The Practice of Maintaining the Feature of Internationalization and Industrialization for Staff Team in School of Software at HIT *

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Abstract: Based on the summary of and practice of maintaining the feature of internationalization and industrialization for staff team in School of Software at Harbin Institute of Technology, this paper analyzes the potential advantageous and disadvantageous factors, puts forward a new way of solving the problem, and analyzes the feasibility and the subsistent advantages and disadvantages of this way.

Key words: lecturer; internationalization; industrialization
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It has been seven years since the founding of School of Software at Harbin Institute of Technology was established in 2000. In the seven years, a whole set of teaching system was formed, and a few curriculum system including computer fundamental, software engineering, software development tools and the teaching method emphasizing practical capacity cultivation were formed into basis. For the staff team construction, a multi-level structure is formed, in which the own professional staff team is established. Meanwhile, depending on the professional staff recourses in School of Computer Science and Technology, the invitation and joining of experienced engineers with the development skills from national big IT industry, and the famous teachers from overseas software engineering to teach in the school, now the teaching in the school has the characters of industrialization and internationalization.

Up to now, the school has already had 14 full-time teaching staff, and the proportion of different degrees is shown in figure 1. 73.7% of full-time staff comes from industries, and the distribution of working experience in industries is shown in figure 2.

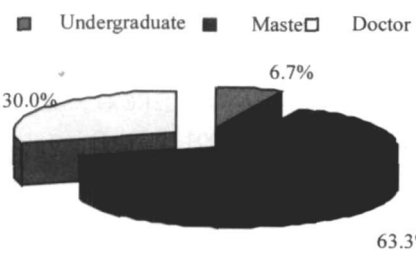

Fig. 1 Proportion of teachers educational background

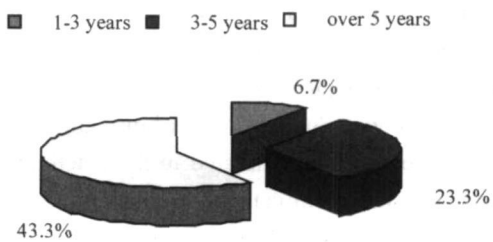

Fig. 2 Proportion of teachers career background

A number of R&D and management personnel from well-known IT industries or overseas software schools come to undertake related courses. The total number of part-time lecturers is between 15 and 20 each year, each lecturer takes 2 courses, the total number of courses reaches to 30 to 40, which occupies 20% to 28% of the total courses. All the courses are taught in English for overseas lecturers, and the courses undertaken by domestic lecturers are taught in Chinese. This helps a lot for students to know the current development in software industries in China, and students are more aware of the technology criterion and management thinking in international software industries.

At the first stage of development in the school, the experienced IT industry staff was recruited as full-time teachers, their experiences in industries opens a new way of teaching for the students. However, the lecturers from industries have little experience of teaching, it takes sometime for them to get used to the teaching environment. To assure the teaching quality in the first few years, the school required full-time teachers to devote themselves in teaching rather than developping projects, which provided a good basis for the teaching

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quality in the school. However, as time goes by, these full-time teachers are getting further away from the industries. How to maintain the staff team, how to keep their capacities of internationalization and industrialization becomes the key issue for the school.

This paper will make a summery analysis of the practice in the first stages of School of Software in HIT, and tries to find a solution scheme for the existing problems for full-time staff in the school.

1 Search and practice at the first stages

(1) Recruiting high-quality internationalized and industrialized talents as the staff in the school. At the first stages of development, the school has set up the target of cultivating internationalized and industrialized software talents. Based on this way, the school recruits staff with master degrees, overseas or industry experiences, which forms a very good pattern of staff team. Almost all the lecturers are software talents with many years' software development experiences from industries. Different enterprises bring different information, and the integration of industry experiences and teaching contents make the students more aware of what the enterprises really require.

(2) Ceaseless update of the staff team and maintaining the characters of industrialization and internationalization. The gradual development of the school requires more and more teachers to join in the group. At the same time, due to the restriction of running the school with its own costs, the recruited staff cannot become the official personnel in the university, and there is a lack of sense of safety for them, which will lead to the replacement of staff team. However, there is the advantageous side since the staff team will be ceaselessly updated, and the characters of industrialization and internationalization maintain very well. But the disadvantage is that the teaching will not be continuous, so there is the need of building up a fairly stable staff team. Besides, the school faced some problem when recruiting new full-time staff, and it is difficult to find the software talents with good education background and IT industry experiences, since under the talent density in Harbin, it is not attractive to the talents from IT industries to come to a northern city. In order to maintain the stable staff team which keeps the industrialized character, the school established a training system for teachers, especially the training of accepting international famous enterprises. Now there are 80% of the full-time staff in the school having the trainings in technology and management from big companies such as CISCO, IBM, etc.

(3) R&D or management personnel from international/national firms and overseas lecturers are invited to the school to give lectures, seminars, which provide an industrialized environment. This will enable students to know the latest development in industries or in technologies and cultivate their industrialized diathesis. Every invited lecturer will be assigned with a TA, who is a full-time staff, to assist the lecturer to finish the teaching tasks which is required by the school, and accept the enterprise training for the full-time staff which will improve the level of both teaching and industrialization. However, this way of teaching has its own problems. First, the invited lecturer for each course is not fixed in each year. Second, in order to make the time arrangement for the lecturer from enterprise or other countries available, the time arrangement of the courses can't be fixed. Third, the invited lecturer always finishes the teaching tasks in a fixed period such as 2 days or 1 week, and the lecture time is comparatively concentrated. There are too many lecture hours every day and the quantity of information is too large to be acquired by students. Although there are problems existing, the invited lecturer is still professional. They master the advanced development methods, and the teaching impresses students a lot. For example, the students from HIT-DIT joint class have very high level of both English and engineering capacities to meet the need of the industrialized and internationalized level. Meanwhile, the teachers in the school also improve their own abilities with the communication with the lecturers from enterprises or other countries. Up to now, there are over 100 lecturers from industries or other countries invited for taking 30% teaching tasks in the school, and their teaching quality is very impressive.

(4) Maintaining a good relationship with the companies. Each year, the staff in the school will be sent to firms to participate in the training. In 2006, the school began to send undergraduates and graduates to firms to begin training for a month, and a teacher will be accompanied with them. On one hand, he is in charge of the management of the living and security for the students. On the other hand, they will be involved in the work with the students. In this way, they will know firstly the dynamic status of the students, their way of thinking and their requirements so as to arrange teaching contents according to students' way of thinking. Secondly, they will be aware of the requirement of students' ability and techniques, get the feedback from the firms the current requirement information from the firms. Thirdly, the personnel from the firms know the firm very well and it is very easy for them to integrate

with the firms and maintain the industrial self-quality. From now on, a teacher will be going to firms to take training with every batch of students each year.

2 The current measurements and emphasis

With the above introduction, School of Software at Harbin Institute of Technology has done much work on teacher's industrialization and internationalization and gained great achievements. The students who are cultivated in this staff team have gained good reputation in the China software industries. From the example of the orientation for graduates in 2006 (shown in Figure 3 and Figure 4), it can be seen that the students accepted by national big companies account for 53% of the total graduates.

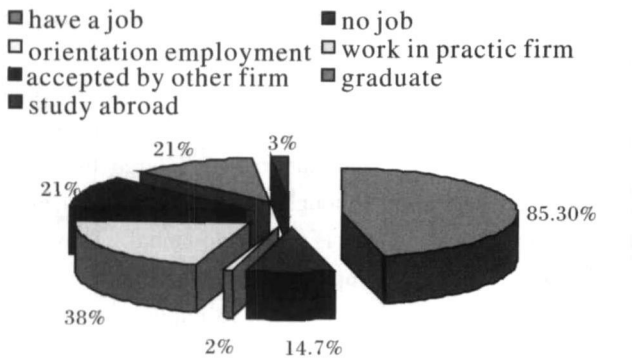

Fig. 3 statistics of graduate direction

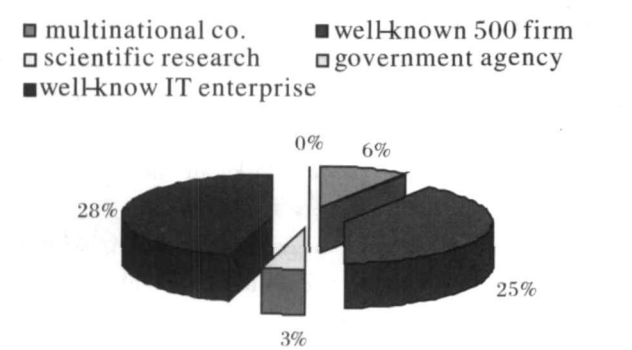

Fig. 4 statstics of employment firm

Based on these achievements, there are still many problems existing in the full-time teachers. First, there are unstable factors and fluidity which is not advantageous to the continuous higher education. Second, as time goes by, the teachers are further separated from the software industry, whether the teachers are stabilized is vital to the software industry which is updated very quickly. Although measurements such as visiting to the companies, participation of work placement, training in the enterprises are taken to strengthen the character of industrialization, however, since the teachers don't participate in the projects any more, their recognition to the enterprises becomes weaker and weaker, which is not favorable for the education methods in the school. But there is a strong need for the stabilization of teachers, which is a key issue to be revolved quickly.

There are abundant recourses in School of Software at Harbin Institute of Technology due to the following reasons: First, the school has a close relationship with the enterprises. Second, each teacher has development experience with big projects. Third, each teacher has its own strong suit, such as technique, management, marketing, etc. Last, there are many talents who are good at software programming. How to make use of the recourses and the how to organize them reasonably is the key issue for us at the moment. The school began to realize the need of establishment of its own development team since 2007.

2.1 The advantage of making use of resources in School of Software

(1) Maintaining the industrialized character of the staff team and keep improving the level of teaching. The industrialized and internationalized training is a long-term task for School of Software. Now there is a state of worry existing in the teaching staff that the longer they stay in the school, the more likely that they will only do teaching rather than remembering their own development potentials, so they are comparatively weak mentally. However, the R&D work ensures the character of industrialization for the teachers and improve their self-development ability, which will increase their confidence and social competitiveness.

(2) Exerting the strong point of software engineering and advancing the process of China software industrialization. The full-time teachers should specialize in software engineering, and the key point of China software industry is the implementation and measurement of software engineering. The teachers with knowledge and ethos of software engineering will easily understand the actual meaning and implementation of software engineering. If we carry out the software engineering work in School of Software and succeed, then the students will accept the software ethos, it will be of extraordinary significance to improve the software engineering efficiently nationally.

(3) Creating its own company, bringing in economic benefits and stabilizing the staff team. In the development process, the best way is to adopt the management method in the company rather than adopting the discrete way of management in the project team in the university. This way will be convenient for the implementation and measurement of software engineering

method. And the successful software development will necessarily bring in economic benefits and is beneficial to the stabilization of staff team.

(4) Close relationship of school and companies. The development of the school is totally different from the technology research in the universities. It is not focused on research on high-tech but closely related to the software projects in enterprises. To develop software products with high quality and efficiency, the contact with the enterprise should be comprehensive, which will further osculate the relationship of school and enterprises.

(5) Further cultivation for the students. The project development in the school should fully make use of the students. Integrate teachers with students. The teachers mainly undertake the projects, the demand and requirement analysis on projects, the overall and detailed design of project to form a complete project development file, and then give part of the models which are comparatively independent and easy to be tested to students for coding, and the teachers are in charge of the supervision and check. Students and teachers make a complete team to develop the software projects together. In the development process, the students will understand the development ethos and technology thinking of the teachers. The teachers will have a deep understanding of the students' requirements, ethos and problems in the co-operation with the students. The teachers will have more ways to educate students, and more real case studies will help in the teaching of courses, which will bring great benefits for the cultivation of students. One of the frequently occurred problems in the previous development process in the school is the big fluidity of students. With the incomplete development files, it is very difficult to take on the project which is more than half developed. In this case, the stable staff team, the complete development files, the reasonable process structure will make the problem of student fluidity will not be a problem at all.

(6) Advancing the connotation construction of the course. The construction of the curriculum system in the school comes from the talents requirement of the companies, and the contents taught by the teachers should directly face to the enterprises. The direct knowledge and experience from the firms is the key contents transferred in the curriculum in the school. The development of a project will enable the teachers to get to know the experiences, which will be effective case studies for courses, and will provide references for the teaching and the compile of the books.

(7) United R&D with teachers from School of Computer Science and Technology with its own emphasis and learn from each other. The characteristic of Computer Science and Technology is the scientific research with specialization, while the characteristic of School of Software is focusing on software framework, software development management, software quality assurance, etc. At present, when taking on the projects from firms, School of Computing Science and Technology will face the problem that it is not guaranteed for the reliability of the system after it is developed. Therefore, there is a long time of maintenance period leading to the insufficiency of development costs. Both schools exert their own characteristics, and solve the problems for the firms, and this kind of recourse integration is not to be achieved by many companies.

2.2 The disadvantages of making use of resources in School of Software

(1) The time conflict of teaching and research. The duty of the teacher is to teach knowledge and skills, so there is no delay in the time for class. But research also needs large amount of time and recourses, there will be great conflict in most of the time. This is why the teachers are not encouraged to do too many projects in the first few years. However, with the development pace, the staff team is becoming large and the gradual development of the curriculum system makes the management of the teaching gradually formal, and the teachers can teach 2 to 4 courses at a time. And with 2 courses which will be taught by at least 2 teachers, each course will be assigned as A and B, in the arrangement of the courses, the course will be reasonably arranged according to the project tasks undertaken by the teachers or assign project staff according to the teaching tasks. Although the conflict will not be avoided, the conflict is not very predominant at all.

(2) Research method difference between school and the company. There is a particular style or system in the school and the company, and it has been years since the big conflict between them. With the development of School of Software, the education ethos and the contents taught are coherent with the culture in the company. Therefore, our school has a substantial difference with the teaching ethos in other schools. The way of management in the school is similar to the way of management in the company, and the way of thinking is also similar, which makes the school advantageous than others.

Big fluidity and level difference for students. In the R&D development in the school, the students resources must be fully used, which means the student participation in the R&D development. But the main duty for the students is to study, and few students are

aware of the fact that the ability gained through project development is far more than the knowledge acquired in the class. With the different technology level and development skills, how to effectively make use of the current students' resources and assure the quality of the contract is a big issue to be tackled. In the first stages of the project, the teacher will distribute different module with different degree of difficulty from different designed process modules according to the ability and level of the students. And the teachers check and evaluate according to the standard and will adopt the qualified and abandon the unqualified. Meanwhile, the enthusiasm and the sense of responsibility of the students will be maneuvered through economic instruments, which will enables the students to learn the experiences of R&D and have their own experiences in the companies. The enthusiasm of the students for participation of project development will also be maneuvered through the management mechanism in the school. For example, the workload of the R&D can be changed to credits, the behavior of the R&D for the students will be recorded in the lab assessment, the R&D achievement will be considered as credit when he is send to graduate after the cognizance by the school, and the school can set up the award, etc.

3 Conclusion

With the past few years of efforts, the school has a strong staff team with the industrial experience, technique skills and teaching competence. Maintaining the industrialized and internationalized characters is the key task for the school. Although the school has made every effort to do re-training for the teachers, the teachers are getting further away from the industrialization if they leave the company is too long. Therefore, in order to keep the original character for the staff team, some efficient measurements must be adapted to assure it. The school plans to build up a development team with modern development ethos, which will fully understand the software engineering thinking and will implement the software engineering. With the contribution to national or local software industries, the industrialized character of teachers will be ensured in the school.

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