

Training inter-disciplinary talent for software outsourcing

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ABSTRACT: With the advance of e-commerce and the outsourcing industry, there has emerged an urgent demand for inter-disciplinary talent that not only grasps e-commerce process analysis, but is also familiar with software development. The authors of this article have analysed existing problems in training for traditional software-related specialties. Also considered were ways to break down the barriers that exist between different disciplines. This was driven by the demands of the industry and enterprises. An inter-disciplinary training model for software outsourcing has been constructed, combining business process analysis, software development and communication skills. University-enterprise co-operation training has been implemented, through several approaches, i.e. a theoretical and practical curriculum, dual-teaching teams and quality assurance mechanisms. Finally, the reform has been verified in practice as achieving good results. The data presented in this article update and extend the data regarding information technology outsourcing and business process outsourcing, included in an earlier article by Ye et al [1].

INTRODUCTION

Outsourcing is an important part of the modern service industry, featuring high value-added, low energy consumption, low pollution, human resource-intensive, and it is internationally recognised as such. Outsourcing has become a critical trend in the globalisation of services, with the global industry extending from manufacturing to services [2][3]. After 20 years of rapid development, the outsourcing industry scope has expanded, from the initially information technology outsourcing (ITO) to the higher level business process outsourcing (BPO), which accounts for the main areas of the outsourcing industry [4][5].

From January to November 2014, China has witnessed 629,000 new employees in the outsourcing industry. By the end of October 2014, China had 27,686 outsourcing enterprises, with a total of 5,991 million employees. Of these, 3,994 million or 67% have Bachelor's degrees. As students they majored in computer science or a software-related discipline. There are few, however, who know both how to conduct a business process analysis for BPO and technology development for ITO. If a suitably qualified person is not available, an initially unqualified employee would need many years' training to adapt to the work.

There exists a great gap between the practical demands of outsourcing enterprises and knowledge, and the capacities and qualities of undergraduates. In recent years, many scholars have paid attention to training outsourcing talent in application-oriented universities. Li [6], Bao [7] and Yang [8] have studied outsourcing training in undergraduate universities.

Wu [9] and Zhong [10] have explored ITO training models. Chen has explored BPO training models [11]. However, the traditional intra-discipline training cannot meet the demands for inter-disciplinary talent required by the outsourcing industry.

Reported in this article is an analysis of the requirements for inter-disciplinary software outsourcing talent required at the core of BPO + ITO and shortcomings in the traditional teaching of undergraduate computer software courses. After that, a training scheme is proposed, including university-enterprise co-operation with disciplines identified starting from a top-level design.

A theoretical and practical teaching system has been designed focusing on targeted capabilities training. The theoretical and practical teaching reform has been implemented, with application transformations at the heart. This training model has been very successful, with support from the teaching faculty and enterprises involved in university-enterprise co-operation. The data presented in this article update and extend the data regarding information technology outsourcing and business process outsourcing, included in an earlier article by Ye et al [1].

PROBLEMS IN INTER-DISCIPLINARY TRAINING IN TRADITIONAL SOFTWARE-RELATED SPECIALTIES

First, inter-disciplinary application-oriented training is difficult due to barriers between disciplines. In China, the boundaries between major disciplines are distinct. The ITO software training belongs to computer science and information technology, while business process analysis training for BPO belongs to business. The two types of training belong to two different major disciplines, which would be in different faculties at universities [12]. To train BPO + ITO inter-disciplinary talent, the barriers between different disciplines would need to be broken down. It is, then, necessary to integrate them to form a cross-disciplinary training model.

Second, the current training does not well support the training of knowledge, ability and quality. At present, almost all computer software training at universities emphasises a deep foundation for, and a wide range of, knowledge. Universities tend to have substantially the same training programmes, curricula and teaching methods, with less attention to the professional direction their graduates may take. Education has always focused on the theory of a discipline, and the completeness of the knowledge, rather than students' practical abilities.

Teaching, which emphasises theory instead of practice, focuses on system rather than skills, and pays attention to academic knowledge rather than practical experiments, thus producing graduates with good knowledge, but weak practical ability. Such graduates find it difficult to adapt to the demands of software outsourcing enterprises. However, the BPO + ITO inter-disciplinary talent requirements are a unique blend of knowledge, abilities and qualities requiring a proper training system that traditional software specialty education does not provide.

Moreover, current teaching material cannot provide support for the required training. At present, teaching materials are oriented to mature knowledge, but are not updated alongside developments in technology. Outsourcing is a high-tech service industry that arose in recent years. The management concepts and development technologies enterprises use are often new. Meanwhile, universities generally lack teaching staff with practical experience. Teachers are often not familiar with the business processes of enterprises and current novel techniques used by enterprises. This leads to a gap directly between university syllabi, teaching content and the actual needs of enterprises.

The works of BPO + ITO inter-disciplinary engineers mainly involves requirement analysis, process design, project development and testing, and technical maintenance. The focus of traditional teaching is not on actual projects, but instead it is oriented to the teaching of single topics from start to finish, e.g. the design of single knowledge-based verification experiments. Such teaching produces graduates who find it difficult to adapt to the needs of outsourced posts.

KNOWLEDGE, ABILITIES AND THE QUALITIES REQUIRED FOR INTER-DISCIPLINARY SOFTWARE OUTSOURCING

In-depth research and the analysis of typical tasks have identified the extensive expertise required for e-commerce BPO + ITO inter-disciplinary application-oriented outsourcing. This includes the basic theory and knowledge of computer applications and e-commerce, outsourcing and e-commerce, e-commerce business process analysis, computer software design and testing, management processes and international standards applicable to software outsourcing.

Three core competencies are required by e-commerce BPO + ITO inter-disciplinary application-oriented outsourcing, viz. software development, business process analysis, and communication and co-ordination. Software development involves object-oriented programming, application systems analysis, design and implementation, data processing and mobile terminal application development. Business process analysis involves the analysis and optimisation of software-based business processes. These include business to consumer (B2C), consumer to consumer (C2C), on-line shopping, collaboration systems, logistics and warehousing software, and e-commerce system architecture design.

Business process analysis determines how to meet enterprise objectives using information technology. Communication and co-ordination skills include English-language abilities required in the outsourcing industry, and the ability to analyse practical problems and propose solutions in a co-operative, team environment. It also covers the ability to acquire new knowledge and new skills, and to deal with the problem flexibly and independently.

The qualities that e-commerce BPO + ITO inter-disciplinary application-oriented outsourcing requires include extensive knowledge, a wide vision, continuous learning and innovation, dedication and collaboration.

THE NATURE OF INTER-DISCIPLINARY TRAINING FOR SOFTWARE OUTSOURCING

Studies of outsourcing training have been carried out at universities, IT training institutes and outsourcing enterprises, such as Tata Group, Insignia Group, Totyu Group and ChinaSoft International. The training is oriented to high-end inter-disciplinary talent in software outsourcing with software development capabilities and with a good disciplinary knowledge base. Subjects should be proficient in the outsourcing language used and be familiar with the management of, and typical business processes in, e-commerce. Moreover, they should be familiar with management processes and international standards for outsourced software development, and have abilities in optimisation, transformation and system implementation.

The architecture of an inter-disciplinary software outsourcing training system is presented in Figure 1. The overall approach is based on the three core competencies, viz. software development, business process analysis, and communication and co-ordination. The BPO + ITO inter-disciplinary application-oriented outsourcing training aim is to satisfy market demand. The three core competencies are segmented into second-level theoretical or practical components. The university-enterprise co-operative teaching team implements theoretical and practical teaching in classrooms and in enterprises, in order to train inter-disciplinary outsourcing talent with the great potential to satisfy enterprise demands.

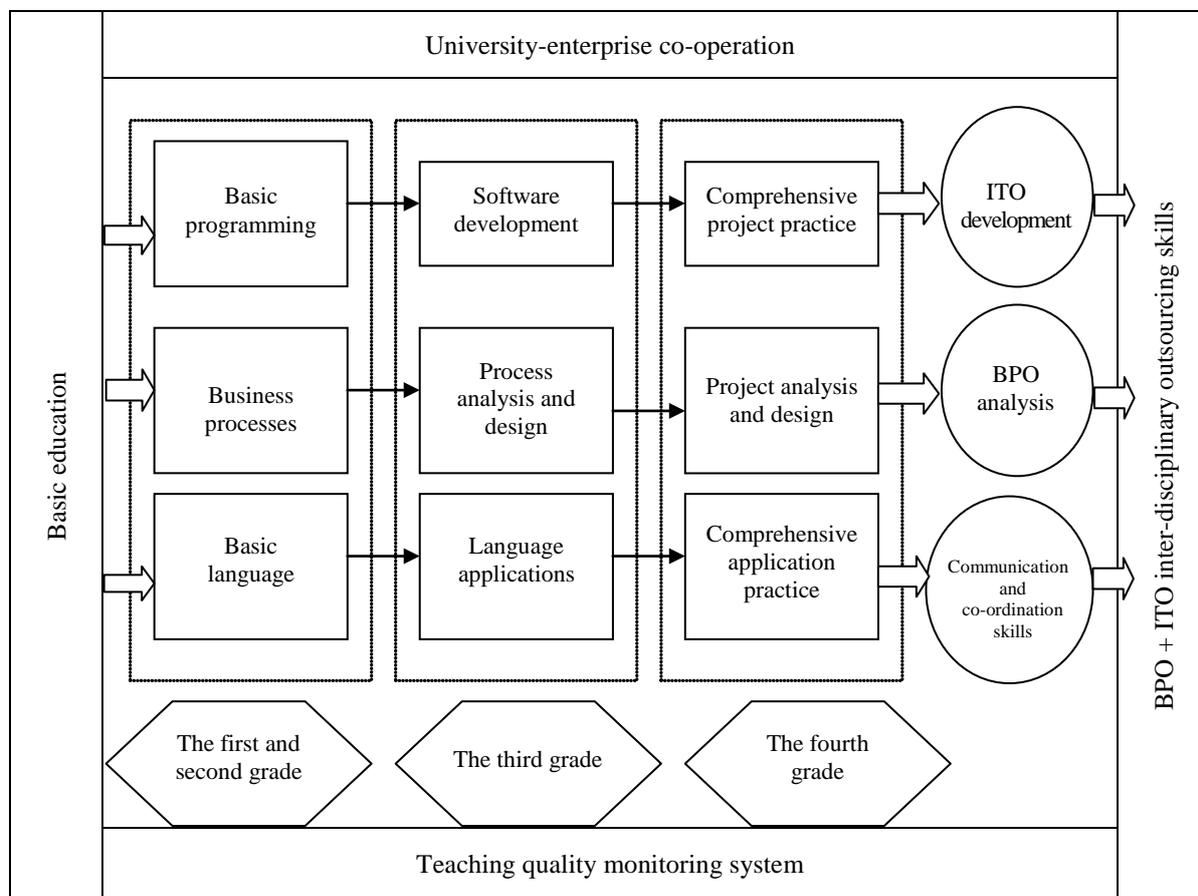


Figure 1: Architecture of an inter-disciplinary software outsourcing training system.

APPROACHES TO INTER-DISCIPLINARY SOFTWARE OUTSOURCING TRAINING

Multi-step Implementation

E-commerce BPO + ITO inter-disciplinary application-oriented training integrates university and enterprise training using a 2 + 1 + 1 model. In this model the first two years are general professional education, the third year is professional skills training, and the fourth year is for comprehensive project skills. With full university-enterprise integration, both universities and enterprises develop training plans collaboratively, which are jointly implemented throughout the three stages of the theoretical and practical teaching.

In the first two years, students would attend classes taught by teaching staff from the university and enterprise engineers. Students participate in projects in enterprises during the short-semester. Both sides jointly provide guidance and career planning among other support. In the third year, skills and material required by the industry and enterprises would be embedded into the teaching. The BPO + ITO outsourcing analysis and actual project training are implemented jointly.

Curriculum System Optimisation and Teaching Reform

Having determined the required learning outcomes, the main courses can be determined and the curriculum established. Some courses are arranged to progress continuously, from shallow to deep and from easy to difficult. Such courses include business process analysis, software development and language-related courses.

There are 11 main courses, including database concepts, case study of e-business, and so forth. These main courses are critical to grasping core knowledge and skills. Class assignments and teaching are structured to assist students' learning.

Depending on the content, the teaching should be reformed to promote learning the application of knowledge. The core courses, such as database concepts, project development, software testing, e-commerce case studies and UML (unified

modelling language), should be capabilities-oriented as opposed to theory-oriented. For these, it is necessary to redefine curriculum goals, the curriculum, teaching content, and the teaching and evaluation methods. Also, it is crucial to co-operate with enterprises to re-develop teaching materials, and combine the teaching with a practical project.

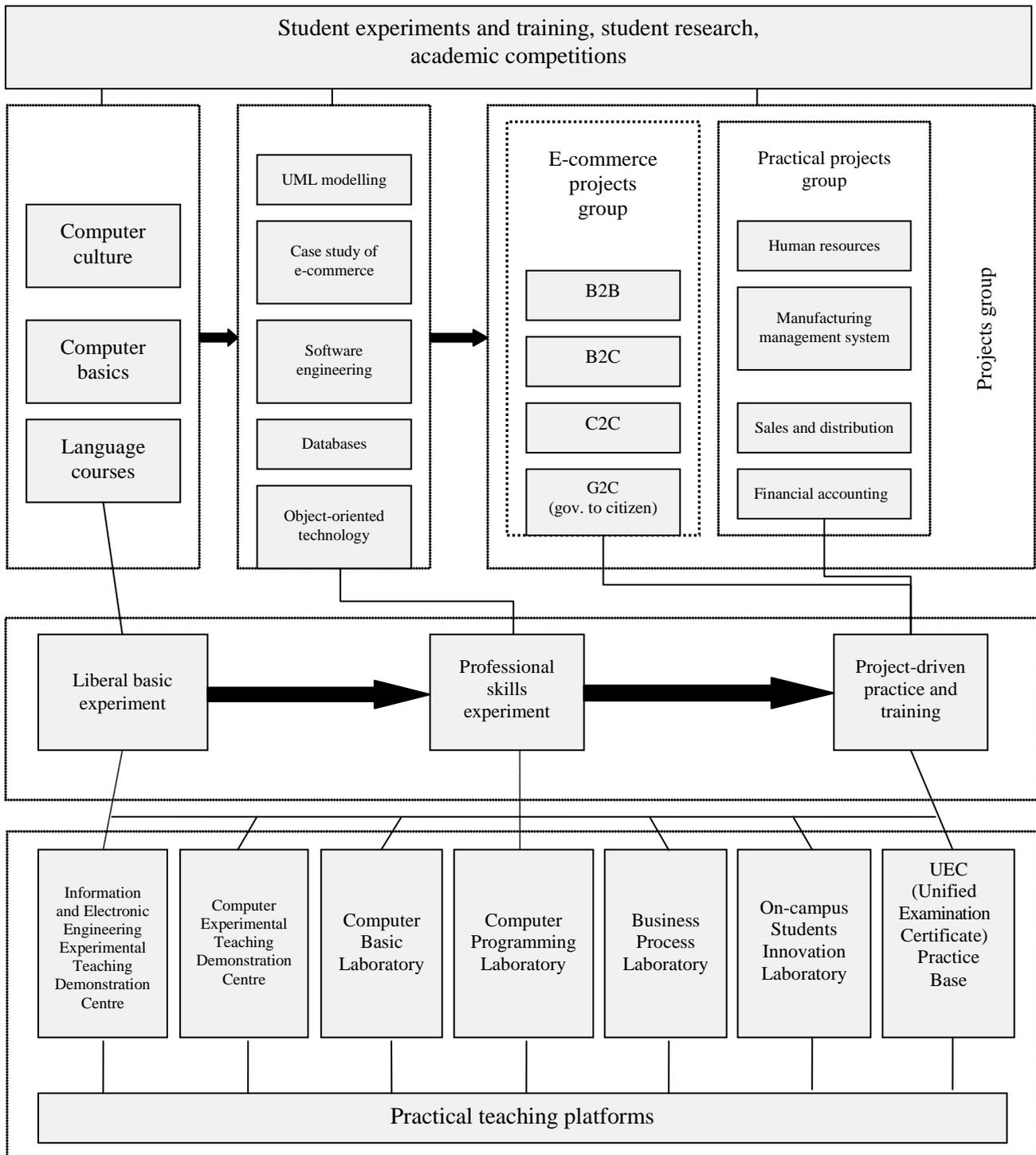


Figure 2: Architecture of the teaching system.

Construction of a Multi-step Practical Teaching System

A progressive innovative curriculum for a multi-step teaching system should be constructed. The steps should include internships, academic research, case studies, graduate project design, projects and holiday post practice. All finally leads to real employment. Courses and projects groups should be established. The aim is to achieve multi-step training, from professional general education, to professional skills training, to project implementation training.

The overall architecture of the current system is shown in Figure 2, while the previous version was published earlier [1]. At the bottom of the figure are the on-campus and off-campus practical teaching platforms. At the top of the figure is listed the practical and innovative teaching, including experiments, training, academic research, and science and technology competitions. In the middle of the figure are experiments, practical courses and integrated projects

corresponding to the three stages, i.e. business process analysis, software development and communications. Each main course and professional skill type should include curricular internships. Practice lessons should be no less than 20-30% of total class hours, and each main course should include at least one internship.

QUALITY ASSURANCE OF THE TRAINING BASED ON UNIVERSITY-ENTERPRISE CO-OPERATION

University-enterprise Teaching Staff

In recent years, the University has launched a project - *the Thousand Engineers Project* - and carried out teaching team construction based on university-enterprise co-operation. An inter-disciplinary cross-courses teaching team and university-enterprise co-operation cross-courses teaching team have been built. Engineers and managers in enterprises, who have abundant experience are hired as part-time teachers of professional courses. They are also appointed as joint tutors, to guide students on finishing their graduate project design [7].

Meanwhile, teachers from the Universities are sent into outsourcing enterprises for one or two semesters to undertake engineering jobs. These teaching staff can improve their e-commerce process analysis capabilities and software development skills by accumulating real engineering experience by, for example, participating in the actual development of outsourcing projects, receiving training in an outsourcing training institution or participating in research projects.

University-enterprise Co-operation Mechanisms and Shared Interests

University-enterprise co-operation is an effective way of training e-commerce BPO + ITO inter-disciplinary application-oriented outsourcing talent. It enables students to become *quasi-employees* and to obtain enough experience, to satisfy the requirements of professional positions. In recent years, Zhejiang Shuren University has established some university-enterprise co-operation platforms with famous outsourcing enterprises, such as the Totyu Group, Inigma Group and Tata Group.

For the construction of the co-operation platform, both sides should establish a management system to provide leadership and a team to plan, guide and co-ordinate. The university-enterprise co-operation platform needs to improve the co-operation mechanisms, with full respect for each other's interests. Furthermore, they need to fully exploit the advantages of the talent and technology of the two sides to promote co-operation in several areas including employment, teaching, research and co-production.

CONCLUSIONS

Zhejiang Shuren University has established a close co-operative relationship with several outsourcing enterprises to train e-commerce BPO + ITO inter-disciplinary application-oriented outsourcing talent. This university-enterprise co-operation has involved the Totyu Group, Inigma Group and Tata Group. Many practical platforms have been involved, e.g. the Totyu for outsourcing training, the national and provincial engineering education centres, the international outsourcing training base of Zhejiang Province and the outsourcing innovation platform of Zhejiang Province.

According to a survey conducted by MyCOS, students of this specialty had an employment rate of 99% in two recent years. By contrast, the employment rate of general undergraduates of the computer specialty at the University was 96.5% in 2014. Employment competitiveness has increased, from 88.5% to 90.1%. Average income has grown to 3,513 Yuan per month six months after graduation, which is almost 5% higher than the average salaries reported by Ye et al in 2013 [1]. The survey has verified that good results have been achieved. Inter-disciplinary software outsourcing training has gained abundant support from several important outsourcing enterprises, i.e. Inigma Group, Totyu Group and ChinaSoft. Hence, the training model has been affirmed and will be further promoted as a better role model by many universities, e.g. Lishui College and Sanjiang College.

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