



4th International Conference on Building Resilience, Building Resilience 2014, 8-10 September
2014, Salford Quays, United Kingdom

Disaster Management Education through Higher Education – Industry Collaboration in the Built Environment

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Abstract

Effectively responding to the current and dynamic construction labour market requirements is a major responsibility of higher education institutions (HEIs). HEIs aim to reduce the mismatch between what they deliver and what is required by the industry. Built environment professionals require continuous update of knowledge and education in order to effectively contribute to disaster management. However, the complex and multidisciplinary nature of disaster management education pose a challenge to the higher education institutions to make them more responsive to the industrial needs and to prepare the students for careers in disaster resilience. Adopting a lifelong learning approach would be appropriate for HEIs to maintain a through-life studentship and to provide disaster related knowledge and education on a continuous basis to respond to the labour market requirements. However, incorporating lifelong learning approach within the system of higher education is not easy and straightforward for HEIs. This is mainly because of the formal and bureaucratic nature of HEIs that acts as a barrier for providing effective lifelong learning education. In resolving this issue, HEIs are increasingly relying on the benefits associated with fostering close collaboration with external organisations such as industries, professional bodies and communities. In this context, this paper discusses the role of HEIs in providing disaster management education, the challenges associated with it, and the way of addressing the challenges through the higher education industry collaboration.

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Selection and/or peer-reviewed under responsibility of the Centre for Disaster Resilience, School of the Built Environment, University of Salford.

Keywords: Disaster management; Education; Higher education – industry collaboration; Built environment

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1. Introduction

Disasters, that are expected to become more frequent and severe, cause damage to the built and human environment. All the stakeholders who are likely to engage with disaster situations have a responsibility to develop their capacity to prepare, mitigate, respond and recover. Effective mitigation and preparedness can greatly reduce the threat posed by hazards of all types and post disaster response will help to reduce the impact of disasters and could minimise the broader economic and social damage that may result otherwise. There has been a growing recognition that the construction industry and associated built environment professions are vital components of this capacity.

This paper shares the findings from a recently completed research namely BELLCURVE (Built Environment Lifelong Learning Challenging University Responses to Vocational Education). It emphasises the importance of disaster related knowledge and education for developing the capacity of the built environment professionals. The role of higher education in providing disaster management education and the challenges of providing such knowledge on a continuous basis are then discussed. Recommendations and good practice guideline are suggested to incorporate lifelong learning approach within the higher education system to provide uninterrupted supply of disaster management education. It further elaborates the recommendation on fostering collaboration between HEIs, industries and communities. A literature review on university-industry collaboration is provided followed by two examples of on-going initiatives that demonstrate the collaboration activities specifically in the field of disaster management. Thus, the paper highlights how collaboration between HEIs and industries would support the educational needs for disaster management.

Key areas of disaster management, skills and knowledge requirement of disaster resilience, lifelong learning and higher education, HEI – industry collaboration were reviewed. Ten semi-structured in-depth interviews were conducted with heads of schools, deans of faculties, heads of governance units, professors, programme directors, and senior lecturers. Apart from the management staffs that were mainly from university governance, all academic staff chosen for the data collection was from the built environment background with certain level of expertise in teaching or researching disaster management. A workshop on disaster resilience was also conducted to capture the expert knowledge on disaster management from selected participants representing a multitude of stakeholders on disaster management education. The workshop brought together many who possess expertise related to disaster resilience in built environment. The workshop was attended by fifteen participants comprising EU and international academics, researchers and representatives of government and semi-government organisations and was related to built environment and disaster management. Suggested recommendations on how HEIs can contribute to the provision of lifelong learning in the context of disaster management in the built environment were validated through a group validation exercise in the form of an organised meeting of panel of experts comprising of built environment disaster management educationalists of HEIs and researchers.

2. Disaster management knowledge for built environment professionals

Built environment is one of the components that are likely to be damaged by all kinds of disasters. Thus clearing, salvaging, rehabilitation and reconstruction work fully or partly require serious effort of the construction sector. Much of the physical damage from disasters is to products of construction industry and therefore construction industry and built environment professionals have a vital role in the rectification of physical damages of disasters (Ofori, 2004). Thus disaster management and the built environment have close relationship with and dependencies on each other. In agreement to this, Pena-Mora (2005) suggests construction professionals have a key role to play within the role of disaster management because they possess valuable information about their projects, and that information can be critical in disaster preparedness, response and recovery. Further, the peculiar nature of disaster reconstruction demands the professionals to demonstrate specialised knowledge and skills to contribute to disaster risk reduction and to effective rebuilding (see Thayaparan et al., 2010). The level of preparedness and education of the exposed country and community influences the magnitude of the impact of disasters (Rouhban, 2011). This reflects the importance to educate the built environment professionals involved in disaster management activities with the appropriate knowledge and skills (see Siriwardena et al., 2013). Thus possessing adequate knowledge on disaster management is a key requisite for built environment professionals, as it will help them to understand the process of mitigation and the recovery.

Knowledge management and education was one of the key priorities for actions in the development of Hyogo Framework for Action -HFA (UNISDR, 2005). Knowledge and education is comprised of the elements such as information management and exchange; formal education (curriculum); formal education (training of teachers and materials); community training and public awareness (GNDR, 2009). Education and training is an integral part of capacity building in the disaster management discipline as trained personnel respond much better to different disasters and will take proactive measures of mitigation and prevention (IDKN, 2009). However, there is gap exists between the growing recognition of the importance of teaching about disaster risks and actually doing it, mainly due to the slower rate of incorporation of such issues within the educational curricula (UNSIDR, 2005). Despite the realisation of the educational needs for disaster management, there are still capacity gaps identified in the area of disaster risk reduction in the built environment. Among these gaps, lack of disaster management related awareness; lack of proper education and training; and lack of skilled and trained human resources (Bosher et al., 2007) are directly related to education. These gaps clearly indicate the educational needs for disaster management in the built environment.

In general, construction professionals obtain their basic professional knowledge and skills through the higher education institutions. Higher education is considered as a social structure for the control of advanced knowledge and technique with teaching in its system predominantly (Clark, 1986). Higher education will be at a level that would qualify someone to work in a professional field and it will usually be taught in an environment, which also includes advanced research activity. As built environment professionals are responsible for integrating resilience into design, construction and operation process, obtaining the necessary level of disaster management education is therefore vital for them. This situation will lead the professionals to be able to demonstrate a good level of specific knowledge and skills to cater the dynamic and emerging needs in the industry especially in a disaster management context. Higher education institutions are therefore required to take the responsibility of educating, training, and supporting the disaster response (McClellan, 2006), by imparting sufficient disaster related knowledge to the built environment professionals to make them more responsive to the needs and challenges of a disaster management environment. As such, higher education institutions need to play a critical role in improving the capacity of the built environment professionals to address post disaster reconstruction challenges which, according to Ofori (2002), is widely recognised. The next section summarises the main findings of the BELLCURVE research that were derived from the literature review, interviews, workshop and group validation.

3. Role of HEIs in the provision of disaster management education

This section provides the existing approaches to disaster management education, the challenges HEIs face in providing disaster management education and recommendations and good practice guidelines to provide disaster management education through the incorporation of lifelong learning approach.

The key existing approaches to disaster management education identified were the undergraduate/ postgraduate programmes conducted by the HEIs; final project/ dissertation in undergraduate and postgraduate programmes; CPDs and short courses conducted by HEIs, professional bodies and other institutes; widely available knowledge on the world wide web; other traditional modes like text books, magazines and other publications; and learning by experience (Siriwardena et al., 2013).

The way of addressing disaster risks and needs will either vary depending on the type and magnitude of disasters. Therefore, in order to be effective, a continuous supply of knowledge for the built environment professionals will be more appropriate than providing the knowledge through a one-off engagement with students. Hence, HEIs need to engage with their students on a continuous basis, even after they graduate and while they are working in the industry. This engagement will facilitate a two way communication and collaboration between HEIs and the learners, in this case the built environment professionals. While providing the necessary knowledge and skills to the professionals, the HEIs are in a position to get a feedback from those who work in the industry on any mismatch between what is required and what is provided. As such maintaining a continuous engagement with students will not only benefit the learners but also will help the institutions to be more responsive to the market needs. This continuous engagement is a key to obtain lifelong learning.

The complex and multidisciplinary nature of disaster management education also pose a challenge to the higher education institutions to prepare students for careers in disaster resilience purely through the delivery of formal curriculum. Further, the time consuming process of making changes to formal curriculum limits the opportunities for HEIs to respond faster to the changing needs of the industry. Considering the flaws in the provision of disaster management education through formal approach, it was suggested to provide the knowledge through a combination of formal, non-formal and informal approaches (Shaw, 2008; Siriwardena et al., 2013). In short, formal learning is achieved through organised programmes delivered through schools and other providers and is recognised through a qualification or part of a qualification; non-formal learning is achieved through an organised programme or instruction, but is not recognised through a qualification; and informal learning is achieved outside of organised provision (OECD, 2004). As such the non-formal approaches such as Continuing Professional Development (CPDs), short courses, seminars, workshops are more responsive and effective ways to provide disaster risk reduction knowledge in a timely manner due to its nature of flexibility compared to formal learning approach. However, these sessions are largely organised by professional and training bodies. The reasons why these sessions are not frequently arranged by HEIs are due to obstacles associated with the higher institutions such the largely adopted formal learning approach, lack of multidisciplinary teaching and learning provisions, lack of flexibility in rapid response to dynamic industry requirements, relatively shorter period of student engagement, lack of collaboration with other HEIs, the industry, professional bodies and the communities (Siriwardena et al., 2013). These features act as obstacles for HEIs to be effective in educating the professionals with disaster management knowledge on a continuous basis.

Having analysed various existing approaches to disaster management education, the research suggested some recommendations to incorporate lifelong learning approach within the higher education system. As HEIs predominantly adopt formal learning approaches, responding to the frequent and continuous changing needs solely with the formal approach was found to be a challenge for them. It has therefore been suggested that the HEIs are to accommodate a lifelong learning model within their educational system in order to be effective in responding to the labour market requirements in disaster situations. As lifelong learning approach can accommodate the formal, non-formal and informal learning approaches, the challenges associated with formal learning process adopted by the HEIs are either partially or fully compensated by taking a lifelong learning approach. The promotion of lifelong learning in higher education would require changes in teaching methods with conventional students studying for traditional degrees (Cropley & Knapper, 1983). OECD (2005, p14) also emphasises that “there is an increasing evidence that countries realise that their qualifications systems need to be able to change and evolve to meet rapidly-changing needs in the world of learning and in the labour market”. As such adopting a lifelong learning approach would be appropriate for HEIs to maintain a through-life studentship and to provide knowledge and education on a continuous basis to respond to the labour market requirements (see Siriwardena et al., 2013). This can be achieved through virtual learning and knowledge sharing; facilitating non-formal and informal approaches for teaching and learning; establishing a franchise system to manage and deliver specific knowledge on disaster management; networking and collaboration with HEIs, industries, professional bodies and communities (see Siriwardena et al., 2013). However, the traditional one-off student engagement, traditional face-to-face mode of teaching and learning, the bureaucratic nature of the university governance to make quick and frequent changes in the curricula, and the lack of collaboration with other HEIs, industries, professional bodies and communities were identified as the major challenges for HEIs to operate effective lifelong learning.

In order to overcome this situation, the study also proposed good practices for HEIs to act more responsive and agile to cater the industry requirements in a timely manner. Research and teaching initiatives to address the educational needs for disaster management were suggested through joint research programmes; staff exchange programmes with other HEIs, professional bodies and industries; integration of disaster knowledge to the existing curriculum; and providing adequate industry exposure to students through teaching and research activities. Maintaining through-life studentship with HEIs was another recommendation suggested to enhance lifelong learning opportunities for the students. Further, exploiting the latest learning and teaching technologies would help the professionals who usually do not find time for a face-to-face traditional mode of learning. Distance learning, online learning and facilitating self-learning through open educational resources were some of the good practices that can be followed by HEIs. For all these recommendations to be effective, it was emphasised that the HEIs need to establish close collaboration between other HEIs, industries and communities. Lack of collaboration of HEIs with

other entities was pointed out as a major obstacle to successfully implement the lifelong learning concept within the higher education system, especially in the context of disaster management education. Lifelong learning concept needs to be expanded beyond the boundaries of HEIs. As such, the higher education programme should be more innovative in providing opportunities to work in close collaboration with industry, communities, humanitarian agencies, private sectors and other higher education institutions. Accordingly, this paper specifically reviews some literature on collaboration and endeavours to provide some insight to this aspect.

4. Collaboration between HEIs and industries

The complex and multidisciplinary nature of disaster management stresses the HEIs to enhance inter-disciplinary and inter-sectoral cooperation to develop innovative education that can increase societal resilience. Collaboration is actively promoted with a view to breaking down the barriers between universities and between universities, industry, government and the public services (Smith and Katz, 2000). Higher education's inequitable and unresponsive relationship with the community and the fact that higher education is largely failing in its efforts to prepare students for lives of social responsibility (Strand et al., 2003) emphasise the need to increase HEI's involvement in their surrounding communities. Community based research is an obvious platform for HEIs to have close collaborations with communities, and it will enhance capacity for all the parties involved in the research and might improve the ability of the community groups to make more strategic decisions on the operations concerned. HEIs can also engage with the community indirectly through their collaboration made with industries. As such, while the education establishments address the requirements of industries, the industries will in turn address the concerns of the communities. The relationship hence should be a triangulation between the HEIs, industries and the communities, rather than a linear duplex relationship between just the HEIs and the industries concerned.

The type and level of interactions between these entities depend on many internal and external factors. Martin (2000) identified some of these factors as teaching and research capacity; existence of industrial or community based research and development activities; funding opportunities; financial and personal incentives and rewards; and organisational structure and culture. Trust, commitment and continuity of personnel were identified as universal success factors for collaboration by Barnes et al. (2002). The authors have further identified choice of partner; project manager; project management; ensuring equality; environmental factors; outcomes and cultural issues as the main themes of factors that are having significant impact on the perceived success of collaboration. Martin (2000) also has pointed out professional management as a success factor for collaboration, where he elaborated professional management in terms of organisational development, financial management; procedures and personnel management; and management of intellectual properties.

The level of collaboration ranges from informal to formal linkages. The interactions can take place in the forms of joint activities such as regular mutual visits, staff exchange programmes, training and guest lectures by industry staff, jointly organised events, joint teaching and supervision, joint curriculum development, joint publications, industrial representation on academic governing boards; contracted or sponsored collaborative research activities and consultancy activities (see Martin, 2000; Perkmann and Walsh, 2007). An initiative called ACBEE (Accelerating Change in Built Environment Education) that specifically focused on built environment education, aims to encourage the closer working of HEIs, industry and professional bodies to provide more relevant training and education in order to deliver true demand-led education. It has developed a framework of engagement between industry, education and professional bodies by identifying five categories ranging from informal to formal. They are awareness activity, ad-hoc engagement, formal engagement; partnership and strategic alliance (see Mel et al., 2009).

HEIs perceive several benefits from stronger collaborations with external entities. Opportunity to attract additional funds for teaching, research and collaborations; opportunity to develop knowledge and capacity on the current- state of art; improved interactions and training opportunities; enhancement of HEI's image as a contributor to the economy are some of such benefits (Martin, 2000; Barnes, 2002). It further contributes to the growth of the knowledge economy and attempts to strengthen the economic and social contribution of research; a shift towards more applied research in collaboration with other knowledge creators and users; greater concentration of research activity and partnership in the use of plant, equipment and expertise; the growth of the directed mode of funding based on priority areas and problem oriented project funding; and, the shift towards a mass higher education system and lifelong learning (Smith and Katz, 2000, p.4).

Despite the benefits, there are challenges associated with successful collaborations. The different orientation of universities and industries, incentives and conflict between public and private knowledge, and conflicts over the intellectual property and dealing with university administration were mentioned as some barriers associated with university industry collaboration (Bruneel et al., 2010). It was argued that the university and industry has different interest and purpose of doing research. The former wants to create knowledge that needs to be acknowledged and shared widely and they choose research topics that are perceived by their peers to be interesting and valuable whereas the latter wants to control the knowledge sharing not making them available to their competitors and they choose topic that are helpful for the development of new products and services (Brown and Duguid, 2000; Nelson, 2004). Mitton et al. (2007) identified inhibitors affecting exchanges between researchers tasked with in a knowledge transfer exchange activities between HEI and industry, of which perceived lack of knowledge of the research process, traditional academic format of communication, lack of timely results, and research that is not relevant to practice-based issues were clear evident to conflict of interests between industry and academia.

Bruneel et al. (2010) argue that collaboration experience, overtime, will help to mitigate the barriers for collaboration by enabling academic and their industrial collaborators to converge in attitudes, learning to share common norms and arrive at mutual understanding about the research process and collaboration. They also recognised the breadth of interaction channels and inter-organisational trust might contribute to better collaboration. As such having a number of various channels for interactions, for example from joint collaborations and consultancy works to informal interactions at meetings, seminars and conferences will be beneficial (see Bruneel et al., 2010).

This paper now presents two on-going initiatives to demonstrate the collaboration activities specifically in the field of disaster management. The first initiative discussed is a network between HEIs, industries and other organisations to influence the European higher education policy in such a way so that it will help addressing to increase resilience to disasters. The second initiative is an effort to develop a joint professional doctorate programme to address the specific needs from the construction industry to increase societal resilience.

4.1. ANDROID Disaster Resilience Network

ANDROID (Academic Network for Disaster Resilience to Optimise educational Development) is an Erasmus academic network that was formed to promote co-operation and innovation among European higher education to increase society's resilience to disasters of human and natural origin. The network also aims at gathering a wide and most advanced set of competencies in the field of disaster resilience in sharing knowledge, discussing methodologies, disseminating good practices and producing and promoting innovation, by bringing together a good mix of stakeholders addressing topics of direct relevance for the EU higher education policy. The network includes 67 member organisations from 31 countries, largely represented by European Universities, but also includes major international organisations such as The United Nations Office for Disaster Risk Reduction (UNISDR) and three universities from Australia, Canada and Sri Lanka. The network also has a stakeholder advisory board, which consists of local and international organisations including UNISDR, the United Nations Human Settlements Programme (UN-HABITAT), Asian Disaster Preparedness Centre (ADPC) and Federation of Sri Lankan Local Government Authorities (FSLGA), to review emerging outputs and to influence the direction of the network to create impacts. In addition, the network includes more than hundred associate member organisations globally. ANDROID network will also raise awareness and promote a common understanding among stakeholders of the importance of disaster resilience education and the essential role of European higher education institutions (HEIs) in improving society's ability to increase disaster resilience. The main objectives of this network are to map the field in disaster resilience education, pool their results and findings, develop interdisciplinary explanations; to describe, analyse, and compare the capacity of European cities and higher education to address disaster risk, and thereby reinforce the link between education and society; and to build the capacity of higher education to address emerging challenges in disaster resilience, strengthen the link between research and teaching, and inform policy development. For more details visit project website: <http://www.disaster-resilience.net/>

4.2. CADRE

CADRE (Collaborative Action towards Disaster Resilience Education) aims to address current and emerging labour market demands in the construction industry to increase societal resilience to disasters. The labour market demand will be addressed through active cooperation funded between HEIs and partners from outside academia, including construction professional bodies, local/national/international bodies and social partners. CADRE will make a contribution to both theory and practice in the development of societal resilience to disaster through the development of curricula and modules to update the knowledge and skills that employees have obtained in the past. It will broaden and deepen the employees' understanding of the disciplines in which they are studying, upgrade their skills, promote interdisciplinary working, and provide them with appropriate transferrable skills. As such CADRE will enhance not only academic knowledge, but also the concerns, capabilities and expectations of the relevant industries and communities. This in turn will create the necessary HEIs, industries and communities feedback and feed-forward mechanisms to enable effective lifelong learning. The main objectives of this initiative are to develop an innovative professional doctorate programme that integrates professional and academic knowledge in the construction industry to develop societal resilience to disasters, to create world-class curricula and modules to support the programme and to address current and emerging capacity gaps in the development of societal resilience to disasters; to establish a framework for collaboration and to exploit ICT to enable cross-boarder cooperation in the sharing and delivery of educational resources that support the professional doctoral programme. For more details visit project website: <http://www.disaster-resilience.net/cadre/>

5. Conclusions

The paper discussed the education needs for built environment professionals in disaster management. The current approaches available for disaster management education were presented with a proposal to the provision of lifelong learning, especially for built environment professionals to obtain the necessary knowledge on a continuous basis. The major challenges associated with the lifelong learning for disaster management are the traditional one-off student engagement, traditional face-to-face mode of teaching and learning, the bureaucratic nature of the university governance to make quick and frequent changes in the curricula, and the lack of collaboration with other HEIs, industry, professional bodies and communities. These challenges can be addressed through joint research programmes; staff exchange programmes with other HEIs, professional bodies and industries; integration of disaster knowledge to the existing curriculum; providing adequate industry exposure to students through teaching and research activities; maintaining through-life studentship with HEIs; and exploiting the latest learning and teaching technologies to adopt non-formal and informal modes of learning. It has been realised that these recommendations won't be effective, if HEIs do not maintain a good relationship with other HEIs and industries. As such higher education-industry collaboration has been emphasised, as it would help to break down the challenges and barriers HEIs face. Collaborations between HEIs and industries are therefore vital in meeting the market demands effectively and in a timely manner.

Acknowledgements

This paper has been written based on three projects namely BELLCURVE, ANDROID, CARDE. These projects have been funded with support from the European Commission. This publication [communication] reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

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