Practice of Teaching Reform of Information System Design and Implementation

Xu Yin[1, a], Xueifei Liu[2, b], Jingfan Hu[3, c]

[1] Computer School,Beijing Information Science & Technology University, Beijing, 100101,China

[2] Computer School,Beijing Information Science & Technology University, Beijing, 100101,China

[3] Computer School,Beijing Information Science & Technology University, Beijing, 100101,China

[a]email: yinxu15@126.com, [b]email:lxf@bistu.edu.cn, [c]email:hujingfan@bistu.edu.cn

Keywords: practice teaching; case-driven; engineering education; information systems

Abstract. Practice is one of the effective ways to develop innovate ability of students. In order to solve the gap between professional theoretical knowledge in the teaching process and ability of analyzing and solving practical problems, changing the traditional teaching mode, adopting case teaching method, highlighting a problem in the case of multiple solutions, and integrating multiple knowledge related can broaden the depth and breadth of knowledge of students and truly improve students' thinking skills and the ability of innovation.

Introduction

Information system design and implementation is a key lesson in the course system of software engineering profession in our school, an extension and integrated use of Introduction to Software Engineering, database system foundation, UML, Java, Web technology courses and so on, but also an effective ways to cultivate the students' innovative ability. Since students do not have practical experience and understanding of complex applications system, and the main objective of information system design and implementation is to allow students to use theoretical knowledge and methods related to the course complexly, and to improve the students' ability to solve practical problems and innovation at the same time, the introduction of case teaching method to connect knowledge and use in practical problems in the teaching process can arouse students' intrinsic motivation ,enhance the behavior of active learning, enhance students' self-directed learning skills, and enhance the transfer of knowledge so as to enable students to apply what they have learned [1]. Traditional teaching objectives can easily be positioned just to make students complete the project from teachers and much more understanding of theoretical knowledge. And the cultivation of students' comprehensive quality is often neglected which is not only against with the quality of education and the comprehensive development of philosophy of education, but also is not consistent with market demands [2]. Through the analysis of existing problems of information systems design and implementation teaching, according to years' experiences of the first line of teaching and practice on database and software engineering, we conduct teaching innovation of some practical courses and organize and implement this carefully in which some experiences and a series of reforms methods are accumulated. The method conduct teaching reforms from combination of multi-faceted teaching, case teaching, teaching resources integrated to standards and so on to adapt to cultivation of innovative talents. Practice shows that the case teaching method is more effective to connect knowledge and practical uses than text description, and much better to stimulate students' curiosity and thirst for knowledge, which make information system design and implementation courses play a important role in practice, improve the ability of comprehensively using knowledge and innovation ability and promote the cultivation of students' innovative ability and quality in order to train talents of applications and social development to adapt to the needs of social development.

Course Content and Analysis

Information systems design and implementation is practical course, opened in the junior semester after studies of operating system, database system, Uml, Java, Web technology courses and so on. It includes 32 hours, 8 hours of lectures and 24 hours on the machine, and is completed through completing selective topic by 2-3 people / groups. The topic is based on common practical problems and to study how the use acquired knowledge to solve practical problems in the development process of information systems which is to resemble the components of the system such as addition, deletion, modification into a new and integral entity according to business logic. In this process improved technology and implementation of methods and procedures [3] are what students need to master, which require students a deep understanding and skilled applications of information systems analysis process and its associated tools, techniques and is helpful to students to cultivate practical ability.

In the teaching process of information system design and implementation, it is often found that students can understand the majority of theoretical knowledge, but often fail to meet requirements in practice to the specific application, which shows students' mastery of theoretical knowledge is not solid, assault is existed in the learning process of the pre-course and students did not really grasp the theoretical knowledge and there are a considerable number of students who did not master the development tools. In addition students rarely use computer language to achieve a more complete task flow before and have a very abstract impression on the target system, so they can not have a whole grasp of development practices process of system, have no plan and have to depend on the teachers' conductions.

Standardization means the standardization of methods and procedures in the design process as well as the design results, In the case of the lack of sample template, Students takes a lot of energy to make a full grasp of the development process and to ensure that no mistakes or less error in a short period of time. In addition, the difference on symbol ,graphics, and even the methods, procedures of analysis and design tools in different textbooks, reference give students a negative impact.

Teaching Content Reform

CDIO, as a new engineering education concept, advocates CDIO whole process of product development as the carrier, and the whole process includes Conceive, Design, Implement and Operate, which thinks that students in the engineering education not only need to master the professional knowledge, but also the adaptation and regulation abilities of system integrated with social, technological, economic, cultural science so that the students can become engineers with lifelong learning and team communication skills, professional and engineering capabilities, and social awareness and entrepreneur sensitivity. So these students play an important role in the engineering team where they work and produce products and systems needed in the society in the future[4]. All of these are the requirements of applied technical talents.

Introducing CDIO engineering education concept into software engineering undergraduate teaching process can realize the aim of training abilities of students and complete cultivation of practical teaching reform and practical innovation abilities of students. In the teaching process, we let the students study with pursuit of solving engineering problems, regard cultivation of personal ability, interpersonal ability and ability of working together as studying target, and emphasize on cultivating students' ability to analyze and solve practical engineering problems. So thinking scientific professional content as the carrier, case teaching as a method and conducting combination of speaking and practicing and learning in the work can cultivate professional skills and engineering capabilities of students, mobilize learning enthusiasm and initiative effectively, improve the independent innovation ability, engineering development and team collaboration capabilities so that a good teaching effect is displayed.

Software engineering related courses such as database systems, UML, Java, Web technology are

achieve effective integration and comprehensive use in a knowledge-based system, software engineering graduate students are mainly engaged in software development and software testing industries. So information system design and implementation course is to target the professional activities as a guide, in addition to cultivate students' "visible" the professional literacy, and should be also bear to cultivate students' "invisible" the comprehensive quality, high-quality talent is not only the mechanical expertise of individual, need more the compound talents of coordinated development in all respects, include: team spirit of cooperation, organizational ability, project management capabilities, the ability to analyze problems and to solve the problem, the method and habits to deal with problem and other aspects of quality[5].

In the teaching process of the database system, uml, java, web technology courses, teachers emphasis on the impact and importance of the information systems design and implementation course. Students have sufficient time to firmly grasp the relevant theoretical knowledge and to skilled use development tools, do promotion, causing students to value, mobilize students' enthusiasm and initiative for prepare work.It also established a related document to make a comprehensive and detailed description about the contents of teacher's instructor work. Including the organization of the design team, the division of work , how to formulate progress planning, the guidance of the system analysis stage ,design stage and implementation stages, summary and assessment requirements, describe the elements of guidance work, focus, methods and procedures. Train students to actively take the initiative, serious, responsible, innovative and enterprising work habits and attitudes, emphasis on the training requirements of the overall quality of students.

As the students' experience lack of a certain size and complexity resolution, result in too much time on the subjective guess about the next step the work results and wait for the instructor, work inefficiency, Initiative and creativity not play. To provide students with a unified standard representative example to facilitate students' reference, function as a template, allow students to design practice in the rule based on example, reduce students' standardized deviation. Through standardization Training of students design and development process, reduce rework rate, enable students to focus on design optimization and innovation, to promote students' abilities and to improve the quality of students. The standardization of the design process training also improves the work efficiency of teachers, so that teachers have more time to do more detailed communication with students, alleviate the problem of insufficient number of guidance teachers to some extent.

Design Ideas of the Teaching Case

The design and selection of teaching cases directly impact on teaching effectiveness and student learning interest. Good teaching cases enable students to consciously learning and transfer of knowledge.According to the teaching programs of information system design and implementation, learning objectives, case description, case highlights, related knowledge points, case implementation, expand and improve are designed for students, the collected material is targeted for screening and organizations .

Software development FAQ Well-known to students is taken as material, such as library management system , online bookstores,easy-to-digest expand according to the teaching content and their level of knowledge, when the students face both familiar and meaningful contexts, the students' desire to learn and interest will be able to be stimulated ,beneficial to the students explore and understand the problems and solutions, ensure the implementing of follow-up heuristic teaching method.

The teaching cases is designed to have a certain depth, the requirements of the case is which reflects the theoretical knowledge and its application, but also learn by analogy, for an actual problem situations, inspire students to think deeply, well grasp the difficulty of the problem, left enough thinking space to the students, must go through a certain amount of analysis and thinking in order to ultimately concluded. By analyzing the teaching case, Inspire students how to explore knowledge, gradually develop the student's skills to ask questions and to solve problems, formed the mind habits to explore the knowledge. There are several ways such as connecting to the database, the ODBC database connectivity is first given, this connection is relatively simple, easy to

succeed, suitable for beginners, self-confidence is established to students, at the same time it enable students to understand the principle of connecting to the database. However, this method is limited, there are its flaws, further requires students explore other methods of database connectivity such as jdbc, open source framework Hibernate, JNDI DataSource etc, and to understand their characteristics, jdbc connection is the most direct and fastest way in operating database, add their own driver packages, errors easy to find and easy debugging. Open-source framework hibernate mode of operation is that the table in the database is directly mapped to entities in java program, database table is operated as the entity,it is   more mainstream, but in terms of response speed, it is worse than the jdbc connection. The DataSource can improve the efficiency of the system to access the database, because every time the connection between application and the database will consume system resources and time. At present, the visits of the project based on B / S is large at the same time, each visitor must call a connection, in this case, the efficiency of database connection can not be ignored. The final conclusion is given by discussion and analysis, in order to cultivate the students to ask questions, problem-solving skills, set up to the habits of mind and confidence to explore the knowledge.

The document in various stages is to be consistent with textbook standards, eventually formed the standard requirements specification, outline design specification, detailed design specification document template as a student's reference, reduce students' standardized deviation, reduce rework rate, the students very clear on the ultimate goal of delivering outcomes, Improve development efficiency.

Conclusion

Information systems development is a rapid development of disciplines, new theories, methods and techniques will continue to appear, teaching content need to constantly update and improve, case-driven can not only improve the students' learning ability and practical ability, but also to develop their ability to solve practical engineering problems, that play a very important role to enhance students' awareness of professional, and is fully affirmed by students. In order to adapt to the rapid development of modern information technology, we will continue to explore new teaching methods, so that teaching standards have improved steadily, the effectiveness of teaching is getting better and better.

Acknowledgement

References

[1] D. Dong,J.J. Jie,C.F. Zhang,Z.H. Sun.Information Systems Engineering Case Design .
Computer Education,2012,(5): 33-37.
[2] H.F. Wu.Design of Software Engineering Teaching Cases. Education and Vocational,2007,(27): 139-140.
[3] X.B. Ji, Z.P. Shao. Curriculum Design and Teaching Innovation of the Course Information Management. Journal of Jimei University,2008,(1): 83-86.
[4] F. Edward,C. Ley,P.H. Gu,M.F. Shen,X.H. Lu.translated. New Understanding of Engineering Education - the International CDIO Culture Models and Methods .BeiJing：Higher Education Press,2009,1.
[5] J.L. Zhang, S.Z. Wang. Practice of Teaching Reform of Information Systems Analysis and Design.Computer Education,2010,(5):2-5.