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# Table of Contents

Welcome Message
Conference Organization

## Session 1: Artificial Intelligence

Research of Intelligence Control Based on Knowledge-increaseable Neural Network Group ........................................... 3
LV Jin, ZHAO Xiang-mo and GUO Chen

Complex Cepstrum Based Single Channel Speech Dereverberation............................................................................. 7
Shen Xizhong and Meng Guang

A Novel Smooth Support Vector Machines for Classification and Regression .......................................................... 12
Jianmin Dong and Ruopeng Wang

Efficient Face Recognition With Variant Pose And Illumination In Video...................................................................... 18
Yi Dai, Guoqiang Xiao and Kaijin Qiu

A Novel Anti-windup Compensator Based on Fuzzy Logic.......................................................................................... 23
Lin Guohan, Wang Yingxu and Huang feng

Research And Application Of A Multi-Ant Colony Clustering Combination Algorithm........................................... 27
Wei xianmin

Memory Effect in DBSCAN Algorithm ......................................................................................................................... 31
LI Jian, YU Wei and YAN Bao-Ping

Improved Fingerprint Thinning Algorithm Based On Directional Images........................................................................ 37
Yang Fan and Li Nan

The Research and Implementation of Virtual Laboratory based on Web in Distance Education..................................... 40
Zhao Ya, Liu Xianmei and Wu Qiong

A Noise-Resistant Fuzzy Kohonen Clustering Network Algorithm for Color Image Segmentation................................. 44
Bosheng Lu, Yuke Wei and Jiangping Li

Hybrid Genetic Algorithm Optimization on Steering Trapezoid Linkage of Linkage of Vehicle..................................... 49
Xi Pingyuan and Wang Cheng

PSO-based Neural Network Model for Teaching Evaluation.......................................................................................... 53
Changjun Zhu and Xiujuan Zhao

A Symbiotic Evolutionary Algorithm for Flexible Job Scheduling Problem.................................................................... 56
Zhang Yan and Qiu Hongze

Empirical Analysis On The Development Level Of Regional Finance In China ............................................................ 62
LEI Hong

Gesture Recognition Model Based on 3D Accelerations................................................................................................. 66
KONG Jun-q, WANG Hui and ZHANG Guang-quan

Traveling-Salesman Competition with Multiple Agents and Simultaneous Move Search Algorithm.......................... 71
Nobuhiro Tomabechi and Yoshichika Fujioka

Application of the Swarm Intelligence in the Organization Of Agricultural Products Logistics....................................... 77
Yao Xinxheng, Xu Guangyin, Cui Yan, Fan Shasha and Wei Jianguang

Research on Submarine Counter-detection Probability by Threat Surface Ship Sonar............................................. 81
Tang Zhiyin and He Lin

A New Method for Texture Classification and Its Application in Texture Synthesis.................................................... 86
Lulu Pan, Guohua Peng, Zhenglin Ye, Weidong Yan and Xiaohong An

The Research of Applying Neural Network to the Vehicles Equipment Performance and Cost Trade-off Analysis....... 92
Ye Yongjin, Yang qi, Zheng Hanyue and Yang xueqiang

Laser Underwater Target Detection Based on Gabor Transform................................................................................... 95
Yang Shubin and Peng Fuyuan

A Modified Motion Detection Algorithm In Complex Background .............................................................................. 98
Zhen Yu and Zhen Wei

Personal Credit Rating Using Artificial Intelligence Technology for the National Student Loans.................................... 103
Hu Jian

On Integrated Model for Image Filtering and Segmenting Based on Structure Statistic of Decomposable Markov Network.................................................................................................................. 107
Cao Jiannong and Fang Yong
Research and Practice of the PBL Model for Data Structure Curriculum

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Abstract—Data Structure is the specialized core course for students majoring in Computer Science and Technology, which has considerable difficulty not only in learning but also in teaching. Project-based Learning (PBL) model is an important means for learning, it had been introduced to the curriculum in the past few years. We conducted Project-based Learning research and practice making full use of network platform, our course group has conducted in-depth research on the Project-based Learning theory and put it into teaching practice in Data Structure. The research shows, it acquires an obviously good effect in teaching practice. This paper describes the Project-based Learning theory, and presents the authors’ actual achievement in research and practice of the PBL teaching model for Data Structure.

Index Terms—Data Structure, Teaching Reform, Project-based Learning (PBL) Model

I. INTRODUCTION

Data Structure is an important foundation core course in computer science and technology, which is between math, computer hardware and software curriculum. It is a theoretical curriculum, and extremely emphasis the application targets at the same time. Data structure not only provides a method of guiding for programming using computer programming language, but also sums up the common programming methods and techniques on a higher level. The objectives of the course are the following. First, the students should know the operation of basic data structures and algorithms in different topics, like sorting, searching. Second, they must understand the principles how the performance of different algorithms is evaluated analytically. Third, they should understand how various algorithms apply to different types of problems and applications. Fourth, they should be able to apply this knowledge to design solutions to realistic problems by combining or modifying the basic algorithms they have learned, and analyze their solutions critically.

Data structure is the cornerstone of design and development software. So, improving data structure curriculum teaching effectiveness in computer science professional teaching will have a positive impact. In order to achieve the objectives of the course, the authors have had beneficial teaching reform and exploration supported by education reform foundation of Jiangxi Provincial educational department. It greatly enhance the students’ ability of practical application.

We have conducted teaching practices in Data Structure based on the Project-Based Learning Model in the undergraduates of 2006 and 2007. Through 3-year practices, we have acquired obviously good results. In 2008, our course group won the second prize for Jiangxi Normal University Excellent Teaching Results. The thesis intends to introduce the Project-based Model and its practices.

II. THE NECESSITY AND URGENCY OF TEACHING REFORM

Our school’s Data Structure curriculum is the first batch of excellent courses in Jiangxi province. Some teachers pay attention to the theory teaching and ignore the practical teaching in the past. Because the curriculum content is very abstract, teachers want to achieve the desired effect of teaching is very difficult. In practice, undergraduate sophomores are lack of computer modeling capabilities, and software engineering courses are generally set up after data structures course. Students have no experience for analysis larger process before curriculum design in Data Structure. This situation leads to students do not know how to do and how they planned the whole process of curriculum design.

As a strong practical foundation course for computer science, Data Structure is necessarily inseparable from the practice of teaching. In the past, we often adopt the general practice curriculum experiment as the main contents, small exercises are arranged for classroom teaching, which enable students to complete the process of independent design and implementation. This approach exists two main defects:

- These exercises generally are experimental verification. So, the knowledge needed are that classroom teaching has just been taught. Students do not need to go to consider their possible solutions and find the most appropriate means. Students should not receive adequate training.
- Although small-scale independent procedures can improve on the capacity of the individual programming. However, students must have team spirit for the requirements of modern software engineering. In order to train team spirit for students as soon as possible, students must be allowed to accept as early as possible in software engineering training. There is a need of teaching reform for our traditional practice teaching.
Since 2003, Jiangxi Normal University has carried out the credit system in an all-round way, in order to guarantee the quality of education in professional courses under the credit system, school put forward a "comprehensive development" training mode. School proposed new construction goals on high-quality curriculum such as Data Structure. In recent years, the curriculum group continue study the development of higher education at home and abroad, some new educational ideas, teaching methods had been used in the Data Structure appropriate.

III. PROJECT-BASED LEARNING MODEL

Project-based Learning model also known as Project-based Teaching model, it focuses on a meaningful activity in which realistic, relevant learning occurs through participation in a challenging and motivating project. It also emphasizes situated learning and apprenticeship learning by dealing with real-world issues. Open-ended generative tasks are advocated in which there is not a prescribed approach or solution and the learners generate their own questions, plans and goals. Collaborative decision-making and problem-solving is necessary as teams work on projects in which they discuss, consult, collaborate and solve problems to create a product. Project-based learning also changes the role of the teacher to a cognitive coach who models, guides and encourages independence in goal-setting and decision-making.

A. The Basic elements of Project-based teaching model

The Project-based Learning model is composed of four elements, that are content, activity, situations and results.

- Content: the core concept and principles of disciplines

The main learning contents of PBL model are the problems which are variety of complex, non-predictive in nature and many cross-disciplinary knowledge. They had been shown in real life and real situations. This positioning reflects the content of today's education reform and development of value orientation. Because it allows students to concentrate on the core concept of subject knowledge and perspectives for in-depth study and research.

- Activity: a lively and effective learning strategies

The events of PBL model mainly refers to the action that students using a certain degree of technical tools and research methods to solve the problem. Usually the order of such activities are:

- Give the students a difficult problem.
- Students search for information, through a variety of ways, such as investigation, study and internet search.
- Processing and generating some information by the corresponding treatment in order to find answers to these questions.

- Situations: the special learning environment

PBL model not only focused on the promotion of cooperative learning among students, but also support the students in individual study.

The role of situational positioning of PBL model mainly manifested in:

- To promote the cooperation between the individuals and social groups.
- To encourage students to use and master technology tools.
- Results: a wealth of learning outcomes

PBL model emphasizes the promotion of students to master rich job skills and application these skills in lifelong learning.

The results include:

- The skills and strategies of application knowledge.
- Specific skills, planning, deployment, attitudes, and belief in the success of its work.

B. The operation flow of Project-Based Teaching model

PBL model is to emphasize student-centered, emphasize team learning, requires students to explore the authenticity of real life issue. Its operation flow as shown in Figure 1.

![Figure 1. The operation flow of PBL model](image)

Teachers guide students to select projects. Content of the plan include the detailed arrangements for study and activity plan. Events Research is the core of projects study. Production works in PBL model is the typical characteristics that distinguished from the general activity. In the production process, students complete the works using knowledge and skills which acquired in the learning process.

Teachers require students to study for their project description, and display their research results. Collaboration is the basic quality which computer workers should have. Project-based teaching model requires students to carry out Teamwork, and to work together to complete the production. It is obviously beneficial to improve students’ innovation ability and teamwork ability. During the process of the analysis, design and implementation of the projects, students not only understand the concepts, but also know how to apply the concepts to solve problems. Besides, students can get an experience on how to cooperate with other team members.

Since the significant advantages of the collaborative teaching model above, We have conducted teaching practices in Data Structure based on the Project-Based Learning Model in the undergraduates of 2006 and 2007. Using information technology support of the PBL model to assist teaching and learning process, and help students improve problem-solving capacity. Practice shows teaching practice under the guidance of Project-Based teaching model has played a prominent role to promote the curriculum building quality. In recent years, our students’ algorithm analysis and design
capability has been improved greatly, which enhance the quality of Data Structure curriculum greatly.

IV. TEACHING PRACTICE OF DATA STRUCTURE BASED ON PBL MODEL

It provided a good resources platform of carrying out the PBL model for the development of information technology. In the past three years, we have adopted the following reform initiatives in Data Structure teaching reform:

A. Using information technology to support the design of PBL activities

Constructivist theory consider knowledge are acquired at certain situations, with the help of others, using the necessary learning resources and making self-construction. So, design contexts and activities is the most important aspect in PBL.

To help students select topics, teachers in addition to guide students in curriculum subjects in daily teaching, also carry out specialized seminars aimed at arousing students. Some general knowledge can be taught about the topics which students are interested. For example, it greatly inspired the students interest in learning after we introduce "Principles of Internet Search Engine" combined with Data Structure. Teacher can appropriate to introduce some Data Structures and algorithms which internet search engine had used in the lecture, such as pattern matching, hash search algorithm.

Works-display is also a kind of effective incentives, good works can allow students to increase self-confidence and power. In order to facilitate students collaborative learning via the web. We develop the Data Structure-assisted learning platform based web mode which website is “www.jxnucie.com/course”. It build a virtual learning environment for students. This platform offers students many resources, like all the courseware, experiment instruction, reference material, teaching syllabus, learning requirements, inquiry manual and online help information and so on, and offers teachers material and test questions for the lesson plan. This platform supports the communication among teachers and students.

We design projects about Data Structure carefully. Students will be divided into several groups according to students and their topics of interest. Students selected the leader of each team. Each leader is equivalent to project manager, and is responsible for the entire software project organization and coordination.

Each member should put forward their own ideas and views of other team members to evaluate by listening to special reports, documentation, inspection, such as aspect, and then by the team leader determine the group's research projects.

B. The application of modern software engineering in PBL model

According to the idea of software engineering, We require students to carry out needs analysis, determine the time to plan, identify action programs, determine finally the form of works, and determine the division of tasks within the group. Teachers responsible for validating the teaching plan. At the initial stage of Project-Based Learning reform, the workload of the teachers are very large, each teacher should complete the teaching job, and also necessary to complete multiple projects additional guidance. A year later, students can learn from the resources left by first-grade students. The best students to our project can serve as an "Assistant Teacher". They could participate in the project validation. On the one hand, it economizes a lot of time for teacher, on the other hand, it greatly increase the ability of students to the actual job.

When the topic is determined, the project team carry out research projects, regular submission of project stage research or documentation. Teachers and teaching assistants involved in the above-mentioned job.

C. The content selection of the project design

Project should be designed to emphasize the integrated use of knowledge, training students in complex analysis and problem solving capabilities.

We followed the following principles in selecting the contents of the projects:

- To avoid knowledge of the subject involved a single point, as far as possible integrated subject.
- For training students in research ability, subject about algorithm analysis and algorithm comparison should be designed.
- Using heuristic teaching ideas, we can design some project which has a wide range of solution, which can give students to stay out of play space for imagination and creativity, and train students to analyze issues and problem-solving abilities.
- Interest is the best teacher, the key of PBL is to inspire students’ enthusiasm and interest, so students interested in the item or not is very important. Only if the students learn voluntarily and search for the solving methods of problems, can they know the key of the book and the practical value of knowledge.

Students usually play games, such as "Lianliankan", "Chinese Chess", "Cosmic Trip", etc. Therefore, students have a great interest in these game projects. They had developed many projects Games.

D. Reforming score evaluation mechanisms, inspiring the initiative of students studying

In order to allow students to have the passion to participate in the project based Learning model. We reformed the traditional teaching grade assessment mechanism. The student’s grade of the paper exam is only 50%, other 50% grade is practice grade. Our college have robot laboratory, laboratory members need strong practical ability, majority of the members are selected from the students who had taken part in project training at one time or another in Data Structure course.

A lot of excellent students become member of ACM contest group successfully. Students who are outstanding in curriculum projects have more opportunities to participate in institute research projects echelon. These incentives have greatly mobilized the initiative of students.
V. THE EFFECT OF TEACHING REFORM

By summing up the teaching experience of Data Structure, our team is going to change the traditional teaching mode. Teaching in PBL model is a process transforming theory into practice to solve realistic problems. Teachers don’t beat knowledge into the students’ heads any more, but induct and lead the students to think, discover, research and practice by themselves.

Through nearly three years teaching reforms, our students have made notable improvement in the design and analysis of software project and have achieved the teaching object of the Data Structure course. Investigation shows that our teaching approach is popular with students. Our students’ results are rising steadily in the ACM competition, for example, we have won a gold medal and a silver medal in the Guangmadao Cup National Robot Programming Competition in August, 2008. “The Teaching Practice and Training of the Data Structure” won the second prize of the Excellent Teaching Results of High Schools in Jiangxi Province in 2006, and “The Reform and Innovation for Programming Teaching” won the second prize of the Excellent Teaching Results in Jiangxi Normal University in 2008. That had highly appreciated the important role of the PBL model played in improving the teaching quality of Data Structure course.

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REFERENCES