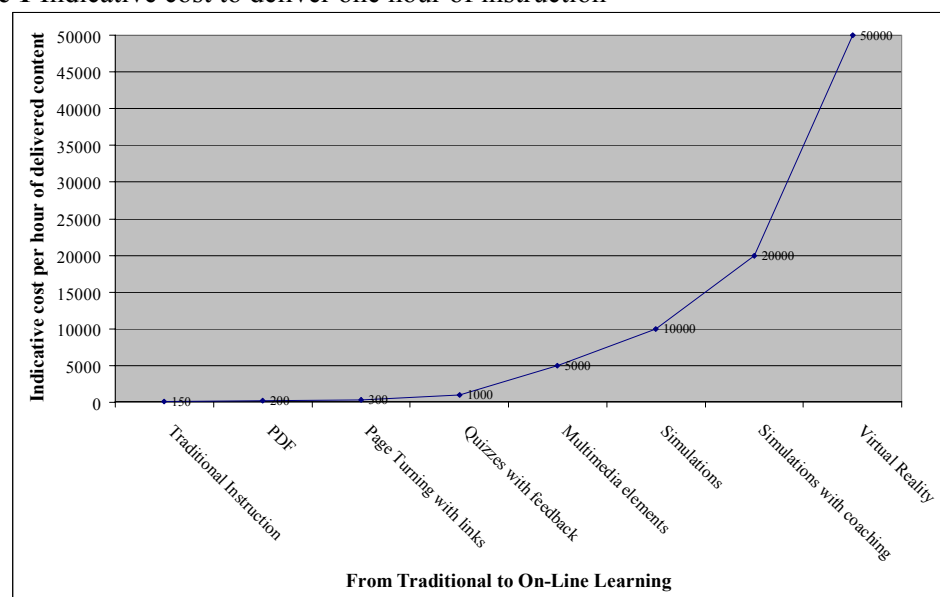
(2005) state that much of the current research into e-learning has been dedicated to producing e-content, describing it with metadata in the construction of e-learning systems. While there has been much research into the technologies available, less attention has been dedicated to integrating technology to improve the learning process (Derntl and Motsching-Pitrik, 2005). These concerns highlight that deploying technology facilitated learning can be a complex undertaking. Coupled with the requisite resources and infrastructure requirement, e-learning creates new variables, constraints and issues making it different fundamentally from traditional face-to-face learning for educators and students (Mandinach, 2005).

Technological advances and the Internet have opened up new opportunities for educational providers to configure traditional classroom and technology assisted learning to promote and encourage access to CPD learning opportunities (Klein and Ware, 2003). In traditional classroom situations, students learn to depend on the tutor for their motivation, goal setting, direction, progress monitoring, self-assessment and achievement (Sun *et al.*, 2003). The challenges that providers' face, in deploying e-learning to facilitate access to CPD, is to replicate traditional classroom situations, get the best from the available resources and ensure that the CPD program meets the objectives of participants in the context of the resources available.

COST CONSIDERATIONS IN DEVELOPING ONLINE CONTENT

Preparing effective e-learning material is expensive (Salmon, 2003). The development time depends on the complexity of the material and the experience of the team developing the content (Horton, 2000). The typical range of estimates are from 50 hours to 2000 hours for developing one hour of on-line content obviously have consequences on the development and deployment of content (Wall and Ahmed, 2005). Other costs that need to factor into any development are operational costs, content maintenance and general maintenance costs (Alshawai *et al.* 2006). If one takes a conservative costing of €50 per hour for development and delivery of content, Figure 1 highlights the range of costs that may be incurred in the development of online resources using a range of methodologies (Wall *et al.*, 2006).

Figure 1 Indicative cost to deliver one hour of instruction

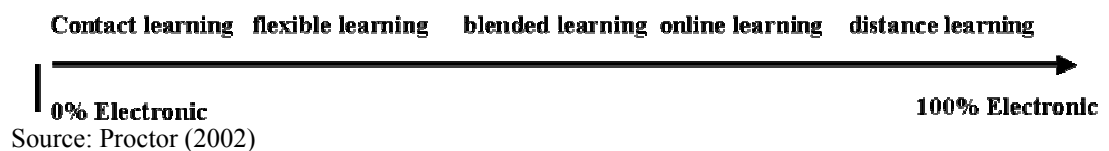


Source: Wall *et al.* (2006)

Figure 1 serves to highlight some of the challenges that educational institutions face when attempting to move from traditional delivery of programmes to a totally online programme including virtual simulations. To avoid failure with any e-learning project one must ensure that the project is sustainable in a given socio-economic environment or business context as well as recognising the importance of instructional design considerations (Romiszowski, 2004).

Blended learning is a methodology that organisations are embracing in its many facets to facilitate a more incremental approach to deploying technology enabled learning. Cost considerations is one of the key drivers behind this approach. Blended learning may include many forms of learning tools such as real-time virtual / collaborative software, self-paced Web-based courses, electronic performance support systems (EPSS) embedded within the job task environment and knowledge management systems Singh (2003). Proctor (2002) refers to this as the spectrum of e-learning highlighted in Figure 2.

Figure 2 Spectrum of E-Learning



This is not a rigid scale like the light spectrum as terms such as flexible learning, open learning, on-line learning and distance learning tend to be used interchangeably and receive meaning only through their usage.

IRISH BLENDED LEARNING INITIATIVE

The phenomenal growth of the Irish economy since 1996, often referred to as the “Celtic Tiger”, driven by and underpinned by the construction industry, coupled with the increasing complexity and scale of projects has fuelled the demand for project managers with specific knowledge and skills (Forfas, 2003). In Waterford Institute of Technology (WIT) staff have embraced this spectrum of e-learning in developing a new postgraduate CPD program addressing project management skills in the construction industry.

A new Masters in Science in Construction Project Management (MSc CPM), which commenced in 2005, builds upon the expertise gained within the Department of Construction and Civil Engineering in WIT, delivering an existing full-time Master of Science in International Construction Management (MSc ICM) programme, involving WIT, Nottingham Trent University in the UK and Hochschule Karlsruhe in Germany, since 1993. However, experience with the MSc ICM program has demonstrated that many professionals in the construction industry wish to undertake CPD programmes that do not necessitate having to leave full-time employment.

The course management team in WIT surveyed the market to establish the current status and providers of formal CPD programs addressing project management in the construction industry. A summary of the current providers of project management education at postgraduate level in Ireland is presented in Table 1. While it was recognised that there are a number of existing programmes in this field, the proposed MSc CPM focused on the construction industry with its combination of traditional and web technologies makes this unique in an Irish context.

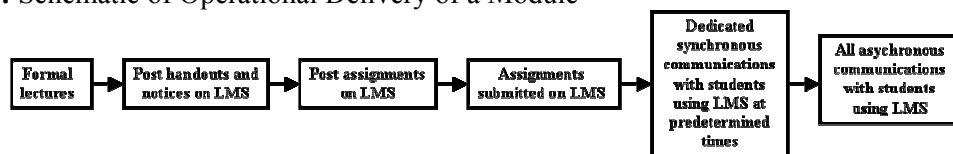
Table 1: Irish Organisations offering a qualification in Project Management at post graduate level

Name of Institute	Qualification offered	Description
University of Limerick	Masters in Project Management	General Project Management qualification offered to participants from a number of industries.
Dublin Institute of Technology	Master of Business Administration with an optional specialisation in Construction Project Management	General MBA with an elective module in Construction Project Management
University College Dublin	Masters of Business Studies in Project Management	General Project Management qualification
Institute of Project Management and University College Cork	Diploma in Applied Project Management	General Project Management Qualification
Trinity College Dublin	Diploma in Project Management	Focused on the construction industry traditional format of delivery – Friday evening/Saturday morning
University of Ulster	MSc Construction & Project Management	Traditional classroom delivery offered both as a full time and part time programme.
Professional Bodies i.e. EI, RIAI and RICS	Continuing Professional Development recognition	Generally 1 to 3 day programmes addressing fundamentals of project management practice.

Source: Brochures and Internet

Whilst offering many advantages to students, a major consideration in delivering training through distance learning modes is maintaining a high level of motivation and commitment, avoiding the sense of isolation, and returning to the requirements and rigours of further education, especially for those who are returning to education after a number of years in industry. In an attempt to address these concerns, the programme is currently being delivered in the format outlined diagrammatically in Figure 3. One key challenge in deploying any blended learning programme, is defining the balance of the blend. In developing this programme, it has initially been designed to consist of 50% traditional classroom instruction and 50% on line activities.

Figure 3 : Schematic of Operational Delivery of a Module



Students attend for a specific period of formal lectures in Waterford for the relevant modules. Prior to / after or both prior to and after formal lectures, handouts, other relevant material and websites are uploaded on the Institute learning management system (LMS) WebCT. Coupled with the delivery methodology, some instructors used voice over IP communication with participants (skype, a freeware solution) to allow participants talk to instructors outside of work time. Other instructors assigned marks for online discussions to encourage online collaboration and learning.

INITIAL EVALUATION OF PROGRAMME

While 10 participants enrolled on the programme, due to work and personal commitments, 8 participants completed the first year of the programme. A detailed evaluation of the programme is currently being undertaken. However, some initial findings from this evaluation highlight the motivation for undertaking the course and the key elements that should be considered in delivering a blended learning approach.

When participants were surveyed on their motivation for undertaken the programme, the overarching reason was to increase opportunities for career development. Figure 4 highlights the various motivational factors.

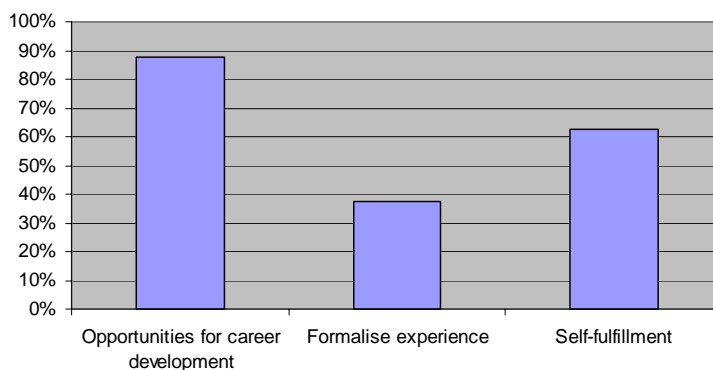


Figure 4: Motivation to Undertake Formal CPD programme

Participants were asked to rank a list of 16 aspects of the programme, with 1 indicating the most important through to 16 as least important. The results of this ranking establish that the most important feature, by quite a margin, was the quality of delivery of classroom instruction. Other key factors that contribute to the success of the programme are the overall quality of instruction, access to staff and the quality of delivery of online instruction.

Table 2: Ranking of Aspects of Programme

Feature	Ranking
Quality of delivery of classroom instruction	1
Quality of instruction	2
Access to staff	3
Quality of delivery of online instruction	4
Communication of course material	5
Responsiveness of staff	6
Speed of feedback	7
Use of online resources	8
The creation of online resources	9
ICT support services	10
Library facilities i.e. databases	11
Access to library/support	11
Staff use of online learning resources	12
Effectiveness of LMS (i.e. WebCT) communication	13
Library facilities support infrastructure	14
PC availability on campus	15

In looking to the future, key to the success of the programme will be ensuring the quality of classroom instruction, supported by online instructional methodologies and facilitating access to staff. Currently a more detailed evaluation of the effectiveness of

the programme is being carried out. Issues that are being researched include; (i) why the participants selected this approach to postgraduate study, (ii) analyse the individual's preferred learning style based on Kolb's Learning Style Inventory questionnaire, (iii) analyse the technical competencies of the individual's on the programmes, (iv) use of problem based learning, (v) effectiveness of online assessment and (vi) balance of traditional instruction to online delivery. The lessons learned from this empirical research, will act as an initial starting point in the development of a separate learning resource being formulated as part of this European initiative.

EUROPEAN CPD INITIATIVE

Nottingham Trent University, Hochschule Karlsruhe, Multimedia Instructional Design in Ireland and Istanbul Technical University in Turkey are collaborating with Waterford Institute of Technology in formulating a framework for deploying blended CPD aimed at the construction industry. These partners have secured funding as part of FP6 through the Minerva Action, which aims to promote European co-operation in the field of Information and Communication Technology (ICT) and Open and Distance Learning (ODL) in education.

The rationale behind this project is to create an innovative international learning resource that will be widely accessible to construction management professionals thereby facilitating improved knowledge and skills within the industry. This network is focused on the management of the learning experience, through implementing well-established pedagogical practices when integrating technology as part of the delivery of learning. One key innovation for the future of this network is to develop modules on-line to offer a "blended solution" to construction management teaching and learning. This will build on the experiences each of the partners have in developing and deploying traditional CPD programmes.

The key drivers in formulating this framework in the delivery of CPD are issues around learning, the technologies to deliver e-learning and the various issues in educational institutions. In attempting to strike a balance between learning, the technologies available to deliver learning and the issues that educational institutions must address it is clear that collaboration on the development of SCORM (Sharable Content Object Reference Model) compliant learning resources offers potential advantages in sharing the risk/reward potential and may then be customised by individual institutions as part of 'blended learning programmes' focused on construction managers needs. A separate learning resource will be deployed to deliver CPD in the domain of construction project management.

DEVELOPMENT OF A SEPARATE LEARNING RESOURCE

According to Steinberg (2004) e-learning is not only an application of technology to teaching, but it is a new business model for higher education. The main objective in developing a separate learning resource is to establish a platform where different instructional strategies will be developed to accommodate different learning styles and cognitive processes. A separate web address or URL <http://www.cpd-construction.com> has been registered. It is envisaged that this will be used as the hosting platform for the resources developed. An open source learning management system will be used to host the learning resources developed. A schematic of the elements that this will incorporate is outlined in Figure 5.

Figure 5: Schematic of Learning Resource Elements



A database of learning material will be developed. A guide on the learning material, outlining circumstances where this material may be integrated effectively into CPD programmes will be formulated. To sustain this initiative in the longer term, the ambition is to grow this online collaborative network. Professional bodies, charged with responsibility for CPD in the construction industry, will be invited to engage with both the development and deployment of this resource.

CONCLUSIONS

In selecting among the varying technologies within distance learning, the question should not necessarily, be what is the best technology, but rather what combination of media is the most appropriate considering learner and instructor characteristics, instructional goals and strategies, learning environments, and the availability of resources? Online learning presents a further set of challenges for participants, educators and educational institutions in integrating technology to facilitate motivation, progress monitoring and achievement. There is an opportunity with the creation of these learning resources to create a diverse, international network of learning resource developers, repositories and users who if they can effectively organise and coordinate their activities will be able to produce a library of high-quality, pedagogically sound inexpensive material that will make the investment in infrastructure pay off in the educational experience of the students.

REFERENCES

- Alshawi M., Goulding J. and Faraj I (2006) Knowledge-Based Learning Environments for Construction, *Journal for Education in the Built Environment*, **1**(1), 51-72
- Bartley S.J. and Golek J.H. (2004) Evaluating the Cost Effectiveness of Online and Face-to-Face Instruction, *Educational Technology and Society*, **7**(4), 167 – 175
- Becher T. (1999) *Universities and the Mid-Career Professionals: The Policy Potential*, Blackwell Publishers
- Berge Z. L. (2004) *Barriers to online teaching in post-secondary institutions: can policy changes fix it?* Online Journal of Distance Learning Administration, Vol. 2, No 1, available at <http://www.westga.edu/~distance/Berge12.html> [accessed 3 November 2004]
- Davey C., Powell J., Cooper I. and Powell J (2004) Innovation, construction SMEs and action learning. *Engineering, Construction and Architectural Management*, **11**(4), 230-237
- Derntl M. and Motsching-Pitrik R. (2005) The role of structure, patterns, and people in blended learning, *Internet and Higher Education*, **8**, 111–130
- Forfas (2003) *The Demand and Supply of Engineers and Engineering Technicians*, Expert Group on Future Skills Needs Report To the Tanaiste, and Minister for Enterprise, Trade and Employment and the Minister for Education and Science, 2003
- Horton W. (2000) *Designing Web-Based Training*, Wiley

- Klein D. and Ware M. (2003) E-Learning: new opportunities in continuing professional development, *Learned Publishing*, **16**(1), 34-46
- Kosak L., Manning D., Dobson E., Rogerson L., Cotnam S., Colaric S., and McFadden C. (2004) *Prepared to Teach Online? Perspectives of Faculty in the University of North Carolina System*, Online Journal of Distance Learning Administration, Vol. VII, Number III, Fall 2004 available to download at <http://www.westga.edu/%7Edistance/ojdl/fall73/kosak73.html> [accessed 3 November 2004]
- Latchem C. (2005) Failure – the key to understanding success, *British Journal of Educational Technology* **36**(4), 665–667
- Mandinach, E.B. (2005) The Development of Effective Evaluation Methods for E-Learning: A Concept Paper and Action Plan, *Teachers College Record*, **107**(8), 1814–1835
- Proctor C. (2002) Proportion, Pedagogy and Processes: The Three P's of E-Learning, *Proceedings of the International Academy for Information Management (IAIM) Annual Conference: International Conference on Informatics Education Research (ICIER)*, Barcelona, 13-15 December 2002
- Romiszowski A. J. (2004) How's the E-learning Baby? Factors Leading to Success or Failure of an Education Technology Innovation, *Education Technology*, Jan-Feb 2004, 5-48
- Salmon G. (2003) Information, interaction, participation: Turning the online wheels. *Training Journal*, June 2004, 34-48
- Singh H. (2003) Building Effective Learning Programmes. *Educational Technology*, **42**(6), 51-54
- Steinberg D. C. (2004) The Business model of e-learning in UK higher education Optimization through outsourcing. *Industry and Higher Education*, June 2004, 187-198
- Sun L., Williams S. and Liu K. (2003) Knowledge Construction in e-Learning: designing an e-Learning environment, *Proceedings of the 5th International Conference on Enterprise Information Systems*, Angers, France, **4**, 111-118. 2003 available to download at <http://www.ais.reading.ac.uk/papers/con-Knowledge%20Construction%20in%20eLearning2003.pdf> [accessed 15th April 2006]
- Thomas Edward J. (1995) Developing continuing education and training in European universities, *Journal of European Industrial Training*, **19**(4), 11-16
- Vrasidas C. and Zembylas M. (2004) Online professional development: lessons from the field, *Education and Training*, **46**(6/7), 326-334
- Wall J. and Ahmed V. (2005) Issues in Developing a Blended Learning Initiative to meet Continuing Professional Development Needs of Construction Professionals in Ireland, *21st Annual Conference Association of Researchers in Construction Management ARCOM*. pp 1289–1299, 7-9 September 2005
- Wall J., Ahmed, V., Hurst A., Garrecht H., Luckey A., McNamee F., Kanoglu A. (2006) Evolving a Framework for Technology facilitated CPD for Construction Management *A European Initiative, Irish Learning and Teaching Association 7th Annual Conference*, 25th and 26th May 2006, Institute of Technology Sligo