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Study of Teaching Model based on Cooperative Learning¹

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Abstract: Cooperative learning is a popular teaching method now in the world. This paper first discusses the teaching model based on cooperative learning, then analyzes the advantages of cooperative learning and at last proposes the steps of carrying out cooperative learning. It is necessary to introduce the teaching model based on cooperative learning into the teaching for training software talents of China.

Key words: Cooperative Learning; Training Model; Teaching Reform

Zuckerman, an American historian of science, surveyed the research methods of Nobel laureates and found that in the first 25 years of the establishment of Nobel Prize the number of cooperative research awards accounted for 41% and in the second 25 years this proportion increased to 65% while in the third 25 years the proportion reached up to 75%. Famous physicist Dr. Yang Zhenning has pointed out that if a person in the past might succeed in the work of Nobel Prize independently, then when entering the eighties, particularly since entering the information society, any great invention-creation is impossible without people's collective participation and mutual cooperation. We can even say that in the highly developed science and technology of today, cooperation is what a person need to survive. But under the traditional teaching model, our students are generally lack of cooperation awareness, so this paper from the perspective of cooperative learning discusses the ideas of introducing cooperative learning into the software engineering teaching and analyzes the values of carrying out the teaching model based on cooperative learning to train software talents.

I. WHAT IS THE TEACHING MODEL BASED ON COOPERATIVE LEARNING

Cooperation is one of the main guarantees of human existence and cooperative learning also has a long history. In the 1st century AD Lynn thought that students could benefit in mutual teaching; Ancient Rome

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philosopher Seneca said that when you were teaching, you learned twice. In 1806, Joseph Lancaster opened a school in New York, and disseminated the idea of cooperative study group from Britain to United States which was energetically encouraged and popularized by American educators Ronald Parker, John Dewey and so on. In 1940s, Morton Deutsch put forward the theory of cooperation and competition, which had become the foundation of research and discussion on cooperative study. Cooperative learning is in the manner of favoring both own success and fellow success, and the score of the entire group is used as the basis for rewards and approval. Brothers Johnson(1989) think the effective application of any kind of cooperative learning method must have five basic elements:

Positive interdependence

Students understand that the group members must cooperate to accomplish the task. If other members are unsuccessful, he is unable to succeed, and vice versa. This means that everyone must be responsible for other partners' learning in own group.

Face-to-face promotive interaction

Students promote each learning and discourse their understood knowledge to other members in the group through mutual communication, mutual help and mutual stimulation, which thereby establishes and maintains a relation of mutual trust among cooperative members.

Individual accountability

Individual accountability refers that every member must undertake certain task and the success of the group are decided by individual learning of all members. To avoid the phenomenon of "free-rider" and "responsibility diffusion", it is possible to establish individual accountability by adopting the methods of random questions, individual tests, role interdependence and randomly choosing the assignment of a team member to represent the group score.

Social skill

That cooperative learning group can not effectively operate is often due to group members' lack of three kinds of social skills: The first kind is the skill of forming a team. The second is the basic skill of group activities, The third is the skill of exchanging ideas. Because the knowledge is not inherent so teachers should teach students these important social skills according to concrete conditions.

Group processing

Group processing is also called group self-assessment including: (1) Consider which members' behaviors are helpful to the group; 2) Decide which behaviors should continue and which should change. Group processing can provide useful feedback to group cooperation and its purpose is to maintain the effectiveness of group activities.

II THE ADVANTAGES OF THE TEACHING MODEL BASED ON COOPERATIVE LEARNING

Famous educationist Dewey once said a best teaching was what could firmly keep the necessity of mutual relationship between school textbooks and practical experience in mind and let students develop an attitude of becoming used to find the contact point and the mutual relationship of these two aspects. Simply speaking from this perspective the teaching model based on cooperative learning is a very effective teaching method to discover the proper combining point between theory and practice. Brothers

Johnson(1990) in the study of cooperative learning have pointed out most people only know to accept higher education and learn professional skills to create opportunities for own career, but they just ignore that the social skills belong to the most important skills for expanding job opportunities, improving work efficiency and achieving career success. In 1995, United States surveyed the world's 300 large enterprises for the qualities of talents required by the future society. As a result cooperation ability was the first. In fact in the personnel recruitment of IBM, Microsoft, HP, Lenovo, Neusoft and so on enterprises, cooperation spirit is also a very important factor. According to Maslow's demand theory, from the perspective of college students' psychological demand, the teaching model based on cooperative learning has the main advantages as following:

The teaching model based on cooperative learning forms student-centered learning strategies

Students become "actors" in teaching activities of cooperative learning who are activists of learning; Teachers become "directors" or mental "birth attendants"; Students become dependents, that is, my success depends on you. It is in accordance with four principles of constructivism theory: initiative, adaptation, development and social principle. Learners are active to re-construct knowledge and learning should be the thing that learners need to do while not be the thing that education institutions need to do for learners.

The teaching model based on cooperative learning is a goal-directed activity

The teaching model based on cooperative learning has both "learning" and "cooperation", so the target system of cooperative learning also includes two parts: academic objectives and cooperative objectives. In the traditional teaching model, teachers usually pay attention to academic objectives, and ignore students' cooperation skill training. In the teaching model of cooperative learning the training of students' cooperation skill is an important part of teaching. Brothers Johnson pointed that school scores could not predict career success but social skills can do it.

The teaching model based on cooperative learning guides learners to conduct researches around problems

Science begins from problem and it is driven by problem. Then what is the problem? Problem is the gap existing between current state and ideal, expected state. Solving the problem is to eliminate the gap(Wang zhongtuo,1999). Proper problems can stimulate the curiosity of cooperative learning group and is sufficient to cause cooperative group learning by doing thereby it can establish the thought of putting knowledge into practice.

The teaching model based on cooperative learning has the interactive characteristic

The interactive view of the teaching model based on cooperative learning is different from that of traditional teaching model no matter in the form and content. It is no longer confined to the interaction between teacher and student, but extended to the interactions between student and student, teacher and teacher. Brothers Johnson thought the interactive relationships among students were more powerful than the influences of any other factor on students' learning achievement, socialization and development. In fact, the teacher also no longer serves as the only information source. In the interactive learning process it is helpful to motivate students to learn communication and in the software development process more than 40% of time is used for communication. The survey of global 500 CIOs found that 70 percent of people thought that the key to success is the effective communication(Huang feixue, 2002).

The teaching model based on cooperative learning can help for improving the student's abilities of analyzing and solving practical problems.

Because students are designed in the specific conditions, they experience the judgment to complex problems under the condition with imperfect information and experience the decision making process by comprehensively using kinds of knowledge. As what Einstein said education should cultivate the student to a people with harmonious development while not a dog with well training. Education should always put the developments of independent thinking and independent judgment abilities first instead of acquiring professional knowledge. Comparisons between cooperative learning and traditional teaching model are shown in Table 1.

Table 1: Comparisons between cooperative learning and traditional teaching model

	Traditional teaching model	Teaching model based on cooperative learning
Guiding ideology	Expositive teaching	Heuristic teaching
Knowledge	Moved from teachers to students	Established together by teachers and students
Function	To teach students knowledge	To teach students learning and developing
Student	The passive knowledge storage container waiting for teachers' infusion	The active builder, discoverer and transmitter of knowledge.
Essence of learning	Study is the personal thing; It need external motive	Study is the social thing; It need potent environment to stimulate internal motive.
Purpose of teachers	To classify and rank students	To cultivate the abilities and qualities of students
Relation with society	Ignore or gab on social skills	Directly teach social skills
Background	Competitive or individualistic	Cooperative learning; group of teaching and learning

III HOW TO CARRY OUT TEACHING OF COOPERATIVE LEARNING

American Management Gurus Drucker said that today our universities are based mainly on teaching, and tomorrow the universities will develop into learning-based universities. Therefore, the teaching model of cooperative learning emphasized on cultivating autonomous learning ability and team spirit.

Teachers teach while the class is divided into cooperative learning groups with 5 to 8 people. There are heterogeneity within group and homogeneity among groups

Singles are prescribed that they can't get scores. Students in their own groups learn, discuss and master knowledge together. The essence of cooperative learning groups lies in active interdependence so that students can realize that "we are together and work hand in hand" in the mutual help.

Assign tasks and duties, and provide that each member has personal responsibility.

Rational division is the premise of successful cooperation. Each has the responsibility to complete own task and at the same time to help other members in learning.

Monitor process and students' behaviors, and provide learning assistance.

Team is the best unit of study. Teachers should always observe the process of cooperative learning groups to see what they understand, what they do not understand and find out the problems in the process of cooperation so they can intervene in the groups at the appropriate time and offer help.

Evaluate results. Members within groups cooperate, and members among groups compete.

- (1) Do presentation in the class. Finally after each group completes task report, present them to the class so that all the students can form deep understanding of this task and change "I am asked to say" to "I want to say". Students play dual roles of teachers and students.
- (2) Evaluate personal responsibility. Members are randomly selected to take the test.
- (3) Evaluate cooperative effect of group. Test the benefit level from mutual teaching.
- (4) Submit comprehensive report of course. Teachers and students make comprehensive evaluations on the quality and quantity of cooperative learning according to task reports.

American educators Wo Maite said in recent ten years cooperative learning is the most important and successful education reform.

IV PRACTICE EFFECT OF TEACHING MODEL BASED ON COOPERATIVE LEARNING

In software engineering, software project management, senior software engineering and so on courses, the teaching model based on cooperative learning has implemented for about two years. The students' feedback excerpts are as follows:

1. Through cooperative learning the past state of "making notes in class, checking notes after class, reciting notes before examination, and forgetting notes after examination" has changed. Now "I am asked to learn" has changed into "I want to learn" and "I learn" has changed into "I learn how to learn".
2. Compared with the wisdom of the team, the individual is insignificant and I understand the purpose of study is application; the aim of inheritance is innovation.
3. The traditional teaching model is: information is transmitted from teachers' notes to students' notes without mutual ideological communication. Now through the teaching model based on cooperative learning, knowledge is deeply rooted in my brain and my former brain which is full of something is changed into a brain with large ideas.
4. New teaching model makes me leave the ivory tower and helps me get ready to enter the real world.
5. New teaching model not only make me learn knowledge, but also make me learn how to behave, how to think, how to live, and make my character developed.
6. Many things learned in the school in the past have been forgotten as time went on, but some knowledge learned by cooperative learning touches my thought and leaves trace in our hearts.

V. IMPLICATIONS AND CONCLUSIONS

The report of UNESCO "Learning: The Treasure Within" has pointed out: learning to know, learning to do, learning to cooperate, and learning to be are four mainstays of future educational society. Cooperative learning has obvious advantages in promoting the development of above four aspects of students. In cooperative learning, because cooperative learning groups have active interdependence, it will cultivate team spirit of students penetrating into the teaching of the class, and team spirit will play an important role in the conversion process of China's software industry from handicraft workshop to industrial production. Therefore, the introduction of teaching model based on cooperative learning into computer courses will lay

a good foundation of the development of EQ and IQ for students entering the society, and embarking on careers.

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