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Postprint

This is the accepted version of a chapter published in *Collaborative Academic Programs as a Contribution to Developing Nations: FICAP-1 Proceedings*.

Citation for the original published chapter:

Berglund, A., Thota, N., Man, Y. (2013)

The Sino–Swedish Master Programme in Computer Science and Software Engineering: Chinese students' experiences.

In: Justine Hitchcock, Leo Hitchcock, Petteri Kaskenpalo (ed.), *Collaborative Academic Programs as a Contribution to Developing Nations: FICAP-1 Proceedings* (pp. 37-45). Boca Raton, FL, USA: BrownWalker Press

N.B. When citing this work, cite the original published chapter.

Permanent link to this version:

<http://urn.kb.se/resolve?urn=urn:nbn:se:uu:diva-181738>

The Sino-Swedish Master Programme in Computer Science and Software Engineering: Chinese students' experiences

Anders Berglund

Uppsala Computing Education Research Group, UpCERG
Department of Information Technology
Uppsala University, Uppsala, Sweden
Anders.Berglund@it.uu.se

Neena Thota

Uppsala Computing Education Research Group, UpCERG
Department of Information Technology
Uppsala University, Uppsala, Sweden
School of Intelligent Systems and Technology
University of Saint Joseph, Macau, S.A.R.
Neena.Thota@it.uu.se
NeenaThota@usj.edu.mo

Yemao Man

Department of Information Technology
Uppsala University, Uppsala, Sweden
School of Software Engineering
Tongji University, Shanghai, China
Yemao.Man.9123@student.uu.se

Abstract—Internationalisation in higher education has led to the emergence of joint educational programmes between universities. In this paper, we document the Sino-Swedish master programme in computer science and software engineering, taught jointly by a Swedish and a Chinese university, from the perspective of the Swedish partner, Uppsala University. We also describe what the programme means to the Chinese students studying in Sweden. For this purpose, we interviewed the Chinese students and asked questions about their experiences of learning and living in Sweden. The students identified the differences in the experiences in Sweden from that of learning and living in China and the challenges that they faced in Sweden. The students also offered recommendations for improving their learning experiences. We discuss the benefits and challenges of joint education programs.

Keywords-computer science education; international students; joint programme

I. INTRODUCTION

International collaboration is well established within research, while internationalisation of education is more recent. Universities are important actors in globalization, as they belong to the local community in which they are situated, and are, at the same time, part of the international arena (Beerkens 2003). New and better means of communication now make it possible to establish more complex relationships between universities. To profit from this, new educational programmes, jointly taught with foreign partners have begun to appear. International education programs help to broaden the educational experience of the students and initiate a process of learning and development at the partner universities (Van Damme 2001). The core idea of joint educational programmes is to benefit from specialised competences at different sites, so that the students can gain a richer expertise. Further, the very setting of international programmes enables the students to meet peers from other cultures.

One example of an international academic collaboration is the joint master programme in Computer Science and Software Engineering between Department of Information Technology, Uppsala University (UU), Uppsala, Sweden and School of Software Engineering, Tongji University (TU), Shanghai, China. The main contribution of this paper is to document this program and to add to the literature on CS education of Chinese students. Little research is done in CS education in China, but an overview can be found in Xiaoming & Lunt (Xiaoming and Lunt 2006). In this context, it is encouraging that some of the work on the topic stems from UU: study of Chinese exchange students learning of CS (Chen and Chen 2007); study of intercultural collaboration between Swedish and Chinese students (Yang and Berglund 2008).

In this paper, we describe the context of the joint program and our study of the experiences of the Chinese students in Sweden. The students identified the differences in their experiences in Sweden from that of learning and living in China, the challenges that they faced in Sweden and the benefits for their future. We also report the suggestions offered by the students to improve the joint programme, and our conclusions about the future of such joint programmes.

Two of the authors of this paper are in different ways involved in the programme: The first author is the founder of the programme and has served as a programme coordinator on the Uppsala side from its start, while the third author is a student at the programme during the current academic year. The second author is currently a visiting researcher at UU, but with an extensive experience of teaching and interacting with Chinese students from her permanent position as a lecturer at University of Saint Joseph, Macau.

II. CONTEXT OF THE JOINT PROGRAM

Uppsala University started a joint Master programme in Computer Science and Software Engineering with Tongji University, Shanghai, China, in autumn 2009. The universities share many fields of expertise, such as embedded systems and Human Computer Interaction, but highlight different aspects of those areas. The Department of Information Technology at UU is a traditional, highly-ranked research department, focusing on the more theoretical aspects of computer science. The School of Software Engineering at TU, on the other hand, is part of a Chinese initiative to educate students for the development of the Chinese IT industry. As a consequence, the School of Software Engineering has strong links to the IT industry, both in the Shanghai region and internationally.

The programme is organised around physical exchanges of the students. All students in the programme study jointly in Sweden during their first year¹, and then continue their studies during a second year in China. The two-year programme offers a double degree to the students: one degree

¹ To be more specific: Most Chinese students take an initial year in China, during which they take compulsory courses, for example in mathematics and English.

from UU (in Computer Science) and one from TU (in Software Engineering). Both universities teach the courses of the programme in English.

The two partners have different foci. The specific learning outcomes of the joint programme are not only from those within the subject area of CS and software engineering, but also related to organisation of work and personal development, obtained by working with students from other cultures (Otten 2003). The students can take courses on cultural aspects, such as language (particularly Chinese or Swedish) or intercultural relationships. Within CS and software engineering, they can create their own specialization by combining courses to create individual curricula.

There are several reasons for the initiation of the programme and its organisation by the two universities: The learning within the subject areas is enriched by the students being educated at two universities well known for their CS programme. Further, the differences go outside the very scope of the subject areas: The students meet and learn to understand different ways of thinking by being in two cultures. As they live in different countries they create networks over the globe². Finally, they get in contact with the labour market in both China and Sweden and get opportunities for an international career.

The Department of Information Technology (UU) and the School of Software Engineering, (TU), has a relatively long history of collaboration, stemming from 2004. Initially, focus was on a bi-directional student exchange, for a semester or a year, where students travelling in both directions took part in the regular courses, taught in English, at the other sites together with local students. This exchange programme has remained the basis for the collaboration and has by now included more than a total of 100 students, with approximately the same number of students in each direction. Approximately 25 Chinese students have taken, or take the programme, while the number is considerably lower on the Swedish side: Approximately 10 Swedish students, have taken, or take, the programme. The difference is mainly due to administrative and marketing problems in Sweden. Sweden has also introduced tuition fees for students from outside the European Union.

The two partners have collaborated in other ways: There has been a teacher exchange, in which staff has offered courses at the other site. The courses have been selected to mirror the competences of the sending university, and to contribute with competencies not easily available at the host university. In this way, students outside the joint master programme and the exchange programme have met competent teachers from the other site. Further, the two universities have been partners in the Runestone course (Berglund 2005), where students, in small internationally distributed groups, jointly develop a software system to control a mechanical device, such as a robot.

III. EXPLORING THE EXPERIENCES OF STUDENTS

With the aim of exploring what the programme means to the students, we conducted focus group interviews with those Chinese students in the master programme who currently study in Uppsala. We asked specific questions about their experiences of learning and living in Sweden.

Focus group interview is a research technique in which data is collected from a group of participants on a topic determined by the researcher's interest. The data emerges from the interactions within the group and is moderated by the researcher. As compared to individual interviews or participant observations, focus groups provide concentrated amounts of data on the precise topic of interest in a short span of time (Morgan 1997). Additionally, when interacting with others in the group, participants can volunteer spontaneous information and insights of how they feel about issues of mutual interest (Bertrand, Brown, and Ward 1992).

² Both universities have extensive student exchange programmes with several countries in many continents. Thus, each of these universities offers an international study environment on their campuses.

We invited 7 students enrolled in the Sino-Swedish program and interviewed them in two groups of 3 and 4. The third author, who has knowledge of his peers, created the groups to facilitate active discussions. The small groups made it easier for the second author, who has experience in interacting with Chinese students and has lived in Sweden about the same time as the students, to act as moderator and engage with the participants. The moderator's role was keeping the meeting open-ended but to the point.

The interviews were conducted in English, and recorded with the consent of the participants. The three guiding questions during the two focus group interviews have been:

1. Based on your experience, what would you say that you learnt from studying in the Sino-Swedish programme?
2. Based on your experience, what would you say that you learnt from living in Sweden?
3. What suggestions do you have to improve the Sino-Swedish programme?

As a first step, the third author transcribed the interviews verbatim. The three authors then jointly reviewed the transcripts and confirmed with the original recordings. Although only 7 students participated in the focus group interviews, we were able to obtain a rich dataset of material that we thematically analysed, and margin coded (Bertrand, Brown, and Ward 1992). Two themes were identified in the preliminary read-through: the differences and the challenges of learning and living in Sweden. Notes were made to synthesize the diverse points of view into meaningful conclusions based on the themes. To preserve their identity, participants are referred to by fictitious names in the extracts from the transcripts that are cited.

IV. FINDINGS FROM THE FOCUS GROUP INTERVIEWS

In this section, we identify (A) the perceived differences between the two institutional environments and (B) the challenges that the students faced from studying in the Sino-Swedish programme and from living in Sweden. We also list the suggestions (C) that they offered to improve the joint programme.

A. *Perceived differences between the two institutional environments*

The main differences related to the content of the academic programmes, the teaching and learning environment, and the potential gains in terms of personal development of the students.

1) *Differences in the academic programme*

There are differences between the universities related to teaching theoretical/practical concepts in CS. In the following extracts, one of the students explains the difference, while the other sees the opportunity for further studies.

Alfred: It's great for knowledge gain because what we learnt in China is more practical things, now maybe starting to focus on the theoretical part. But here we've followed some highly advanced courses and cutting edge technologies..... I think it's a good thing that we're involved in the Sino-Swedish program.

Steven: In Uppsala I think I have broadened my eyes because I came from a totally Chinese atmosphere and Asian atmosphere and here is different. This is the atmosphere in western academic world. So I found myself some new plans for the future as well. I plan to apply for PhD position but in EU countries but not in China.

2) *Differences in the teaching and learning environment*

Apart from the difference in the focus on theoretical/practical aspect of CS, the students noted differences in the teaching styles at the two universities. It appeared that along with traditional lectures, teachers at UU stimulated learning through class discussions, seminars, projects, presentations, and labs. The use of open-ended questions in the final exams at UU was mentioned as a way of encouraging thinking. Two of the students describe the teaching environment.

Wendy: Usually in China, the teacher just teaches what he/she has prepared, but here the teacher will use another way – the heuristic way, by asking some questions or having a discussion, or a seminar, to teach the student. But usually in China teachers talk and students listen.

Alfred: In China we have this phenomenon that the teacher knows a lot of things, but he doesn't know or ... how to let the students understand what they've acquired.....

Differences in the way that Swedish students learn were also mentioned. Unlike students in China, Swedish students are seen as more active in class discussions and apt to make their own choice about their major. We illustrate this with an extract where George describes the differences.

George: Yeah.. I think students here have more concentration on their majors. They feel more interested so maybe they think more about the subjects that's why I think they get more solutions to problems. Discussions are more expected here in Sweden. In China we are usually taught by teachers and books but less discussions stimulated by teachers. So during the class we just listen then we revise later. Without discussion you can't understand much or think that much. That's we need to improve in China I think.

Later in the interview, George points out the pressure that Chinese students experience when they have to take decisions about which major to choose.

George: And you can decide what you want to do. ... Maybe you should decide the priority of things by yourself. It's a kind of new way to express your life..... Sometimes because decisions were made in high school. Maybe not all of the students know what they are going to do in universities, in their majors. Maybe students here know how to choose their majors earlier or get more chance or more choices. But in China we are forced by the time, by our parents, by the society. So it's like we don't get to things from the beginning. So it's kind of "urgency".

Wendy explains why she thinks Chinese students lack creative thinking.

Wendy: The students here are really clever and they have creative thinking to solve problems. In China we have books. Chinese students are really good at reading things and getting knowledge from books. They seldom have creative thinking about something. Ya...I think that's a thinking style. Chinese students like to learn something from the teacher first and follow these kinds of lines to go through. But here student first will have different thinking and they will try to discuss from the teacher and find solutions by themselves. The totally different solutions. But usually Chinese students will get one conclusion at last.

3) *Potential gains in terms of personal development*

In terms of personal development, the students felt that learning and living in Sweden had improved their job prospects, and their communication skills in English. They also appreciated the Swedish way of life

a) Better job prospects

Studying in a multicultural setting was perceived as being advantageous for future job prospects. In the following two extracts, the cultural aspect and the development of a worldview are highlighted.

George: Meeting different people from different countries make you know different culture and the possibility for you to work in different foreign companies maybe. You need to find a suitable place for work. Also I think for the future this program provides us possibilities to work in different places. Maybe here you can do thesis here or find jobs later. It's quite nice to be here I think. And it also can add value if you go back to China.

Leo: I think an excellent employee needs a worldwide view. If you do labs with students from different countries, you will learn how to collaborate with them. And that will help you easier in working in the future.

b) Improving communication skills in English

Studying at UU enabled the students to develop communicative skills in English. Wendy describes the process of not just improving her language skills, but also of taking ownership of the process of learning.

Wendy: First you have to listen to English courses. You have to talk in English. You have to write the assignments in English. So your English skills are improved. The second thing is that I learnt how to teach myself. Because sometimes I cannot catch up with the teachers who are talking so quickly and I couldn't understand the meaning, I need to download the slides and learn by myself, searching something on the internet.

c) Learning from Swedish way of life

The students offered examples of a number of ways in which the Swedish way of life had influenced them. Wendy appreciates the slow pace of life and honesty in expression.

Wendy: Comparing with Swedish people, Chinese people are quite busy and always hurry. When I came here I found there're lots of Swedes slowing down their living pace, so I always ask myself "Calm down~!" and if you are in a hurry don't run. And second thing is that I really learnt a really good quality of Swedish people. They are always honest... They want to be pure in thinking. They don't want to be complicated. If they want to do something you just speak out. Just go to your goals directly. Chinese people also aim at that goal but they don't speak out "This is my aim" but they will cover the goal and they will go indirectly. So if you want to make money and make friends you just speak out. But in China, people tend to behave in an indirect way. I won't tell you that I want to be friends with you but come close to you first and try to talk with you something ...

In the following extracts, three students give examples of how they learned to be independent.

George: In Sweden we have to take care of our lives, you have to cook by yourself. You have to prepare food and do the cleaning and also go to the courses. This requires more from yourself. Then you need to control your life. You think a lot about the future. Is it the life I

want to live or which kind of things should I take care of? So I learnt to think about the future. Maybe in China we never think about the cooking thing, accommodations and the connection with people. It's quite different here. I got more experience and this is quite useful and interesting.

Leo: Yeah. Before I came here I can't cook but now I can. I think this is the biggest thing on me. Other thing might be same as in China because...just like he said before, thinking about future.

Fiona: I also find one good point that can be learnt from Swedish people. They are very independent. For me I still receive money from my parents during my study. But here I know some Swedes can support themselves to study. So I think it's very good. They are very independent.

B. Challenges of learning and living in Sweden

The students have identified the challenges they face when they study in Sweden. Some of these challenges refer to practical problems with finding accommodation and coping with the cost of living. Other difficulties deal with social and cultural interactions in the classroom and group project work.

1) Practical challenges

The students pointed out that finding accommodation in Uppsala was difficult. In China, after enrolling in a program, they lived in dormitories with other students. In Uppsala, not only did they have to find their own accommodation, but it was costly to rent an apartment. In addition, they had to spend time to do their own cooking as eating out at restaurants was expensive. They also coped with the severe winter conditions in Sweden.

2) Social and cultural challenges

a) Personal challenges

Initiating friendship with other international students appeared to be problematic as explained in the following extract. However, the general impressions were that Swedish students are shy, but are nice when one gets to know them, and that most Swedish people are very helpful.

Steven: The most difficult thing here is that we felt lonely here because we used to live in big crowd. We have friends living in the same room or around. But here we live alone, most of us. And in the corridor, in the beginning we don't get along ...or fully get involved with other international friends. That's the difficulty...

b) Challenges of working in teams and multicultural groups

The Chinese students we interviewed felt that having international students in class was helpful for making friends from many countries. However, working with multicultural groups made them realize that everyone has different ideas and ways of thinking. Alfred and Steven explain why they found group work challenging.

Alfred: I think you need to get used to the atmosphere here, which S... has mentioned just now. Because you know a lot of students are discussing with you or each other or they have question so they raise them immediately ... so I think you need to get yourself in this situation and be an active part.

Steven: Yeah.. I can't agree more especially some Chinese students in the class tend to form the group from the perspectives of nationality. So that's a difficult thing maybe for Chinese students but I want to improve.

Another concern was that arriving at group consensus was difficult. Wendy describes how she tried to get her group to decide matters, while respecting the opinion of others.

Wendy: After the first time that I found that we can't get a conclusion about one problem, I will push up the process. I will say, "OK let's start, let's start the next question" to push the procedure...

Interviewer: So can I say that you learnt to be assertive, to be direct?

Wendy: No we should respect everyone's opinion so we cannot say ... so this is the conclusion. We should say something like "Ok what you think? Next time you will find a better solution and reconsider this question but now can we have a rough conclusion and go to next question..."

C. Suggestions for improving the joint program

The suggestions for improvements were directed at the students in the programme and at the partner universities.

1) Students should ask questions

The interviewees felt that the students take some of the responsibility to make their studies in the programme successful. The advice was to ask questions to the program director or to the university administration when in doubt.

2) There should be better communication between the two universities

The students suggested that in administrative matters, the communication between the two partner universities should be improved. Practical arrangements related to accommodation, course credit transfers, thesis proposals, and choice of courses should be settled between the partner universities and not left to the students to negotiate.

3) There should be a buddy system for Chinese students visiting Sweden

The interviewees suggested that each Chinese student who is in Sweden for the joint programme should be allocated a student buddy. Especially for those students on their first visit to Sweden, such a buddy would help with settling in and for learning new languages.

V. DISCUSSION OF THE JOINT PROGRAMME

This paper has reported about the joint Sino-Swedish Master Programme in Computer Science and Software Engineering. Despite the different traditions at the two sites, the institutions concerned manage to organize and run the programme. The students express different impressions, concerning their learning of computer science and life in Sweden.

For the students, the program was perceived as improving chances for getting jobs in Europe or in China, as they receive double degrees in CS and in software engineering. The theoretical nature of the Swedish part of the programme was seen as preparing them for further research specialization leading to a PhD degree. We found that the students are aware of the differences between the two universities that relate to learning outcomes, assignments, teaching activities, and learning tasks. The main differences have been attributed to the Swedish teaching and learning styles that focus on understanding of concepts, active classroom discussions, open ended questions in exams, and

emphasis on lab work. The students have mentioned their learning gains as the development of creative thinking, and social and communicative skills. They believe that their experience of living in Sweden has contributed to their ability to live independently and to make decisions on their own.

The main challenges of internationalization of education are quality control of programs, issues with the recognition and validation of foreign diplomas, degrees and credits, as well as the recognition of credits and study periods abroad by students (Van Damme 2001). We have identified some of these issues between the partner universities in the Sino-Swedish programme related to administrative issues. Our students have reported difficulties in finding accommodation and coping with the cost of living in Sweden. They have also talked about issues with interactions in the classroom and group project work.

Running an international master programme of this kind is not without complications, as there are many differences between the universities, their context and their people. An important difference can be found in the ways in which decisions are taken. UU has a transparent, but often slow, way of handling changes. TU, on the other hand, offers faster decisions in a less transparent system. Certainly, each of these ways of working is suitable in its own traditional and cultural context, but in the meeting between the systems, certain issues have sometimes seemed problematic. Normally, this has been solved through informal contacts and through flexibility of the programme directors at the two sites.

The great challenge has, of course, been in the meeting between the people at the two institutions, as there are important cultural differences between China and Sweden (see for example Hofstede 1980). Only on rare occasions, have these differences surfaced as problems. On these occasions, the problems have easily been tackled, as both sides have been aware of the situation. Instead, the cultural challenges have often appeared as possibilities, as new and different perspectives on issues have appeared.

The findings from the interviews and our own experiences with the joint programme serve as a basis to improve the learning experiences and motivations of students from China, and for identifying improvements to the CS programs offered to international students at the Department of Information Technology, UU. The study also broadens the theoretical understanding of how, and to what extent, the learning of computer science is culturally situated. With this understanding, we can better adapt the teaching of computer science to cater for the diversity in internationalised educational contexts.

Our on-going work with the international, joint educational programme invites us to question claims stating that science is above or beyond gender, race, class, and other socio-cultural distinctions. Instead, we posit that culture matters, and that different forms of collaboration serve as tools to improve education. The exchanges can be seen as a back-bone to create a continuum that influences the local environments. The programme aims to bring two universities closer, in that their resources become “pooled” to the benefit of their students.

We also argue that research collaboration is an important part of this: A combination of collaboration in research and education can keep the participants motivated and the collaboration sustainable. The key to success for international collaboration in education is that students get to engage with students from other universities in a way that creates insights and experiences that could not have been obtained otherwise.

ACKNOWLEDGEMENT

We thank the students in the Sino-Swedish program who participated in this study.

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