EDINBURGH NAPIER UNIVERSITY – SHANGHAI NORMAL UNIVERSITY COLLABORATIVE PROGRAMME IN CIVIL ENGINEERING: REFLECTIONS AFTER 5 YEARS

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Abstract

Edinburgh Napier University (ENU) and Shanghai Normal University (SNU) have established a joint undergraduate programme in Civil Engineering. The programme was launched in 2007. The dual-award programme is fully accredited by the Professional Body for Civil Engineering in the UK (the Institution of Civil Engineers (ICE)) and is approved by the Ministry of Education in China. Such professional accreditation enables graduates of the programmes to practice as fully qualified civil engineers in China, in the UK and in many other countries in the world where the ICE accreditation is recognised.

The four year long programme enables graduates to achieve the award BSc (Honours) Civil Engineering. Students study Years 1 – 3 in Shanghai and then transfer to Edinburgh for Year 4. In total, more than one-third of the entire professional or technical course is taught in English. To enable this, staff from Edinburgh Napier University teach in Shanghai during Years 2 and 3. In this way, the students start to appreciate the significance of the English language throughout their studies, and naturally gain knowledge of the technical subjects in a truly international manner. Modules in structural mechanics, geotechnical engineering, structural design, structural analysis and project management are delivered and assessed in English in 2-week long blocks. Students wishing to progress to Year 4 in Edinburgh must achieve an IELTS score of 6.0 or more. This is readily achievable by most students having studied these modules in English in Shanghai. Students choosing not to study Year 4 in Edinburgh can instead study Year 4 in Shanghai where additional modules (Water Engineering, Highway Engineering and Railway Engineering) are delivered by Edinburgh Napier University staff.

Students studying in Edinburgh experience a truly international dimension to their studies. Mixing with students of many other (mainly European) nationalities gives the Chinese students a real international experience. Living, studying and working in Edinburgh is very rewarding for the students and many choose to continue their studies to Masters level following completion of the BSc. Session 2011-12 saw the second complete cohort of students graduate from Edinburgh Napier University, thus marking the 5 year anniversary of the commencement of the programme. This paper describes the structure of the joint programme, the mode by which it operates and the great opportunities that exist for all students enrolled on the programme.

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 different 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. University engineering departments 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 means 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 ENU-SNU collaborative 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 collaborative programme and the programme structure and methods of teaching established to deliver an international element to the teaching of the undergraduate civil engineering degree course at SNU. The programme structures and methods of teaching adopted both in Shanghai and in Edinburgh are described and the findings of the students' experiences are explained. The programme has rapidly become widely respected as a flagship model for a truly UK-Chinese collaboration educational course.

2 COLLABORATIVE PROGRAMME IN CIVIL ENGINEERING

2.1 Historical Development

Session 2011 – 12 saw the 5 year milestone in the delivery of the programme and now is an appropriate time to reflect on and assess the success of the programme. Discussions on the collaborative programme between the two institutions actually commenced as far back as 2002. The objectives of the programme and an outline programme structure were rapidly developed and further discussions involving teaching teams and university management enabled the course content and delivery method details to be established.

During development, the strategically important *Professional Body* (UK) and *Government* (China) approvals for the programme were gained. In the UK, the Joint Board of Moderators (JBM) of the Institution of Civil Engineers and the Institution of Structural Engineers confirmed that graduates from the programme would possess the educational base to train towards the professional status of Incorporated Engineer after obtaining the honours bachelor degree. In China, the much-coveted Ministry of Education (MoE) approval for the programme was granted meaning that graduates of the programme would have national recognition of their joint ENU – SNU award. In order to be granted MoE approval, the programme structure (see Section 2.4) had to be such that at least 45% of the programme is taught in English and one third of the programme professional or technical course is taught by the British partner University (i.e. ENU). The Joint Programme Agreement was drawn up and signed by senior management of both institutions in 2004.

Fig. 1 shows the timeline of the programme. The first cohort of students commenced Year 1 at SNU in September 2007 and the first teaching by ENU staff in Shanghai took place to the same cohort when they were in Year 2 in Session 2008-09. ENU teaching input in Shanghai increased in their Year 3 (Session 2009-10) and then the cohort progressed to study Year 4 in Edinburgh for Session 2010-11 and the first graduates of the programme graduated in July 2011. The second cohort graduated in 2012. The programme is now well established and the subsequent cohorts are all progressing through the programme.

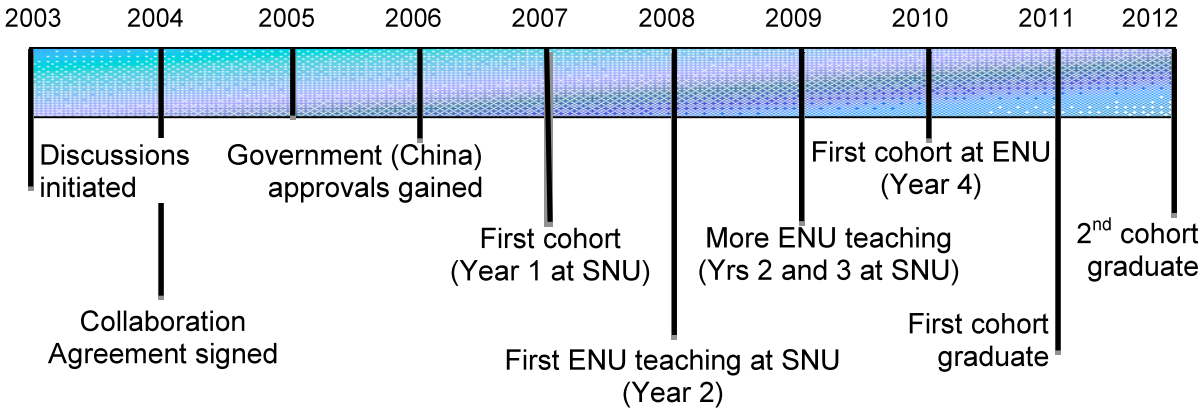

Fig. 1: Timeline of programme development and delivery.

2.2 Joint-Programme Objectives

The programme was established to provide the Chinese civil engineering undergraduates the opportunity to experience a truly international component to their studies. To this end the following objectives were identified to enable appropriate programme development:

- to provide civil engineering undergraduates from Shanghai Normal University with a significant international component to their studies;
- to provide civil engineering undergraduates from Shanghai Normal University with the opportunity to achieve a joint degree in civil engineering; the exiting qualification is the internationally recognised BSc (Honours) Civil Engineering;
- to enable civil engineering undergraduates from Shanghai Normal University to significantly improve their written, spoken and technical English;
- to provide civil engineering undergraduates from Edinburgh Napier University with the opportunity to study alongside a number of international students in their honours year;
- to provide sustainable, enhanced fee income generation for both Edinburgh Napier University and Shanghai Normal Universities.

2.3 Management Board

To ensure the smooth running of the programme, a Management Board has been established with the responsibility of agreeing programme content, methods of delivery, teaching support requirements, administrative and contractual issues, and working with the MoE and the JBM as appropriate to ensure sustained approval and accreditation. The Board comprises senior staff from both universities, and is a separate body from the programme's teaching teams.

In May 2012 the Management Board met at Edinburgh Napier University to review the collaborative programme and in particular to reflect on the first 5 years of delivery. The Board were unanimous in reporting their delight with the success of the programme. The success of the programme is now widely reported both in the UK and in China, and earlier details of the collaborative programme have been published by the authors [7].

2.4 Programme structure

The joint programme enables the students from Shanghai Normal University to graduate with two degrees: the SNU, MoE approved Diploma in Civil Engineering and the ENU BSc (Hons) Civil Engineering degree. The programme structures are illustrated in Fig. 2(a) and Fig. 2(b). From the figures it is clear where the teaching is given by ENU staff, both in Shanghai and in Edinburgh. Students progressing to Year 4 in Edinburgh are deemed to have covered all the material covered in Years 1 – 3 of the BSc Civil Engineering course, thus entry to Year 4 is permissible. Students wishing to progress to Year 4 in Edinburgh must achieve an IELTS score of 6.0 or more. Students choosing not to study Year 4 in Edinburgh can instead study Year 4 in Shanghai where additional modules (Water Engineering, Highway Engineering and Railway Engineering) are delivered by Edinburgh Napier University staff.

3 TEACHING AND LEARNING IN SHANGHAI

3.1 Planning

The modules shown in red in Fig. 2(a) are delivered in Shanghai by the Edinburgh Napier University staff. (These are the equivalent modules to those shown in red in Fig. 2(b).) Delivery is arranged such that Structural Mechanics is taught to Year 2 students, and all other modules are delivered to Year 3 students. The Year 4 modules delivered to those students choosing to remain in Shanghai are also delivered by Edinburgh Napier staff. To ensure efficient and timely delivery of all of these modules, a schedule of teaching is arranged at the beginning of each session. Related issues such as visas, travel and accommodation are organised ahead of each staff visiting Shanghai. This careful planning ensures a smooth delivery of all modules.

Year 1	Theoretical Mechanics **(54 hrs)**	Outline of Modern Chinese History **(36 hrs)**	Ideological and Moral and Legal Basis **(36 hrs)**	Fundamen-tals of Law **(36 hrs)**	College English **(288 hrs)**	Listening English **(54 hrs)**	Oral English **(40 hrs)**
	Physical Education **(36 hrs)**	Computer Applicants **(144 hrs)**	Advanced Maths **(108 hrs)**	Speaking English **(36 hrs)**	Engineering Drawing **(54 hrs)**	Civil Engineering CAD **(36 hrs)**	Oral English **(40 hrs)**
Year 2	Principles of Mao Ze Dong Theory **(36 hrs)**	Material Mechanics **(72 hrs)**	College English **(36 hrs)**	Listening English **(54 hrs)**	Speaking English **(36 hrs)**	Oral English **(40 hrs)**	
	Physical Education **(36 hrs)**	Construction Materials **(36 hrs)**	Structural Mechanics **(60 hrs)**	Specified Subject English **(72 hrs)**	Building Architecture **(54 hrs)**	Oral English **(40 hrs)**	
Year 3	Construction Project Managmnt **(60 hrs)**	Fundamen-tals of Reinforced Concrete **(72 hrs)**	Structural Design: Reinforced Concrete **(60 hrs)**	Construction of Civil Engineering **(72 hrs)**			
	Estimating and Tendering **(54 hrs)**	Geotech Engineering 1 & 2 **(60 hrs)**	Civil Engineering Survey **(54 hrs)**	Advanced Soil Mechs & Foundtn Eng **(54 hrs)**	Structural Design: Steel **(60 hrs)**		

= Taught by ENU staff = English language subjects

Fig. 2(a): SNU Diploma in Civil Engineering programme structure and learning hours.

		Trimester 1 (Sept - Dec)			Trimester 2 (Jan - May)		
Year 1	**Module number**	CTR07102	CTR07103	ELE07102	--	CTR07101	CTR07100
	Module title	Construction Engineering	Engineering Principles (Civil)	Foundation Mathematics	Option	Construction Surveying	Civil Engineering Materials
Year 2	**Module number**	--	CTR08100	CTR08101	ELE08102	CTR08104	CTR08102
	Module title	Option	Fluid Mechanics	Structural Analysis & Design	Intermediate Maths	Soil Mechanics and Project Management	Timber Properties & Construction
Year 3	**Module number**	--	CTR09103	CTR09108	CTR09110	CTR09111	CTR09121
	Module title	Core Choice List C	Structural Timber Design 1	Applied Structural Design 1	Integrating Design Project	Water Engineering	Geotechnical Engineering
Year 4	**Module number**	CTR10100	CTR10125	CTR10106	CTR10100	CTR10109	CTR10111
	Module title	Honours Project	Ground Engineering	Applied Structural Design 2	Honours Project	Environmental Hydraulics	Construction Law and Contracts

= Taught in Shanghai = Taught in Edinburgh

Fig. 2(b): BSc Civil Engineering programme structure.

3.2 Teaching

Teaching at Shanghai takes place at the Fengxian Campus, about 1 hour south of the city centre. The delivery of the module material is made wholly by the visiting member of ENU staff and takes place over a 2-week long intense period, see Fig. 3. Naturally, all module material is delivered in English. Additional support in the classroom is provided by two SNU teaching assistants. The 3 staff work cooperatively to ensure the students follow the intricacies of the subject material along with the UK and European specific design procedures, management processes and technical references. Typically, seven hours of contact in English language takes place each day and the material covered in the fortnight is the same as covered over a 12-week long period to the Scottish students on the BSc course in Edinburgh.

Fig.3: Teaching at the Fengxian Campus

4 TEACHING AND LEARNING IN EDINBURGH

Students are free to arrive in July and follow an optional 4-week or 8-week long intensive language training course and other pre-semester orientation activities such as city and campus tours, international student welcome events, and site visits etc. In addition, the senior management of the Faculty of Engineering at Edinburgh Napier University welcome the students to the university such that, overall, they experience a thorough, valuable and above all, helpful induction process to the university which enables them to readily settle in.

During Semester 1 the students follow taught courses in Ground Engineering and Applied Structural Design. They also work on their Honours Project, which is a significant study exercise that continues into Semester 2. Additional support with this very discursive module is made available to all

students and the teaching team ensure that the SNU cohort is aware of this. Indeed the SNU students work with the Faculty Advisor of Studies to develop their research skills within the Honours Project work.

As part of the Ground Engineering module, the SNU students team up with other, Scottish students to design and construct a reinforced soil wall, see Fig. 4.

Fig. 4: Students from Shanghai Normal University mix and integrate well with the other Scottish students in the soil mechanics laboratory group project.

5 ADDITIONAL BENEFITS OF THE COLLABORATION

In addition to the collaborative programme in civil engineering, by both institutions working so closely together, additional opportunities present themselves for further collaboration for mutual benefit. The Collaboration Agreement makes provision for staff exchange and each year staff from SNU visit Edinburgh Napier University for a period of 3 months for teaching observation and access to learning resources in Edinburgh. This enables the SNU staff to see first-hand the methods and styles of teaching, learning and assessment adopted in the UK. Visiting scholars are also able to contribute to the teaching and project supervision activities at Edinburgh Napier University such that both students and staff alike gain from the experience.

Beyond Civil Engineering, discussions are on-going exploring opportunities for further areas of educational collaboration between the institutions and collaborative programmes may soon be developed in the disciplines of *Computing* and the *Creative Industries*. In addition to this, naturally when institutions collaborate, opportunities for joint research and joint PhD supervision are investigated. Although Edinburgh Napier and Shanghai Normal are not yet carrying out joint research work, it is hoped that this is something that will happen in the near future.

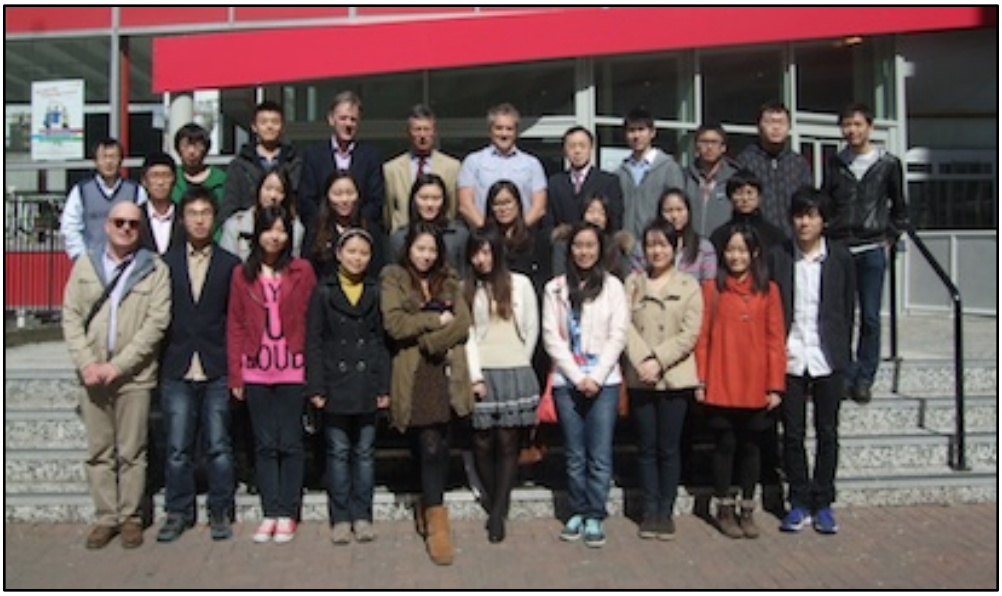

Fig. 5: Class of 2012: SNU students together with ENU staff
at the entrance to Edinburgh Napier University.

6 CONCLUSIONS

To date, all SNU students have coped well with the transition to Edinburgh Napier and have established friendships with other students, as seen in Fig. 4. Twenty-six SNU students studied at ENU in 2010-11 and they all had an enjoyable and rewarding experience in Edinburgh. Indeed 6 of the 26 SNU graduates gained a first class honours degree and 22 of them continued to Masters level at Edinburgh Napier and at other UK universities. This illustrates that not only does their year at ENU fulfil their immediate needs, but it also prepares them for further, higher studies, which will prepare them fully for their future careers.

Feedback was acquired from the graduates of 2011 and it was clear that the planning and delivery of the programme had been totally successful and the students had had a memorable experience in Edinburgh.

A selection of quotes from the students is offered below:

"The reinforced soil wall challenge was fun"

"I'm having a great time in Edinburgh"

"Staff are very helpful"

"Edinburgh is beautiful"

"I am so happy to have come to Edinburgh Napier. It is a good university and a lovely city"

In Session 2011-12 a further 26 SNU students studied at ENU and again, all had an enjoyable and rewarding experience. Of the cohort of 26, eleven gained a first class honours degree and 19 of them continued to Masters level at UK universities. The Class of 2012 is shown standing at the entrance to Edinburgh Napier University with some of the Edinburgh Napier teaching staff in Fig. 5. Similar feedback was acquired from the graduating students of 2012 and amongst the many positive quotes received were the following:

"I really am having a good stay in Edinburgh"

"The Edinburgh Napier University is a very nice university. I really enjoy it here"

"I like the way subjects are taught at Napier. It is different from in Shanghai. It's good to get both ways."

"My English has really improved by studying in Edinburgh"

"I have decided to stay in Edinburgh to do a MSc course. Napier is very good university. Good and friendly staff are here."

The collaborative programme is widely regarded as a great success, and has been praised by accreditation authorities both in the UK and in China. Careful planning and consideration of the methods and content of subject delivery has ensured that the course is both interesting and relevant to the students. This is vital in ensuring that the take-up of the course is at a required level to ensure its viability. With an average number of 26 students progressing to Year 4 in Edinburgh each year, the programme undoubtedly is viable and many future students from China are set to benefit from this leading collaborative programme in civil engineering.

The annual programme review event held in alternating cities (Edinburgh / Shanghai) allows the Management Board to reflect on the successes and issues arising during the previous session. This enables an action plan to be established to ensure the smooth operation of the programme continues.

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