The Role of International Exchange Visits in the Geotechnical Education of Undergraduate Students

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ABSTRACT: The increasing international presence of design and construction companies has generated the need for civil engineering graduates to be able to work in an international environment, understand a series of international design standards and - with respect to geotechnical engineering - deal with different types of soil conditions. The above trend has placed an emphasis on internationalising civil engineering degrees, which in turn generates a challenge to educational institutions in terms of curriculum design. In the present paper, the authors take inspiration from the student exchange programme of International Project Week (IPW), an initiative that brings together students from seven (7) different European Institutions for a week of lectures, site visits and a final group project. The authors provide a comprehensive description of the programme and attempt to explore ways that this and similar events can shape and contribute to the geotechnical education of their respective institutions. The ultimate objective is to trace potential margins for improving the existing undergraduate geotechnical curricula and propose modern pedagogical means for their enrichment.

Keywords: geotechnical education, pedagogical research, curriculum design, internationalisation

1 Introduction

The globalisation of the economy has had a direct effect upon the strategic planning of many companies and organisations, which focus on emerging economies. The need for new infrastructure and buildings in developing countries has led many design and (mostly) construction companies to grow beyond their national markets. This shift in development focus has altered the workforce trends and the desired professional qualifications of engineers, hence creating a shortage of skilled professionals (Mariasingam et al., 2007). Darwish et al. (2012) make a very thorough analysis of the impact of globalisation upon the construction engineering education and among others highlight some of the technical and social skills that new graduates need to have in the construction industry (technical competence, multicultural communications skills, etc.). Regarding geotechnical engineering education, globalisation of the profession poses an extra layer of complexity, as young graduates not only need to possess sufficient technical skills and a good understanding of the international design codes and standards but need to be able to deal with very different soil conditions. Hence, in this internationalised context current geotechnical engineering programmes face a significant challenge; that of providing their students with a global perspective.

The present paper addresses the question of how exchange visits among European institutions can contribute to the internationalisation of geotechnical education, with a view of preparing undergraduate students to respond to future professional challenges. More specifically, the student exchange programme entitled 'International Project Week' (IPW) is used as the starting point to explore how such events can shape and contribute to the geotechnical education. The International Project Week programme is designed to bring together students from the 7 participating European institutions

[Edinburgh Napier University (ENU), Amsterdam University of Applied Sciences (Hogeschool van Amsterdam), Technical University of Denmark, Frankfurt University of Applied Sciences, University Claude Bernard Lyon 1, University of Life Science and Technologies (Latvia), Roma Tre University] for a week of guest lectures, site visits and a final group project. The principal aim of IPW is to promote collaboration among students of different nationalities during the event, but more importantly to assist students understand the international aspect of their future profession. Additionally, the programme helps the participating universities adopt an ‘extrovert’ approach of teaching in engineering and initiate opportunities for students and staff members for teaching and/or research exchange visits between institutions.

The IPW concept was first established by Peter de Klerk from Hogeschool van Amsterdam, as a voluntary partnership among European educational institutions. His vision was to provide engineering students in Europe with opportunities for knowledge exchange and networking. The first IPW event took place in 2007 in Amsterdam, with 4 member universities, and approximately 120 students (Taylor et al., 2009). Since then, the network of participating institutions has expanded to seven (7) and the structure of the programme has been standardised to include guest lectures from either academia members or industry representatives, site visits of different civil engineering projects, social events and group work in mixed international student groups. The event is taking place yearly, in April or May, and the location changes between the member institutions each year. The latter is decided at the IPW event of the previous year, where it is further confirmed that all participating institutions are willing to continue. The number of participating institutions is subject to practical restrictions, such as number limitations for site visits. Historically, the number of participating students ranges between 150 – 200, which creates the main challenge with reference to finding and organising site visits. Requests from new institutions to join the programme are discussed and decided among the existing IPW members. The participating students normally cover their own travel and accommodation costs, while the hosting institution covers all other costs (lunches, promotional material, minor transportation costs, etc.) along with any support obtained from industrial partnerships.

Within the above context, the focus of this paper is upon the IPW events organised by Edinburgh Napier University in 2019 (6th – 9th of May) and Frankfurt University of Applied Sciences in 2016 (9th – 12th of May). In the first section of the paper, a more detailed description of the programme’s layout is given, attempting to highlight its pedagogical dimension. In the sequel, key information about selected site visits with a geotechnical interest, which were organised in the two cities, are collected and presented (Queensferry Crossing in Edinburgh and the Schiersteiner Bridge in Frankfurt). The main geotechnical design issues are identified, in view of tracing potential margins to improve existing undergraduate geotechnical curricula and propose modern pedagogical means for their enhancement.

2 Structure and Workflow of IPW

2.1 Structural Frame

The IPW week typically starts with the registration of the participants, welcome speeches from the Dean and the organisers and continues with the invited lectures. The topic of the invited lectures is mainly related to the site visits of the following days, but it can also be linked to the main research area of the hosting institution or even have a broader civil engineering content. The second and third days are dedicated to the site visits and typically, at the end of the third day a social gathering is organised by the students of the hosting university for their student guests. This can be an evening at a local pub or dance club. A dinner is also organised for the members of staff, which helps share their experiences on the past days. The fourth day is dedicated to the main student activity, which normally has an open topic each year, a staff meeting, and the closing ceremony. Students and staff are gathered at a common hall for the closing ceremony where winners of the student activity are selected, small prizes are handed out and short talks by the organisation committee are delivered.

In the 2019 IPW event in Edinburgh, four invited lectures were scheduled. Two of them were relevant to the site visits (New Waverley development and the Forth Road Bridge) and were delivered by engineers who were currently working or have worked on the projects. The third one covered the similarities and differences in the geotechnical conditions between Edinburgh and Glasgow and was delivered by a local senior geotechnical engineer. The fourth lecture was about building sustainability, which is a very active research area at Edinburgh Napier University and was delivered by an Associate

Lecturer of ENU. The site visits of the following two days are briefly presented in Table 1. Regarding the 2016 IPW event, held in Frankfurt, the site visits are summarised in Table 2, whereas the guest lectures covered the Frankfurt Public Transport System, the Skyscrapers and the European Quarter.

Table 1. Brief description of the site visits during the 2019 IPW week

Site visit	Brief description
The New Waverley development	A tour of the redevelopment of a 425,000 ft^2 area comprising offices, hotels, leisure and retail with some residential area, in the east of the city centre.
Anchor Chamber visit and bridge crossing of the Forth Road Bridge (1964) - The Three Bridges	Visit of the anchor chamber of the Forth Road Bridge (1964), the fourth longest suspension bridge in the world. Crossing of the bridge on foot, while seeing the Forth Rail Bridge (1889) and the Queensferry Crossing (2017).
Queensferry Community High School, South Queensferry	A visit to the construction site of the South Queensferry High School – including main school building, sports hall, swimming pool and outdoor sports facilities.

Table 2. Brief description of the site visits during the 2016 IPW week

Site visit	Brief description
District Heating Tunneling	A visit to the 300 m long and 3 m diameter tunnel, running below river Main, to accomplish the extension of the energy network.
European Quarter – Urban Development	A tour of the redevelopment of a 60,000m² area comprising offices, hotels, leisure and retail with residential area for up to 30,000 inhabitants.
Riederwald Tunnel Construction site	Visit of the construction site of the tunnel – a key element of a planned motorway link between two motorways in Frankfurt (A66 and A661).
Schierstein Bridge – Reconstruction and Extension	Visit to the construction site of the new bridge to accommodate the traffic volume increase from 20,000 vehicles per day in 1962 to 90,000 vehicles per day in 2012.
The WINX Tower	Visit of the open pit site used for the construction of a 110-metre high tower.

2.2 Pedagogical objectives

In the final day of IPW 2019, the students were asked to collaboratively work towards the preparation of a poster, following conference-oriented format guidelines and present it in front of the organising committee and the other participants. Each group consisted of 10 students of different nationalities. The topic of the poster was to present and discuss the most interesting features (design, construction or maintenance challenges) of one of the visited projects. In the final day of IPW 2016, the students - each group consisted of 6 students of different nationalities - were asked to work on the preparation and the load testing of a skyscraper model. Students were encouraged to search for their own information sources, as well as rely on the information presented in the lectures and provided during the visits. In both events, the best three group projects (posters or models) were selected at the closing ceremony, based on quality of presentation, content and creativity and small commemorative prizes were awarded. Such events are the main means of assessment of the students. It is noted that there is no formal assessment of the students' performance, as the programme is structured as a seminar, aimed in promoting communication and to create networking opportunities among students and staff. Given the open nature of the event in terms of assessment criteria, the educational background of the students does not follow any specific restrictions, such as prerequisite modules. Most undergraduate students are in their 2nd or 3rd year in civil engineering programmes. Given that students are self-funding their participation (traveling and accommodation), they have occasionally participated in multiple IPW events, which have taken place in different countries.

3 Queensferry Crossing – Edinburgh

The three bridges at the Firth of Forth area in Edinburgh are typically included in IPW events and the participants get the opportunity to appraise three engineering projects constructed in three consecutive centuries. In 2019 and due to accessibility reasons, the Forth Road Bridge (1964) was the focus of the visit, however information was provided on the other two bridges as well. Given the abundance of data on the soil conditions and the geotechnical design, the Queensferry Crossing (2017) is presented herein.

3.1 General information of the project

The Queensferry Crossing is a 2.7 km long cable-stayed bridge, which carries the M90 motorway over the Firth of Forth, connecting Edinburgh at South Queensferry and Fife in North Queensferry. It is the third bridge across the Forth at Queensferry, alongside the Forth Road Bridge (1964) and the Forth Bridge (1890), hence making a unique site with three bridges constructed in three consecutive centuries (see Picture 1).

Picture 1. The Forth Road Bridge (centre, left), alongside the new Queensferry Crossing and the railway bridge (Scottishfield.co.uk)

The Queensferry Crossing is the longest three-tower, cable-stayed bridge in the world and the largest to feature cables, which cross mid-span. The particular feature adds more structural stiffness and strength, allowing the construction of more slender towers and decks. The bridge was constructed to replace the existing Forth Road Bridge, which, despite of a planned design life of 120 years, was exceeding its theoretical capacity of 11 million vehicles per year, reaching 23 million vehicles in 2006. Additionally, the inspection programme in the period 2003-2005 revealed a significant loss of strength of the suspension cables, in the order of 8 – 10%, because of corrosion. It was then projected that the Forth Road Bridge would have to close by 2019, unless successful major structural work was carried out. In view of the potential significant disruption in the economic activity in the area, the idea of a new bridge was actively pursued, leading to the completion of its construction in 2017.

3.2 Geological setting

The ground conditions in the project area were determined based on published and historical information, and a project-specific site investigation programme (Jacobs-Arup, 2009). In this report, the term ‘solid’ geology is used to describe the local rock conditions and the term ‘drift’ deposits to describe the superficial soil deposits. These terms are also adopted here.

At the north part, the drift deposits included made ground, alluvial deposits, peat, reclaimed deposits, marine beach deposits, as well as weathered and fresh glacial till. The solid geology in the area mainly consists of quartz dolerite and sedimentary rock formations (i.e. sandstones, mudstones, siltstones, limestones) and thin coal seams. Five faults are mapped across the site with varying dip angles. Groundwater was located within the made ground, natural superficial deposits and bedrock, at variable depths, ranging from 0.3 m to > 25.0, particularly at the northern end. The rockhead (depth to bedrock) was very variable in the area, from ground level (outcrop) to 36 m depth. At the south of the Firth of Forth the drift deposits consisted mainly of weathered glacial till (sandy to gravelly clay) of approximately 2 m thickness. The solid geology in this location of the project is mainly of sedimentary origin, composed of sandstones, siltstones and mudstones. The depth to bedrock varied between 1.0 m to 30 m. Groundwater levels ranged between 1 m to 2 m of existing ground level. The soil profile at the main crossing was a combination of Raised beach deposits, alluvium, granular Fluvio-Glacial deposits over cohesive till. Made ground, consisting of gravel with small proportions of clay and sand, generally less than 2 m thick, was sporadically encountered. The alluvium layer (of maximum thickness of 14 m) mainly consisted of unconsolidated clay and silt, with granular deposits. The till formation consisted of sand and gravel and presented a variable thickness typically less than 6 m, with local thicknesses of 12.9 m. The encountered rock formations were of sedimentary nature (sandstone, siltstone, oil shale, limestone) with coal seams and volcanic tuffs, as well as dolerite, which was intruded by igneous silts of variable thickness (between 0.1 m – 60 m).

3.3 Geotechnical Design

The project spans across an area of variable soil conditions and geological background, hence a variety of geotechnical works was required. The foundations of the main crossing were the main design objective, alongside a series of general earthworks, regarding the proposed mainline and associated road network connections had also to be addressed.

Foundations. - In selecting the most appropriate foundation option, the following key aspects had to be considered:

- Ground conditions, i.e. the depth to bedrock or a competent bearing stratum,
- Water depth and
- Constructability

The selected foundation type depended on the local soil conditions, depth to bedrock, and the type of loads that the foundation would have to carry. Generally, three types of foundations were adopted (West et al., 2019), namely (i) spread footing in modular precast cofferdam (central tower), (ii) caisson and marine sheet-piled cofferdam spread foundations (approach piers, north and south towers) and (iii) land-based spread footings on rock (all in-land approach piers). In Figure 1, a cross section of the bridge with the locations and types of foundations is presented.

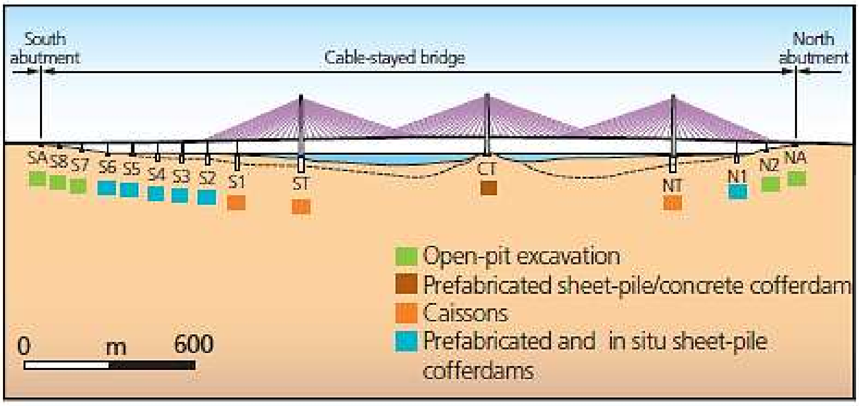
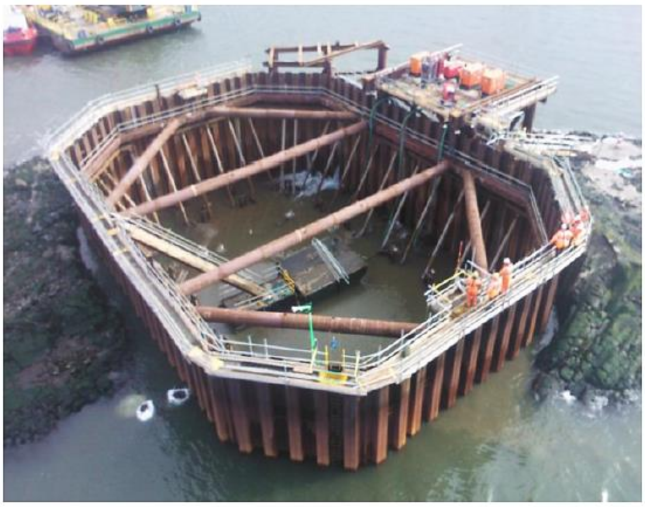


Figure 1. Locations and types of foundations (Climie & Shackman, 2019)

Particularly the 210 m high central tower (CT), was founded directly on an outcropping very strong dolerite pinnacle, with prior controlling blasting to form a suitable foundation pocket to support the prefabricated steel sections that formed a sealed cofferdam. A general view of the central tower enclosure including the temporary horizontal bracing system and diagonal struts is presented in Picture 2. The foundations of the north (NT) and south (ST) flanking towers and pier S1, needed to be constructed in deep water over deep soft soil layers, with bedrock encountered in excess of 30 m, below sea level. For that purpose, circular steel caissons of 25 – 33 m diameter were initially sunk into the seabed, by a combination of dredging and ballasting with concrete. Underwater excavation allowed for the underwater concrete pouring to form a concrete plug, which would enable the construction of a reinforced concrete base. The construction of the spread footings was performed in dry environment. The land-based foundations were all constructed in-situ and consisted of spread foundations.

General earthworks. Apart from the foundations, a series of major or minor geotechnical works were carried out in the project area, mainly in the approach areas. General earthwork design issues included soil cutting slopes, rock cutting slopes, embankment slopes and associated stabilisation measures, such as soil nailing, in-slope drainage, rock dwelling, embankment reinforcement etc. Control and removal of groundwater from the different earthworks was deemed necessary, to guarantee the short- and long-term stability of the works and was achieved through in-slope drainage in the form of racking drains, toe or lined crest channels and rock slope drainage measures. Occasional use of geotextiles was also required to protect in-situ materials. Short (< 2 m) retaining walls were required to support existing structures and walls as well as sporadic piled embankments. Depending on the local soil conditions ground improvement methods were used, such as local removal of soft soils (mainly peat), or soil reinforcement of made ground, sand and alluvial deposits, in order to deal with the potential accumulation of excessive settlements. Band drains, surcharging and geogrid placement were required in some embankment construction locations.



Picture 2. General view of the central tower enclosure (West et al., 2019)

4 Schiersteiner Bridge – Frankfurt

4.1 General information of the project

The Schiersteiner Bridge (SCHIERSTEINER BRÜCKE) is a 1282 m long road bridge (fly over the River Rhine), connecting the capitals of the federal states of Hessen and Rheinland-Pfalz- Wiesbaden and Mainz (Picture 2). It is one of three bridges, which cross the River Rhine over 125 km, thus emphasizing the importance of the bridge for the regional infrastructure.

The bridge was erected between 1959 and 1962 and consists of six individual structures. It was built as a composite structure with several sequences of prestressed concrete (about 100 m long with a maximum width of 205 m). Upon its completion in 1962, the bridge could accommodate 20,000 vehicles per day without any problem. Nevertheless, due to the dramatic increase of the traffic volume (90,000 vehicles per day in 2012) and the continuous use of the structure for over 50 years, a replacement was deemed necessary. The planned highway is going to have two pavements of three lanes each, of width equal to 14.50 m. The project was planned to be constructed in two phases; namely the construction of the down flow stream from 2013 to 2016 and the subsequent demolition of the existing bridge prior to the construction of the upward flow (2nd three-lane pavement) between 2016 and 2020. The construction started in 2013 and the completion is scheduled for 2020.

Picture 3. Existing bridge with new construction in progress (Samstag & Stremmel, 2016)

4.2 Geological setting

The bearing subsoil of the bridge line consists of marine Tertiary sediments (Oligocene) that consist of a non-homogeneous, stiff and over-consolidated clay with embedded limestone bands of varying thickness. This layer is underlain by limestone and dolomite layers, as well as algal reefs, marly calcareous sands and silts and marly clay. The rather thin top layer consists of quaternary sand and gravel. Especially the top 40 m of the Tertiary sediments consist of clay layers, which are geologically defined by brackish water snails (Hydrobia). In greater depths, the limestone layers are geologically defined by shell-type Corbicula formations. The above soil conditions are typical of the subsoil encountered in Frankfurt (Mainz Basin) and the mechanical behaviour of the soil can -in principle- be compared to that of London Clay (deposited during the Eocene epoch). Note that the Eocene epoch stretches from the end of the Paleocene Epoch to the beginning of the Oligocene Epoch, which partially explains the similarity to the Tertiary deposits in Frankfurt.

Near the river borders and the floodplain, the Tertiary subsoil is covered by Quaternary Rhine sediments that consist of sand and gravel, mixed with Aeolian sediments and anthropogenic sediments of World War II demolition waste of the formerly destroyed cities nearby. The inclination of the Tertiary layers is south to south-west. Moreover, there is great variability in both the vertical and horizontal direction, with a direct effect upon the shear strength and bearing capacity of the soil.

Based on the above, the local soil conditions are summarised as follows:

- Small water depth and only small layer thickness of the river’s soil cover;
- Non-homogeneous, stiff and overconsolidated clay;
- Immediate extreme changes of subsoil strength at a small scale from very hard to chemically weathered;
- World war II demolition waste;
- Big changes of the hydraulic conductivity with depth.

4.3 Geotechnical Design and Challenges

The old and new construction will be fully supported by floating pile foundations (Pelke & Dieter, 2013). Generally, two types of pile foundations with sheet-piled cofferdam are adopted, namely (i) land-based, (ii) pontoon-based on the river. The bored pile foundation is constructed in a steel sheet piling support chamber (cofferdam), as presented in Figure 2 and Pictures 3 and 4. The first part of the bridge side will be built onshore, on auxiliary supports of 133 m in length and 2500 tons in weight. The assembly component is pushed 87 m over the pillar up to 40 m above the shipping lane, meaning that this part of the pile foundation will have to withstand many load changes.

For all areas of civil engineering, this is a demanding and complicated task, especially for geotechnical engineers when considering the active settlement of the clay layers and the danger of high settlements and tilting of the structure itself. As the boundaries of soil layers are dipping, the thickness of the settlement-active clay varies below the foundation structures. When planning foundations, under these difficult conditions, a major task is the reduction of settlements and differential settlements of the structures as well as adjacent buildings. The aim is to also ensure their safety and serviceability under live load criteria and furthermore when considering the option of re-use of foundations.

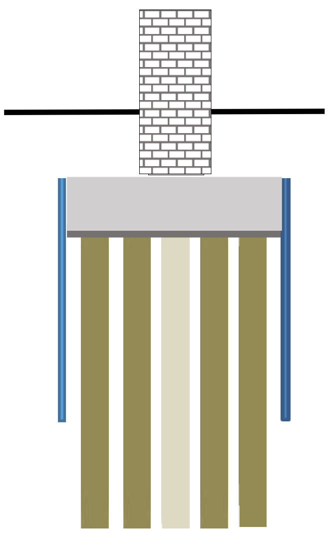
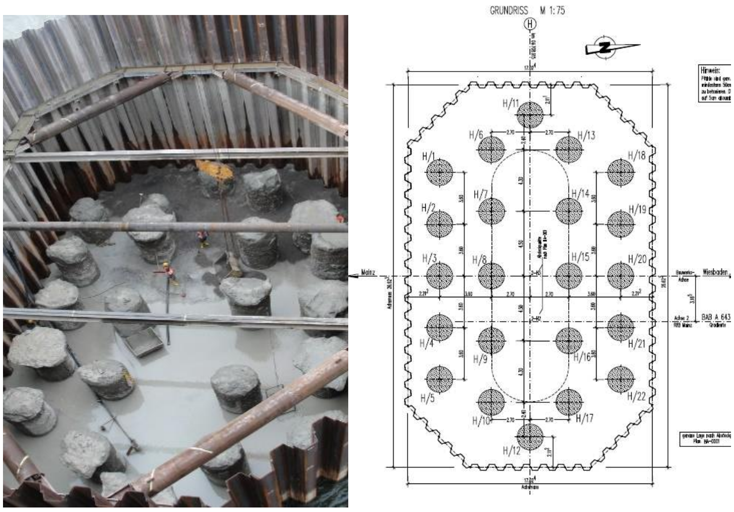


Figure 2. Sketch of the pile foundation (Samstag & Stremmel, 2016)

Picture 4. Diameter of piles: 1.80 m, Length: 30 m (Samstag & Stremmel, 2016)



Picture 5. Sheet pile chamber, piles and under water concrete floor (Samstag & Stremmel, 2016)

5 Identified issues in curriculum design

The previously presented large-scale projects involve a wide variety of geotechnical design issues, such as foundation design, embankments, slope cutting, retaining walls etc. Each one of the above works involve multiple levels of analysis and design, which span different construction phases of a project and may even require different design approaches depending on their temporary or permanent character. It is acknowledged that the previously presented information may not be fully appraised by the IPW participants through a half-day visit and a 45-min lecture. As IPW is a European collaborative network of institutions, the main objective is to provide participants the opportunity to expand their academic and professional network, realise the international nature of their profession and appraise the engineering challenges, construction practices and methods used abroad. As a result, the programme is built around activities (site visits, invited lectures from established engineering professionals) that target student engagement and participation. In the aftermath, it is noted that many students have successfully applied for job positions to companies involved in the site visits that had been organised. Moreover, since the majority of students come from non-English speaking countries, they also have the opportunity to practice their English skills, as they are invited to collaborate in multi-national groups on the final project. The above features are believed to compose a useful set of basic but necessary - transferable - employability skills, which the students possess upon graduation from an undergraduate programme and which can further grow, as part of their ongoing professional development. Based on student feedback, students are happy to increase their awareness of the profession in other countries, learn about the hosting institution and country, and more importantly understand how civil engineering theory is put into practice through site visits in a foreign country.

Programmes such as the International Project Week underpin the purpose of problem-centred curriculum design in multiple levels. Considering their geotechnical background, the authors here attempt to identify learning objectives that could be included in such events so that their technical character is enriched. Additionally, indicative means of accomplishing the above objectives are identified. The local geology, stratigraphy and composition of the soil greatly determine the level of complexity and difficulty in design and construction of any civil engineering project. Hence, understanding the local geological and soil conditions is fundamental from the early design stages of a project and normally geotechnical engineers closely collaborate with engineering geologists to properly account for the local geological conditions. A minimum knowledge of engineering geology/rock mechanics is therefore believed to contribute to the interdisciplinarity of modern academic education and benefit young geotechnical engineers in their adaptation in a fast-moving international professional environment. Building upon the geological information of the presented projects, a series of learning outcomes can be introduced to a technical geology module, such as: (i) appraising the processes involved in rock formation and categorising rock formations in terms of increasing durability, (ii) identifying rock formations susceptible to dissolution (i.e. limestone), which is associated with the creation of sinkholes and a significant subsidence hazard, (iii) discriminating between permeable (sandstones) and impermeable (siltstones) rock formations or (iv) understanding the effects of fault orientation upon underground structures or slope cutting. Bringing into the classroom examples as the previously presented projects and using them as case studies significantly promotes the above objectives. Moreover, as part of class projects, students can be asked to search for additional information or even compare the geological conditions between case studies.

Young graduates are typically able to perform basic calculations, such as the bearing capacity and settlements of a foundation or the factor of safety against sliding and overturning of a retaining structure. However, they are often unaware of how the construction process affects the initial geotechnical design. More specifically, a great majority of them, do not fully perceive that multiple design issues may affect a project, such as the construction of temporary retaining structures prior to the construction of a spread foundation. Similar issues may require the adoption of different design approaches, namely the safety factor for a temporary structure may be lower or it may not be required to be analysed for seismic loading conditions. To that end, construction-related topics can be added to relevant geotechnical modules (such as foundation design). For instance, the construction sequence of the north (NT) and south (ST) towers of the Queensferry Crossing provide a good basis for further discussion in the classroom regarding the challenges involved in underwater excavation, or the logistics involved in dredging and ballasting with concrete. The development of short class-projects where students seek further information on these or similar issues and even perform preliminary engineering and cost calculations can also significantly enhance their employability skills and broaden their geotechnical engineering awareness.

The previously identified learning goals and the proposed delivery approaches (lecture notes and class-projects) are only indicative and provide a first level of action that contributes to the establishment of a strong technical background. Apart from that, and given that modern employers seek self-motivated candidates with a global mind-set, good interpersonal skills and teamwork attitude, a problem-centred approach, following Wood (2003), in curriculum design can be very beneficial. Namely, specially crafted learning activities, such as international exchange programmes can serve this purpose. It is also vital that they are appropriately tailored and oriented towards developing key industry-related attributes and professional skills of the participants.

6 Concluding remarks

In the present paper, the role of international exchange visits, such as the International Project Week (IPW) in the geotechnical undergraduate education is explored. The authors, who are involved in the organisation of the IPW event, initially give a description of the programme and attempt to trace its benefits upon the students, which revolve around networking, obtaining conceptual knowledge on a broad spectrum of civil engineering projects and exploring opportunities to work abroad. The authors further identify two large-scale projects, which are typically visited as part of the programme. They present their main geotechnical characteristics and construction challenges, in order to trace potential areas of development in the design of geotechnical modules and investigate pedagogical means of achieving them. To that end, they recognise that international exchange visits can play a crucial role, when a distinct technical character is added and the experience is further capitalised into the classroom, in the form of relevant learning activities. That way, undergraduate students not only are they exposed to an international environment and develop a global mind-set during their visit but they can further enhance their technical background and obtain a more inter-disciplinary education.

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Dr. Kurt Kliesch is a professor at the Frankfurt University of Applied Sciences and the head of its geotechnical team. He graduated in civil engineering (Dipl.-Ing.) from University of Karlsruhe (now KIT, Karlsruhe), and obtained a Ph.D. at University Darmstadt. In 1984-1986 and 1990-2001 he worked in Germany. His main technical interests and experiences are geotechnical engineering of retaining walls and stabilization of landslides. Professor Kliesch's research focuses on analysing groundwater monitoring in the urban setting of Frankfurt and on analysing the bearing behaviour of displacement piles. Due to his strong passion for teaching, Dr. Kliesch stimulates students’ international exchange interests, e.g. by supporting and pushing the concept of Interdisciplinary Project Work, IPW. Dr. Kliesch and his team were awarded a “Youth builds Europe” award from the Prof. Joachim Lenz Foundation for their Polish-German project “Flood Control of the Palace of Kurozweki, Poland.”