TOWARDS CURRICULA FOR DOCTORAL EDUCATION: EXPLORATIONS IN CHINA AND FINLAND

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Abstract

Doctoral curricula tend to be very university and department specific. Despite of this, we are working towards a framework within which doctoral curricula can be harmonized between two very different countries and among four different universities, in a subfield of Information Systems, eBusiness. In this paper, the educational systems in both countries are presented and compared. The planning carried out so far and its results are presented in terms of some key elements in course work: studies in the subject matter and research methods. The curriculum itself is a topic for future work.

Keywords: model curriculum, doctoral studies, eBusiness

1 INTRODUCTION

Information systems professionals are constantly facing new challenges as the nature of the field transforms. Current trends include a move towards IT being a utility. More and more types of software are a commodities acquired by the companies as services. The focus is on business models which direct the enterprise models towards flexibility and rapid changes. The field of information systems is growing and diversifying. Perhaps the field as we know it now will disappear into the specific business and organisation disciplines such as Digital Government, Digital Services, Digital Commerce, or Digital Humanities.

Information Systems is a recognized discipline with a history of over 50 years, with a first undergraduate program established in 1963 at Mississippi State University Business School. There are several international associations that support research and teaching. The most notable of these is the Association of Information Systems (AIS), founded in 1994. Together with the Association for Computing Machinery (ACM), several task groups have worked to develop curricula for the Bachelor's Degree (Topi et al 2007; 2010) and for the Master's Degree (Gorgone et al 2006). Also Topi et al (2014) note that the field of Information Systems is changing substantially, due to IT commoditization, digital services, virtualization, and analytics.

The subfield or thematic area we chose to start this work is electronic business, with a specific focus on electronic commerce and digital services. There are three reasons for this. First, we wanted to use the existing relationships and experiences of the eBEREA network. eBEREA (www.eberea.org), the Electronic Business Research by Euro-Asian Collaboration, is a research network dedicated to advancing current knowledge and knowledge transfer in eBusiness research and to develop sustainable collaboration between EU and China in research and higher education. The eBEREA consortium builds on networks of researchers for exchange of information between and among Chinese and European Universities. It aims at advocating a prospering eSociety by means of researching and teaching eBusiness and sharing knowledge between EU and China.

Second, in China, electronic business is one of the key areas in long-term development of science and technology (S&T). Its importance is continuously increasing and the challenges and emergent issues in codes of conduct, financing, and legislation are recognised. Therefore the S&T responsible researchers in the field of eBusiness are keen to exchange knowledge with their colleagues in Finland.

The third reason is that for Finland, the research collaboration with China is especially interesting because of high volumes and high growth rates of eBusiness and eBusiness teaching: the largest and busiest eBusiness sites in the world are Chinese. The decisions made by Chinese authorities and economic actors regarding regulations are of global importance and crucial to the development of global eBusiness environment. Cooperation in education with the key universities providing eBusiness programmes gives an opportunity for the Finnish partners to influence the development of eBusiness research and practices in China in the long term. The importance of collaboration in eBusiness research and education is acknowledged also by EU: eBusiness belongs to the main focus areas in the R&D&I policy of the European Union towards China.

Doctoral degrees in these emerging, multi-disciplinary areas present many challenges. Entering doctoral students have varied and uneven backgrounds; both research and practice are changing at an uneven pace, and new research methods must complement the familiar and tested ones. The design of a new curriculum for doctorate studies is an advanced step as currently (see, e.g., Doctoral Programs in IS http://apps.aisnet.org/isprograms/) the curriculum structures appear tailor-made for each doctoral student or research group. However, no task force has been set to formulate a model curriculum for doctoral studies in Information Systems or a sub-field like eCommerce. We see this as due, as the transformation in the IT paradigm must be reflected in a contemporary doctoral curriculum, as well as in the a Master's (Topi et al 2014) and Bachelor's (Topi et al 2010) curricula. We claim that the current issues can be addressed alongside "timeless high-level capabilities" (Topi et al 2014: 695).

A jointly planned curriculum between two countries on doctoral level is a major step forward in terms of collaboration between universities and a logical step towards mutually acknowledged or even double doctoral degrees. We have started this planning amongst two Chinese and two Finnish universities.

The 1st Sino-European Research Seminar on eBusiness and Future Services and Summer School, August 2012, Espoo, Finland.
Coordinators' meeting January 1-8, 2013, Haikou, Hainan.
eBEREA Winter School, January 9 and 12-17, and the 2nd Sino-European Future Internet and IS Society Forums January 10-11, 2013.
International Conference on Electronic Commerce, August 12.-15 and the 3rd Sino-European IS and InfoSoc Forum August 16, 2014, Turku
The 4th Sino-Finnish eBusiness Education and Research Collaborative Innovation Forum November 6-11, 2013, Haikou, Hainan, China.

Table 1. Key meetings on curriculum preparation

The fundaments for the project were laid during an August 2012 meeting. During the project, the representatives of the four universities have met to discuss the curriculum in January, August and November 2013. The larger meetings during which the KURRI planning project meetings took place were organized by eBEREA in collaboration with the China-Finland Strategic ICT Alliance (www.ictalliance.org) and the China Information Economics Society (www.cies.org.cn).

2 COUNTRY-LEVEL DIFFERENCES AND SIMILARITIES

2.1 Educational systems

China and Finland are vastly different countries. The population of China is 1.354 billion inhabitants and that of Finland is 5.5 million. In Finland, there are 14 universities under the Ministry of Education. All of these can give degrees on all three levels. In China, there are 1731 regular higher education institutions (HEI).

Also the educational systems are different (Ketola 2007). In China, the current educational system was created after 1976. In Finland, like in most European countries, the university education was re-formulated to follow the so called Bologna model (3+2) in 2002. In Table 2, the duration of studies at each stage is presented for both countries. However, in an ideal case, both Chinese and Finnish persons can gain a Doctoral Degree at the age of 28. The Finnish educational system is free for students even though tuition is being experimented for non-EU students. In China, tuition was introduced in the early 1990s.

	China	Finland
Age for entering primary school	6	7
Primary school (compulsory)	6 years	9 years
Lower middle school (compulsory)	3 years	N/A
Senior middle school / Secondary school	3 years	3 years
University: Bachelor's studies	4 years	3 years
University: Master's studies	3 years	2 years
University: Doctoral studies	3 years	4 years (goal)

Table 2. Educational systems in China and in Finland.

In Finland, students are admitted usually to a combined Bachelor's and Master's degree programmes. Higher education studies are measured in credits (cr/opintopiste/studiepoäng). Study courses are quantified according to the work load required. One year of studies is equivalent to 1600 hours of

student work on the average and is defined as 60 credits. The credit system complies with the European Credit Transfer and Accumulation System (ECTS). A Bachelor's Degree is 180 cr, a Master's Degree is 120 cr, and a Doctoral Degree is 240 cr.

Entry to higher education in China is highly competitive, whereas in Finland perhaps less so. In China, admission is based on scores obtained in the unified national university or college entrance examination. Curriculum guidelines are prepared nationally. The number of student places available in specific programmes are specific institutions is based on economic needs as determined through central government planning. Only programmes approved by the Academic Degrees Committee or the Ministry of Education can be considered as recognized. The concept of 'credit' has not been defined nationally. This is why the required number of credits for graduation varies among colleges and universities.

2.2 Entry to Doctoral Programs

According to Ketola (2007), to enter a doctoral programme in China, the candidates must hold a Master's degree and be of 40 years of age or younger. Candidates must take an entrance examination. Doctoral programmes usually take a minimum of three years to complete. The required coursework includes advanced courses in one specialized area and mastery of foreign languages. The written thesis is defended.

In Finland, to enter a Doctoral Degree program, the applicant must have a suitable higher education degree. The applicant must submit a written application to the department. The application contains at least the following information on the applicant: previous education, language skills, agreements on supervision and studies, as well a research plan. Crucial is to find a suitable supervisor and become accepted by her or him. For funded doctoral study positions, capabilities for research need to be clearly demonstrated.

In 2012, 1660 doctoral degrees were granted in Finland. Roughly 12% of students with a Master's degree later gain a doctoral degree.

3 PARTICIPATING UNIVERSITIES AND RESEARCH UNITS

3.1 The eBEREA Collaboration

Collaboration between universities starts usually with exchange visits. Under the auspices of eBEREA, these visits started in 2007 between Chinese and European universities.

The eBEREA network, founded in 2007, consists of 10 universities: Renmin University of China, CHINA (www.ruc.edu.cn), Southwestern University of Finance and Economics, CHINA (www.swufe.edu.cn); Xi'an Jiaotong University, CHINA (www.xjtu.edu.cn) Xiamen University, CHINA (http://www.xmu.edu.cn); Zhejiang University CHINA (http://www.zju.edu.cn), University of Trento, ITALY (www.unitn.it); Delft University of Technology, NETHERLANDS (www.tudelft.nl); Aalto University (www.aalto.fi), Åbo Akademi University (www.abo.fi); and the coordinator of eBEREA, University of Jyväskylä, FINLAND (www.jyu.fi). There are four affiliate members: Central China Normal University, Hainan Normal University, Harbin Institute of Technology, CHINA and University of Turku, FINLAND.

The representatives of the universities form the eBEREA management board, which agrees over the eBEREA activities and plans the future research collaboration. The partner universities have institutional commitment and interest in advancing eBusiness research and educational collaboration between Europe and China. All eBEREA university members have signed the eBEREA memorandum of understanding, stating that scientific and educational cooperation is of high value to all institutions, and that its purpose is to facilitate the joint development of educational programmes in the field of e-Business.

eBEREA is affiliated with Digile, one of the Finnish Strategic Centres for Science, Technology and Innovation. We also have close collaboration in the area of Finland-China research networking. Some members of eBEREA also belong to the board of China-Finland Strategic ICT Alliance. In Finland the alliance is coordinated by Digile. In China the coordinating parties are Chinese Science and Technology Ministry (MOST), and Shanghai Research Center for Wireless Communications (WICO).

The activities of eBEREA so far have concentrated mainly on research of e-business. The collaboration has been facilitated by about 100 research staff visits between the universities during the past seven years. In addition, some pilot courses have been organized. These have provided important practical knowledge about the issues related to educational collaboration. Furthermore, In August 2012, eBEREA in collaboration with the China-Finland Strategic ICT Alliance (www.ictalliance.org) and the China Information Economics Society (www.cies.org.cn) organized a Sino-European Research Seminar on eBusiness and Future Services and a three weeks summer school for PhD students on research methods.

For researcher exchange eBEREA won an IRSES programme for the period of March 2010 to February 2014, funded by European Union FP7 research programme. The programme advanced eBusiness research by providing travel funding for longer term research staff secondments between China and Europe. It was implemented by a network of five EU universities (JYU, ÅAU, AALTO, TuDELFT, UNITN) and three universities in China (XJTU, SWUFE, RUC).

3.2 Curriculum development project participants

In the first phase (December 2012 – October 2014), four universities are participating in the work of curriculum development. These are Renmin University in Beijing, Xi'an Jiaotong University in Xi'an, Aalto University in Espoo and Abo Akademi University in Turku.

Renmin University of China (RUC, also known as the People's University of China) is a key university in China, established in 1939. Traditionally, this university is known for its emphasis on humanities and social science. However, nowadays the university also embraces disciplines in the area of natural sciences and technologies. The RUC is a comprehensive research-oriented university. Since its establishment, RUC students and teachers have always endeavoured to carry out its redoubtable injunction to "unceasingly strive to be always in the vanguard." The RUC shares a common fate with the Party and the nation. Through prudence, dedicated effort, active and practical exploration, the RUC has become an important teaching and research base in the areas of the humanities, social sciences, and management science in China. RUC is regarded as the Standard in the Humanities and Social Sciences in Higher Education Sector in China.

Xi'an Jiaotong University (XJTU) is the leading university in eCommerce education and research development in China: It is heading the Guidance Committee for China's eCommerce Education appointed by the Ministry of Education (Responsible for analysis of the state-of-the-art and curriculum development of eCommerce education and research in China.) It has a national level Joint Lab for eCommerce and eGovernment Research and Education and a KeyLab of eCommerce and eGovernment Research and Education for Shaanxi Province (KLEERE).

Aalto University was founded in 2006 by joining together the Helsinki University of Technology, the Helsinki School of Economics and Business Administration, and the School of Industrial Design. In average, Aalto produces about 1680 Master's Degrees and about 190 Doctoral Degrees per year. Software Business and Engineering Laboratory (SoberIT) offers studies in Enterprise Information Systems, Software development, Strategic Usability and ICT-Law. SoberIT research themes include business and management aspects of software production and of the use of ICT in industry. Related to eBusiness, SoberIT has experience in research on technology support for networked business, mass-customized products and services, management aspects of open source, and the related business models and legal aspects. The laboratory strives for practically relevant and high quality academic research carried out in close cooperation with industry in a multi-disciplinary setting.

Abo Akademi is the only Swedish-speaking university in Finland, founded in 1922. Abo Akademi produces about 540 Master's Degrees and about 65 Doctoral Degrees per year. IAMSR is an institute

for advanced research in information systems. IAMSR is a networking organisation for international and national cooperation, and project work to promote its research and doctoral programs. IAMSR is carrying out its research programs in co-operation with major Finnish companies and in international networks funded by the EU IST program. IAMSR has built international cooperative networks with research institutions in several of its research programs: (i) soft computing, intelligent systems and knowledge mobilisation, (ii) logistics optimisation and knowledge support, and (iii) mobile technology and applications. In the mobile research program IAMSR is working with several partners on a regular basis. The faculty at the IAMSR have supervised over 30 Doctors, of which six have become full professors.

4 SOME ELEMENTS FOR THE CURRICULUM

There are two directions for approaching the curriculum. The Finnish approach is to minimize the courses to be taken in favour of working on the dissertation. The Chinese approach has a much heavier course load.

In Finland, the structure of Doctoral Degree studies is divided into two parts. First, the student must take courses in the chosen area for 40-60 cr. Second, a Thesis (180-200 cr) is written and publicly defended. The courses should include theoretical studies (25-40 cr) and generic skills (max 5 cr). Participation in international conferences, especially with own presentation, can give maximum of 5 cr. If the student does not have a sufficient background (i.e., completed advanced studies in the prospective major subject), supplementary studies may be required. In Philosophy of Science (5 cr) the focus is on European philosophy.

In Information Systems, language studies are usually not included in the curriculum as the students are expected to have a sufficient background, the studies are carried out in English in international groups plus the dissertation is usually written in English. The downside of this is the low visibility of Information Systems research in Finland. Other transferrable skills the student studies independently.

Finnish universities have devoted much effort on building structure for doctoral studies in Information Systems. An example of this work is the curriculum developed at the University of Jyväskylä (Karsten et al 1997). In this pre-Bologna curriculum, the amount of work is measured in study weeks (1 study week is 40 hours)

1. Studies in the discipline		**10 study weeks**
a. IS classics and schools of thought	4	
b. Research methods in IS	4	
c. Doctoral seminar	2	
2. Studies in the area of research		**6-12 study weeks**
a. Seminars in IS	max 4	
b. Book exam	max 4	
c. Courses on Doctoral or Master's level	max 8	
d. Research methods in the area of the dissertation	max 4	
3. Studies in other areas that support research work		**18-24 study weeks**
a. Philosophy of Science	3	
b. Other studies	15-21	
3. Doctoral dissertation		**120 study weeks**
TOTAL		**160 study weeks**

Table 3. *A curriculum at University of Jyväskylä in 1997.*

The participating universities in China are amongst Project 985 universities, one in Beijing and the other one in a major city.

In China, doctoral studies last three to six years. The student takes courses, do research, take part in conferences, and publish papers. They read up classics and current research on the subject. About half way thru, the students take a qualification exam. After having passed this exam, the student finalises the research proposal and can begin to focus on dissertation.

There are two major differences between Finland (and other European countries) and China: use of the credit system in Europe and use of a qualification exam in China. The qualification exam would be good to have in Finland to give a solid basis and recognized entry into actual dissertation research. A credit system would help in China to calculate the workloads of both students and teachers.

5 COURSES

5.1 Research Methods

The work on the curriculum started with focusing on empirical methods of research. In both countries, using statistical and mathematical methods in research has a long tradition. These methods are important in analysing large amounts of numerical data, and therefore one area of common interest became analytics and big data. In analysing market segments, advanced statistical methods are used in both countries.

Qualitative methods (Corbin & Strauss 2013) and case studies (Yin 2014) appeared to present a challenge both to teachers and to students. However, in the summer and winter schools these were discussed and promising areas of joint research emerged.

Design science (Hevner & Chatterjee 2010) and action design science (Sein et al 2011) would be suitable approaches for research where a software application is built, or a service or business is modelled.

It is clear that the student gains a deep knowledge in the particular research method chosen for the dissertation project.

5.2 Philosophy of science

Whilst eCommerce is on the outset a very practice-oriented area to study, basic knowledge of the philosophy of science is needed to enable comparability with other disciplines and research areas. Moreover, planning and carrying out research is supported by the knowledge of scientific argumentation and concept definition.

5.3 Theory

In the November 2013 meeting, a large part was devoted on identifying the core theories for the doctoral students to learn in their course work. As the results of a brainstorming session, each group brought forth the importance of consumer behaviour theories. Acceptance models and innovation diffusion theory can be included in these.

Group	Theories mentioned
1	Productivity theory of E-commerce on macro-level Eco-systematic theory of E-commerce (platform economics and the like) Game theory Consumer behaviour theory
2	Basics of doing business Basics of e

	Business models Logistics Acceptance models, innovation diffusion Statistical skills, metrics Social media: enabler, reputation Customer needs/expectations analysis: customer-inspired development
3	Systems Science Consumer Behaviour theory Game theory Information economics Operation Research Something from Psychology
4	Advanced management Advanced econometrics Advanced operations research

Table 4. Theories for doctoral studies in eCommerce.

As the table clearly shows, the brainstorming session yielded a very wide scope of theories, from the level of a society to individual consumers; from economics to psychology. This is quite typical for a developing area of study. Each student then chooses those areas of theory that support carrying out the actual research.

6 COLLABORATION BETWEEN UNIVERSITIES

6.1 Double and Joint degrees

Two universities, usually in different countries, can form a doctoral program together. If the student gains one doctoral degree, this is called *joint degree*. A joint degree programme is formulated and carried out in this way; there remains the issue of which university can count this as its degree when reporting to the Ministry of Education. If the student gains two doctoral degrees, one from both universities, it is called a *double degree*. Both universities can then count the degree in their own statistics. According to the current legislation in Finland, it is very difficult to form joint degree programmes, as the degree certificate must be given in Finnish or Swedish, the two official languages of the country. On Master's level, forming a joint degree programme is even more difficult, as the education in Finland must be free in all parts, that is, there may not be credits included where tuition has been paid. However, this might be a situation to be overcome later, as weak signals from the Ministry of Education indicate modifications to the legislature.

6.2 Cotutelle agreements

A doctoral student may have two supervisors, each working for a different university. If this kind of arrangement is to be recognized, a *cotutelle agreement* needs to be signed by both universities. This agreement concerns an arrangement where a doctoral candidate pursues a doctoral degree at two universities, satisfying each institution's admission and degree requirements, and leading to one doctoral thesis with a thesis supervisor at each institution.

There is also a possibility that the doctoral candidate will receive a degree from both universities, with a notation on the degree certificate stating that the degree was obtained under a joint supervision (cotutelle) agreement leading to a double doctoral degree from the respective universities.

The cotutelle agreements in which Abo Akademi participates have a very detailed, written document, signed by the rectors (presidents) of both universities, the participating doctoral schools, possible participating laboratories, the co-supervisors of the doctoral candidate and the doctoral candidate her- or himself. In the agreement, the tasks of the supervisors, duties of the doctoral candidate, coursework requirements, thesis and the assessment of it, awarding the degree(s), the funding of the studies and of

travel, IPR and publication rights, liabilities, settlements of disputes and many other matters are described in detail.

7 SUMMARY AND CONCLUSIONS

Despite the very different countries participating in curriculum development, the process of getting to know the educational systems in both countries has already been beneficial for participants. This paper summarizes the work carried out so far, to facilitate wider discussions around curricula.

The work with curriculum planning will continue, with the planned outcome in October 2014 a proposal for harmonizing the doctoral studies and a model curriculum. In future collaboration we have the goals of having cotutelle agreements, double degrees and jointly given courses. The courses can be partially virtual, partly local. We aim to continue the winter and summer schools and the research visits.

The lessons we have learned so far is to strive for long-term collaboration and joint research projects where the participating doctoral students can spend their time in both countries.

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