

INTERNATIONALISING GROUP PROJECT WORK FOR CIVIL ENGINEERING STUDENTS: INTERNATIONAL PROJECT WEEK 2009

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Abstract

Edinburgh Napier University hosted a huge gathering of European civil engineering students for one week in May 2009 for the International Project Week 2009 (IPW 2009). The week long event saw over 300 students and staff from 8 institutions across 7 countries (Scotland, The Netherlands, Denmark, Germany, France, Spain and Latvia) come together for a week of internationalisation, site visits, project work, networking, tourism and socialising.

The event was opened by the Scottish government Education Minister – such was the high profile nature of the event – and attracted local media coverage. After an opening session of short presentations from industrialists on the projects to be visited later in the week, the students were placed into groups of 6 to begin their week-long project work. Each group comprised a student from each participating institution (as best as numbers would permit) and the new friendships commenced immediately. The project work was fun yet educational, and the students had to gather information on what they saw and heard throughout the week working as a team. Site visits to major civil engineering projects going on in and around Edinburgh were orchestrated and the support from industry in enabling this was wonderful. The site visits ran over a 2 day long period and the week closed with another day of fun and educational group work. Evening socialising events were organised and the friendships, started on the first day, grew and matured in the evenings and through the week.

IPW 2009 was a phenomenal success and all participants left the city with fantastic memories, new friendships and in awe at the civil engineering projects they had witnessed and the hospitality they had received. For all participants the week was to be the most memorable week in their entire civil engineering education. In terms of student experience, IPW 2009 quite simply took things off the scale. The paper describes the background to the IPW network and the Edinburgh event, together with details of all of the activities undertaken by the students. The objective of this paper is to illustrate to all civil engineering departments around Europe the importance of such an event and to encourage those departments that don't currently engage in such an event, to consider doing so in the future.

Keywords - civil engineering, undergraduate, internationalisation.

1 INTRODUCTION

The term 'internationalisation' is defined herein as a range of teaching processes that are designed to assist undergraduate civil engineering students in understanding the international context of their profession, the civil engineering challenges faced by other European countries and developing the skills that will be required to operate effectively beyond their home nation. It is essential that undergraduate students within the engineering profession be prepared for working in an increasingly international society. Engineering colleges and universities must therefore develop strategies that provide the global perspectives and international experiences that will help graduates excel in this new world order [1].

The need to prepare students for working in an increasingly international society and workplace has been highlighted in other professions such as nursing and medicine [2]. Internationalising education is seen as playing a role in the empowerment of students through the acquisition of skills to help them become more independent, more able to participate in society and able to make the most of the

opportunities which are presented to them [3, 4]. The direct contact with persons with different cultural backgrounds can form an efficient, effective and stimulating method to learn about the differences in geographies and teaching methods [5]. In light of recent economic events, preparing students for international travel to obtain work in their chosen profession has become even more critical.

In 1996, the Organisation for Economic Co-operation and Development (OECD) and its Centre for Educational Research and Innovation (CERI) initiated a survey entitled 'Internationalisation of Higher Education'. This survey proposed a typology of internationalised curricula of which 'Type 2' was identified as '*curricula in which the traditional/original subject area is broadened by an internationally comparative approach (e.g. international comparative education)*' [6]. The IPW programme can be considered as a Type 2 methodology for broadening the understanding of the undergraduate student's appreciation for the challenges facing the international civil engineering profession.

The intention of this paper is to describe the historical development of the International Project Week (IPW) and the strategic collaborative network established to deliver an international element to the teaching of undergraduate civil engineering degree courses. The themes and successful elements of the IPW are identified and described to assist other European academic institutions in the development of similar activities. Specific detail is then paid to the event held in Edinburgh in May 2009 and widely reported as a phenomenal event for all participating students.

The IPW network comprises five core institutions: Edinburgh Napier University (Scotland), Hogeschool van Amsterdam (The Netherlands), Engineering College of Copenhagen (Denmark), Université Claude Bernard, Lyon (France) and Frankfurt Fachhochschule (Germany). As will be shown in Section 2.1, in addition to students from these five institutions taking part in the Edinburgh event, students from Escuela Politécnica Superior de Burgos (Spain), CESFA-BTP Paris (France) and Latvia University of Agriculture, Civil and Rural Engineering (Latvia) also participated.

2 INTERNATIONAL PROJECT WEEK

2.1 Historical Development

The Hogeschool van Amsterdam and Edinburgh Napier University have historically excelled in the provision of practical work experience as a core component of their civil engineering education. In combination with work placements and internships, both institutions also provide live project site visits to students with support from construction contractors and civil engineering infrastructure clients (public and private). These significantly contribute to the development of the practical awareness that undergraduate civil engineering students have of the ultimate goal of their professional activities, i.e. to design and construct our civilisations.

The Hogeschool van Amsterdam, due to their ideal geographical location, have undertaken site visits and study tours beyond the Netherlands for some time. These events have proven to be a valuable addition to lecture based teaching methods and have provided students with an awareness of their profession beyond the Netherlands.

In May 2006, 50 staff and students from the Hogeschool van Amsterdam visited Edinburgh Napier University for a week of site visits and lectures relating to critical civil engineering challenges facing both Scotland and the rest of the United Kingdom. This event was a complete success and as a result the IPW collaborative network was established.

In May 2007, the first IPW was held in Amsterdam with the Hogeschool van Amsterdam (HvA) as the hosting institution. Edinburgh Napier University (ENU) and the two other partners, Engineering College of Copenhagen (ECC) and IUT A Université Claude Bernard (UCB), Lyon descended on Amsterdam for a week-long event. Approximately 120 students from the partnering institutions participated in lectures on Dutch civil engineering projects, visited coastal defence schemes and live tunnelling projects. Furthermore, the students undertook a range of tasks and activities that specifically encouraged them to socialise and interact with each other. One area of improvement identified from this event was the need to force social interaction and encourage the students to interact with students from the other institutions.

In April 2008, the network enlarged to include the Latvian University of Agriculture (LUA) Department of Civil and Rural Engineering. The 2008 IPW was hosted by the Engineering College of Copenhagen and saw over 130 students attend the event. The theme was transportation and water infrastructure and included site visits to live construction projects in Denmark and in Sweden. By this stage the IPW

event was beginning to take on a familiar format: lectures from both academics and practicing civil engineers, project site visits, civil engineering infrastructure site visits, student mini-projects as part of a contest between the student groups and an inspirational amount of interaction and socialising between the different student groups. Details of the IPWs held in Amsterdam and Copenhagen have already been published [7].

The event format was now established and, as confirmed through the student feedback received, the event proved to be a great success. The 2009 IPW event in Edinburgh enlarged to include visiting institutions from the Fachhochschule of Frankfurt (FF), Universidad de Burgos (UBu), Spain and CESFA-BTP, Paris. The growth in popularity of IPW is shown in Fig. 1.

Year	Host city	Participating institutions	Number of participants
2007	Amsterdam	HvA (Amsterdam), ECC (Copenhagen), ENU (Edinburgh), UCB (Lyon)	120
2008	Copenhagen	HvA (Amsterdam), ECC (Copenhagen), ENU (Edinburgh), UCB (Lyon), LUA (Jelgava)	135
2009	Edinburgh	HvA (Amsterdam), ECC (Copenhagen), ENU (Edinburgh), UCB (Lyon), FF (Frankfurt), LUA (Jelgava), UBu (Burgos), CESFA-BTP (Paris)	310

Figure 1. IPW events since 2007

2.2 IPW Objectives

The overall objectives of the IPW are:

- to provide future European civil engineers with an awareness of civil engineering education and industrial practice beyond their home nation;
- to provide the students with a technical insight into civil engineering projects addressing major future issues facing the profession: e.g. protection of the environment, urban transportation, flood defence and sustainability;
- to provide the students with the opportunity to experience working on projects (tasks) with colleagues from other European nations, ahead of doing so when employed in the industry;
- to assist European students in the development of their English language skills; and
- to provide the students with an international component to their civil engineering studies.

2.3 Organisational structure

The core organisational committee consists of Edinburgh Napier University, the Hogeschool van Amsterdam, the Engineering College of Copenhagen, the Frankfurt Fachhochschule and IUTA Université Claude Bernard. The IPW committee is chaired by its founding partner Peter de Klerk of the Hogeschool van Amsterdam (Fig. 2). It is the intention to maintain the core principal partners of the international exchange group with the provision to bring in additional partners as and when they are identified and willing to participate.

The primary function of the collaborative network is for one of the participating universities to host an IPW event each year. Each year a different partner acts as the host institution. The host institution then forms an event organisational co-ordination team to undertake fund raising, gain industrial partners for the event, co-ordinate the project site visits and organise the lectures. There are also various social events to be organised that aim to assist the students in interacting with the different nationalities of students.

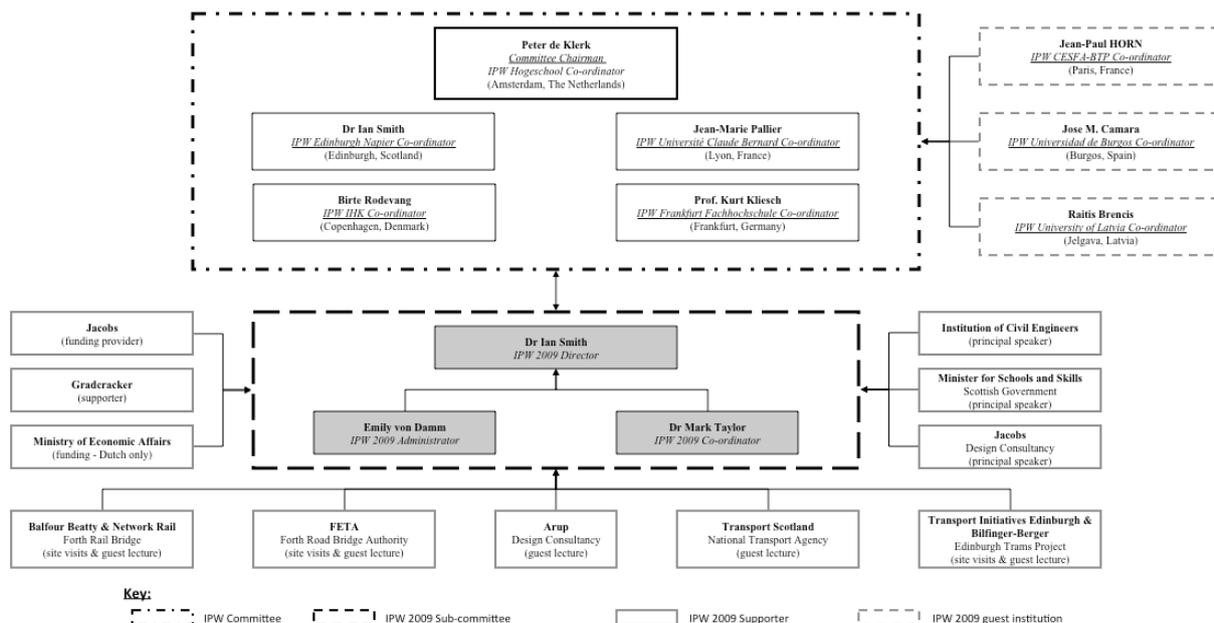


Figure 2. IPW organisational structure and supporters.

3 IPW 2009: EDINBURGH

3.1 Planning IPW 2009

All the planning and organisation for the Edinburgh event was undertaken by the two lead authors, both based at Edinburgh Napier University. The planning started a whole year in advance of the week and the final, phenomenal success of IPW 2009 was due to the attention paid to detail in the planning process. Buy in was required from all supporting industrialists from the outset and initial meetings to identify supporting construction organisations were held right at the beginning of the process. The list of supporting organisations is included in the Acknowledgments at the end of this paper.

A. Construction site visits

It was the lead author's desire to include crossing the iconic Forth Bridge structure (Fig. 3) as one of the highlights of the week for the students. To enable participating students to access this fascinating structure, discussions were held with the bridge operators (Network Rail) and the contractor refurbishing the 120 year old bridge (Balfour Beatty). To compliment the visit to the rail bridge, it was quickly identified that crossing the Forth Road Bridge (Fig. 3) and inspecting the suspension cables anchorage chambers would be exciting for the students too. In this way, the students would witness first hand the range of maintenance activities going on on the two structures. It is important that civil engineering students recognise early in their career that much of the profession's work is concerned with maintenance projects and visiting these two bridges would be an excellent opportunity to illustrate large scale examples of maintenance projects to the students.



Figure 3. The Forth bridges: Rail bridge (left) and road bridge (right).

The logistics of getting 200 students, mixed together in multi-national groups of 6, across both bridges over a 2 day period was a real challenge, but working together with all relevant organisations, a solution was established and implemented for the week. The established plan is represented in Fig. 4.

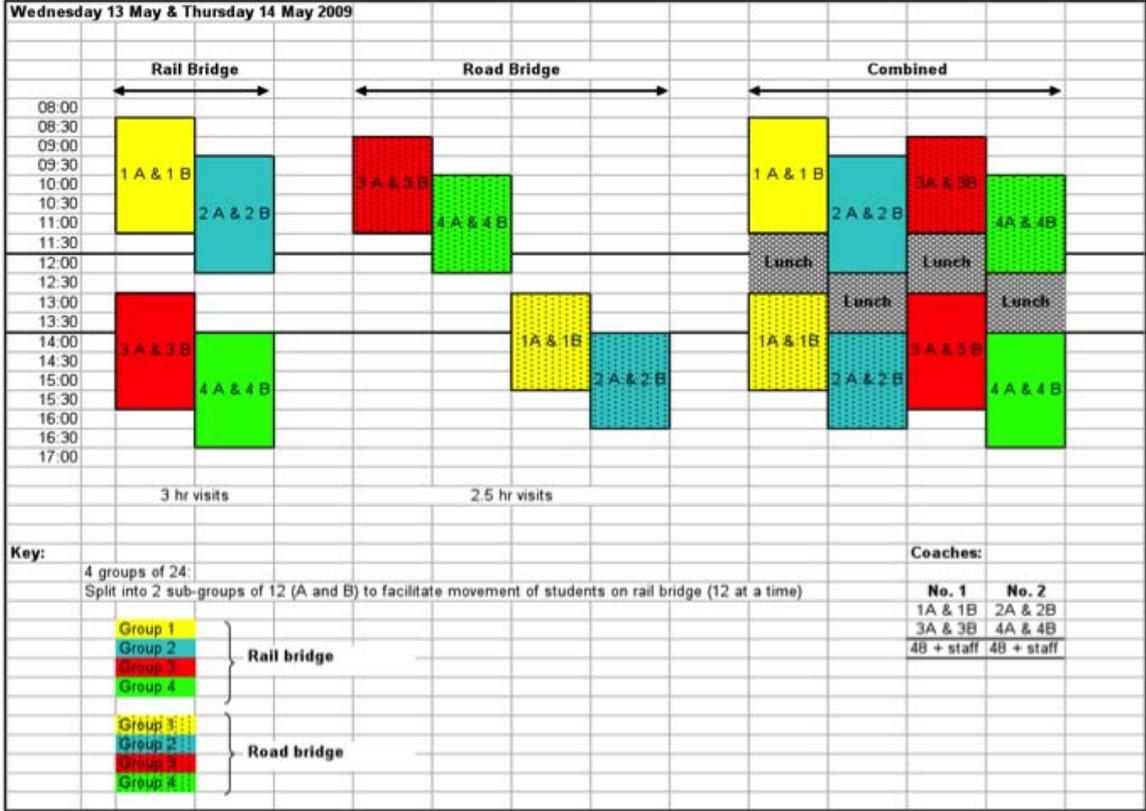


Figure 4. Plan used to enable 200 students to cross both bridges over two days.

In addition to crossing the two forth bridges, additional construction sites were sought for the programme. Two further large-scale sites were quickly identified: the construction of the huge aircraft carrier dry docks at Rosyth, and the construction of the Edinburgh tramway. Through negotiations with the relevant companies (Babcock, BAM Nuttall, Transport Initiatives Edinburgh (TIE) and Bilfinger-Berger) again a plan for enabling 200 students to view the works over a 2 day period was established. The inclusion of these 2 sites meant that the backbone of the IPW programme was established and students would visit 2 out of the 3 sites over a 2-day period in the programme. This meant that 100 students would visit each site each day and the logistics of working out coach and mini-bus transport

to and from the sites followed. A team of four coaches and four mini-buses were hired for the 2-day period to transport all students, and accompanying staff, to the sites.

B. Lecture Programme

A series of high-profile speakers from industry and government were identified and approached to deliver interesting and relevant presentations to the students. These would take place on the opening day of the event and would set the scene for the week's activities. The list of speakers and topics is listed in Section 3.2.

C. Group work mini-project

To facilitate the objective of getting the students to work collaboratively in multi-national groupings, a mini-project was devised. The work would commence on Day 1 and run throughout the week so that the group dynamics would run continuously and friendships become established. The mini-project was designed to be educational yet fun. There were to be prizes for the best groups and this ensured a competitive element was introduced. The project would involve a fun, against-the-clock internet search based quiz on Day 1 as an ice-breaker, making observations on all heard and seen during the lectures and site visits, a quiz on all they had seen and heard during the week, plus a scavenger hunt to take the students around the old town sector of the city of Edinburgh. The prize ceremony would then conclude the week.

D. Social events

Scotland is a fabulous nation and the Scottish people warmly welcome foreign visitors and take pride in their culture and sharing that with their visitors. To this end a diary of evening social events would run alongside the daytime activities. This would include much Scottish culture, dancing, tartan and, of course, bagpipes. The main social event would be a Scottish evening held at Murrayfield Stadium – the home of Scotland's national rugby team. That night would include music, dance, food, drink and create the perfect situation for the students to meet new friends and to start sharing experiences. The stadium itself is a showpiece civil engineering achievement and would be of interest to all students, especially those with an interest in the game of rugby. Other social events would revolve around pubs in the city and students – even though strangers to one another – are experts at utilising those environments to further the bonding and friendships. Specific pubs in the city were informed of the IPW and one agreed to give free food and put on live music for all the students. The social events would be as important as the educational events in achieving the objectives of IPW.

3.2 The week of IPW 2009 (11 – 15 May)

A. Programme

The final programme for the week is shown in Fig. 5. It is apparent from the programme that this was a week full of educational and social activities for the students.

Monday 11 May - Travel to Edinburgh; Informal gathering of staff in evening

Tuesday 12 May

am: Welcome Session (Riardy, Craiglockhart Campus)

08.30 Assemble/coffee

09.00 Opening video

09.05 Welcome to Napier (I Smith, Prof J Stringer, Principal of Napier University)

09.10 IPW Welcome (P de Klerk, HVA, Chairman of IPW)

09.15 Welcome to Scotland (Keith Brown MSP, Minister for Schools and Skills,
Scottish Government)

09.30 Technical Lectures (Session 1):

09.30 Welcome to UK Civil Engineering (Richard Coackley, Vice President of ICE)

09.50 The Transport Infrastructure Agenda for Scotland (Jim Barton, Director, Transport

Scotland)

10.45 Technical Lectures (Session 2)

- 10.45 Forth Road Bridge maintenance (Barry Colford, Chief Engineer, FETA)
- 11.10 New Forth Crossing (Stuart Hunter, Arup; Stuart Turnbull Jacobs; Steven Brown, Transport Scotland)
- 11.35 Forth Rail Bridge Refurbishment (Ken Brown, Project Manager, Balfour Beatty)
- 12.05 Questions
- 12.20 Explanation of IPW 2009: group photograph, group exercise and site visits (I Smith)

lunch

pm: Student group exercise

- 13.30 Group photograph
- 13.45 coaches leave Craiglockhart for Merchiston
- 14.00 Group work Part 1: issue of exercise, start of work
- 15.30 coaches leave Merchiston for city
-
- 18.15 coaches leave city for Murrayfield

eve: Evening meal Scottish theme (Murrayfield stadium): Arrival 19:00, meal commences 20:45.

Wednesday/Thursday 13th/14th

Site visits:

- Groups A & B - Forth Rail Bridge and Road Bridges* (2 coaches)
- Groups C & D - Edinburgh Trams – Gogar works/Rosyth Dockyard
- (Groups alternate the visits over the two days.)

Weds eve: Formal staff dinner / free evening for students

Thurs eve: IPW members discussion (staff) (17:00 – 19:00) :
"Student night" in Drop Kick Murphys (students)

Friday 15 May (at Dynamic Earth)

am: Group-work Part 2: quiz

pm: Group-work Part 3: scavenger hunt integrating with all industrial supporters (mini careers fair) followed by award of prizes and closure of event.
Closing buffet and bar.

Saturday 16 May

Free day for tourism

Figure 5. Programme for IPW 2009.

B. Educational activities

From Fig. 5 it is clear to see the range of educational activities that took place in the week. From the lectures presented in English by leading technical directors and senior engineers, through to the site visits, the whole programme was setup to maximise student learning in a fun and informal manner. The lecture programme complemented the site visits, and each presentation provided facts and information about the projects that the students would visit later in the week. Each speaker was chosen because of their high profile and standing within the UK construction and transportation sectors. To this end the quality and relevance of the talks were second to none and the students absorbed all that they saw and heard (Fig. 6).



Figure 6. Day 1 activities: Lectures (left) and group work ice-breaker fun task (right)

Students were placed in multi-national groups of six for the week. They worked within their group on each activity including an ice-breaker internet fact finding quiz on Day 1 (Fig. 6) and remained in their group for the site visits. Coaches took the students to and from the sites and they were moved around the sites seeing locations where the public are forbidden to access. Full Personal Protective Equipment (PPE) had to be worn on all sites to comply with the strictly enforced safety requirements of UK construction sites. Working together and sharing experiences amongst each other, the students readily learned not only about what they were seeing in Scotland, but about what similarities and differences existed in the other nations.

The site visits ran entirely to plan and provided the students with memorable experiences. Sample photographs are shown in Fig. 7.



Figure 7. Site visits: on top of the Forth Rail Bridge (left) and trams project (right).

C. Social activities

The social events provided much enjoyed and appreciated time to network and have fun. The Scottish evening held at Murrayfield Stadium (Fig. 8) was undoubtedly the highlight of the social programme and the students thoroughly enjoyed the bagpipes and Scottish dancing. Friendships were firming up in a truly relaxing and enjoyable environment.



Figure 8. Murrayfield Stadium: stadium reception (left) and Scottish dancing (right).

D. Student Feedback

Feedback was sought from all students who attended the Amsterdam IPW 2007 and the Copenhagen IPW 2008. This constructive feedback was considered as part of a continuous improvement process in the development of the programme of events for the Edinburgh IPW 2009. Feedback was acquired from IPW 2009 too and it was clear that the planning and delivery of the week had been totally successful and the students had had a memorable experience.

A selection of quotes from the students are offered below:

"... the best week I've had in my life so far." Aernout Hoesintalib, Amsterdam.

"Not only was this week extremely interesting concerning the technical aspects but also in the human relationship aspect." Manel Naimi and Jeremy Argoud, Lyon.

"Thank you all for an awesome week!" Jane Gadeberg, Copenhagen.

"The highlight for me had to be getting to go on top of the Forth Rail Bridge." James Anderson, Edinburgh.

"Thanks everybody! For a fantastic week!" Magnus Bros, Copenhagen.

"This week in one word: FANTASTIC!!" Nadine Tegelbeckers, Amsterdam.

"It was a fantastic week. The introduction day was very educational." Bodil Narud, Copenhagen.

"Thanks for the great week in Edinburgh!!! really was awesome." Harco Legdeur, Amsterdam.

"I loved IPW 2009 so much that I transferred from Latvia to study at Edinburgh Napier." Zane Kalnina, Latvia.

4 ADDITIONAL BENEFITS OF IPW

As a supplementary benefit to the IPW event, the academic staff involved have actively pursued further scholarly activities in relation to visiting scholarships, guest lectures and assistance in establishing communication within civil engineering design consultancy practices to allow students in obtaining internships and work placement opportunities beyond their home nation. There has been discussion relating to the use of already established Erasmus agreements and the further exchange of best practice in teaching. For example, Edinburgh Napier University and the Hogeschool van Amsterdam are in discussion on the use of an internet based summer placement, internship and graduate opportunities database to allow Scottish and Dutch students access to information relating to such opportunities in each country. The existing Edinburgh Napier University system, currently known

as Prospects, will be adapted to allow European employers to post information relating to employment opportunities and assist students in targeting employers.

5 CONCLUSIONS

The IPW event provided the students with a unique experience in relation to understanding the working culture of the Scotland's civil engineering sector. The event not only improved their communication skills but their understanding of other European cultures. Many of the students commented that they would consider working beyond their home nation and look for potential employment throughout Europe. During the site visits, a selection of the visiting students made comments referring to the fact that they had 'not seen anything like this in their own country'. With a greater awareness of civil engineering solutions beyond their home nation, it is likely that this new generation of civil engineers will be more likely to look more internationally for innovative design and construction solutions to adopt on their projects. This can only lead to improved knowledge transfer and a greater willingness to adopt design best practice from throughout Europe.

IPW 2009 was a phenomenal success and all students left the city of Edinburgh enthralled by the week they had experienced. The paper has presented an account of the range of activities that were planned and then delivered to ensure IPW 2009 was a success, and that the objectives of the week were fully achieved. It is clear that the benefits of the week experienced by all students were quite remarkable and long-lasting. A Facebook group "IPW 2009" was setup to help foster contacts and friendships, an article on the week was published by the Institution of Civil Engineers [8] and a DVD of the whole event was produced and distributed to all participants. The authors hope that other institutions around Europe will consider adopting the philosophy and ideas of the IPW series in their own courses.

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