Editorial

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Welcome to the February 2014 issue of the *Management, Procurement and Law* journal. The journal publishes original research and practice papers, briefing notes, case studies and book reviews covering a wide range of topics in civil engineering. This themed issue focuses on 'Education and training of civil engineers in a changing global environment'. Civil engineering produces the structures and infrastructure on which a civilised quality of life depends, including housing, transportation, water supply and sanitation, energy generation and distribution. The civil engineering profession has a prestigious history but future needs challenge the profession in different ways to the recent past. The profession is increasingly being influenced by a range of external forces including political, economic and social factors over which it has little control.

New infrastructure is vital to economic and social progress. Indeed, investment in new schools, hospitals, roads and rail links constitutes an essential macroeconomic policy lever with which to kick-start a slowing economy. In most OECD (Organisation for Economic Co-operation and Development) nations, a substantial proportion of the required infrastructure is already in place. However, qualitative improvements are still required through repair, maintenance, refurbishment, operation and facilities management. Civil engineering challenges in developed countries include responding to technological and management changes, increasing complexity and the forces of globalisation. Globalisation will continue to affect both the demand and supply of civil engineering services. The rapid growth in information technology and the ease with which work can be undertaken overseas at a fraction of the cost pose a real challenge to engineers in the western world.

In many developing nations there is still a great need for new infrastructure. Several developing countries have high population growth rates and rapid rates of urbanisation which increase the demand for infrastructure. Worldwide there are now more people living in urban centres than in rural areas. It is estimated by the United Nations that the world's population will reach 9.6 billion by 2050, with most growth in developing countries. At the country level, much of the overall increase between now and 2050 is projected to take place in Africa, as well as in countries with large populations, such as India, Indonesia, Pakistan, the Philippines, and the USA. It is further estimated that by 2030, more than 60 per cent of the world population will be living in towns and cities (United Nations, 2013). As a consequence, the challenges for decision makers are likely to

include: high levels of unemployment and urban poverty, proliferation of slums, unplanned developments, solid waste management, environmental pollution, overcrowding, and conflict over resources (such as water and land). Nonetheless, these challenges provide opportunities to ensure that relevant infrastructure is built and used sustainably. Civil engineers have a key role to play in designing and building the cities of the future to ensure low carbon emissions, sustainable development, adaptation to climate change and, where necessary, effective response to natural disasters.

With governments in both the developed and the developing world facing severe financial constraints, private sector financing of infrastructure development continues to be essential. The growth of private sector finance and new products offer new opportunities and challenges for civil engineers; particularly, opportunities for civil engineers to become more actively and continuously engaged in project identification, in identifying and assembling resources (including finance) and developing project delivery strategies that meet client needs. Public sector involvement at both local and national levels continues to be vital in terms of overall strategic planning to determine which infrastructure projects should be designed and built to optimise both short-term and long-term benefits.

Governments of all political persuasions worldwide acknowledge the role of the market in infrastructure service provision. For example, water supply, energy generation and distribution utilities in many countries today operate on a commercial basis. Furthermore, there is increasingly a greater role for private sector companies in providing local government services, such as street cleaning, refuse collection, solid waste management and various urban regeneration programmes. As a consequence, civil engineers, now more than ever, require a market-oriented proactive approach to seeking new work opportunities. In addition, there is now an increasing emphasis on securing value for money in the procurement of goods and services. To secure value for money, the balance between long-term and non-financial issues and the requirement for an adequate return on investments has to be addressed constructively. The real cost of construction projects, for example, includes whole-life costs, encompassing those associated with maintenance, operation, repair, refurbishment and decommissioning. Whole-life cost also includes environmental costs and risk factors. Civil engineers now need a greater understanding of whole-life and external costs and benefits of construction projects.

Although the core of civil engineering education is likely to remain the development of analytical and problem-solving skills, there is increasingly a greater need for awareness and understanding of the wider societal context. Civil engineers today need highly specialised skills in technical areas, such as structures, geotechnical engineering, materials, water engineering and sanitation, highways and transportation engineering. However, they also need the ability to communicate with others. Civil engineers need to be interdisciplinary in their approach to technology, finance and management, crossing the traditional boundaries to acquire both technical and managerial skills. Civil engineers now require in addition to their specialised knowledge of infrastructure planning and design, the fundamentals of social and environmental sustainability, risk management, health and safety, marketing, finance, project economics, communications and the use of information technology.

In many countries, civil engineering education and training in colleges and universities faces several challenges. These include: undertaking meaningful research; improving the links between teaching and research; developing greater academic and industry collaboration; focusing on student learning as opposed to teaching; and the development of new models of programme delivery, such as blended or online learning. This list is not exhaustive but serves to illustrate some of the topical areas for discussion and debate. Some of these topics are discussed in this themed issue, which consists of two briefing notes and four full papers.

The first briefing paper, by Paul (2014), is based on research carried out at Brunel University, UK, and investigates trends in possible parental involvement on students' course choice and choice of university. The rationale for the investigation is that with the new model for funding of higher education in the UK, university education is bound to be treated like any other long-term investment. The study finds that parents and guardians have a significant influence on students' course choice and choice of university. Thus in their programme and university promotional strategies, civil engineering and marketing departments in universities should rethink their communication channels to ensure that students and parents alike are provided with relevant information to enable them to make informed choices.

The second briefing paper, by Gossman *et al.* (2014), analyses questions about the nature of lecturing in civil engineering and in particular the nature and types of skills that should be developed in civil engineering students. The discussion is in the context of curriculum design and development, and the types of knowledge and epistemological stance that civil engineering academics might have and how this influences the stance taken by their students. The briefing paper concludes that to provide for civil engineering education in a changing global environment, civil engineering academics need a sophisticated conception of teaching, which is active and student-centred, in addition to a sophisticated stance in relation to discipline knowledge.

The first full paper reports results of research undertaken at Edinburgh University, UK, to identify what academics do to develop innovative learning activities and the reactions of students to various ideas of innovative learning (Furber *et al.*, 2014). The paper finds that civil engineering academic staff hold divergent views about what constitutes innovative teaching. The paper reports that some academic staff do not see the need for change, or are unwilling or unable to change. However, others see the need and are willing to innovate and to try new teaching methods to complement the traditional lecture method. Among other findings, one of the key lessons of this study is that the activities that civil engineering students found most attractive were those with a hands-on component involving making or doing something.

The study by Soetanto *et al.* (2014) investigated the processes, strategies and expected outcomes of virtual collaboration by teams of students based at one university in the UK and another in Canada in problem-based learning to refine communication and team-working skills. Based on data collected from interviews with the participating students, the study finds that professionalism and the building of trust are the two most significant requisites for successful collaboration and can successfully overcome barriers of technology, differences in culture, language, time zones and tasks.

The penultimate paper reports results of research into the soft skills requirements of senior personnel in construction companies in Northern Ireland, UK (Fletcher *et al.*, 2014), and finds that there exist gaps in the following areas: stress management, communication, people management, negotiation and presentations. It is reported that although respondents to the survey perceive their skills in these areas as being broadly adequate there is still room for improvement. Major barriers to training in soft management skills were found to include: lack of time; the mandatory nature of health and safety training taking up all the available training time; lack of financial support; and the difficulties associated with assessing and measuring soft management training outcomes.

The final paper, by Arciszewski (2014), stimulates debate and argues that the present system of engineering education produces engineers that are focused on the analytical and technical aspects of engineering and therefore not naturally prepared to lead and invent. The paper proposes that a successful university engineering department of the future, in which successful engineering education will take place, must be designed to include complementary components, research and professional services, public outreach and physical, intellectual and emotional environments. The paper suggests that it is in such an environment that traditional engineering knowledge as well as the practical, analytical aspects and creative intelligence will be harmoniously taught.

I enjoyed reading the papers in this issue. I found their content informative and thought provoking. I commend them to you and look forward to reading your views and feedback. Future themed issues currently under preparation will feature the following topics: building information modelling, knowledge management in construction, modelling and simulation in management, and international perspectives on construction contracts.

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