Research and Practice of Team Learning Model in Computer Practice Teaching for Female College Students

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Abstract: This paper discusses the specific scheme of team learning in computer practice teaching. That is, using dividing stage groups to form team, and improving the team learning gradually through two stage groups. In order to carry out team learning effectively, the team need to accept necessary vertical training of the style of "task-driven" divided into three stages, to ensure that students can complete the corresponding learning tasks. Practice shows that the team learning model can effectively improve students' professional quality, team consciousness, enterprising and innovative consciousness.

1. Introduction

Peter M. Senge, professor of Sloan School of Management at MIT, put forward the concept of "learning organization" in his brilliant masterpiece *The Fifth Discipline: The Art and Practice of the Learning Organization* in 1990. This is the earliest concept of "team learning" [1].Senge believes that team learning is to enable everyone in the team to show their own mental model, to communicate with each other, to inspire each other, so that the team can learn and progress quickly.

Nearly 30 years have passed since the concept of team learning was put forward. In the current situation of individualized teaching and education at all levels, such as universities and middle schools, the comprehensive use of knowledge, especially in the innovative activities of knowledge, the breadth and depth of personal knowledge is limited[2]. So we require more individual members to form a joint force, that is, to build a learning team, increasing the comprehensive analysis and refining ability of knowledge, enhancing the sense of innovation and teamwork[3], in order to meet the social requirements for computer professionals.

In Shandong Women's University, where I work and teach, female college students are the majority. The outstanding problems of female college students in professional learning are that they often show relatively weak consciousness of independent innovation, lack of enterprising spirit and competitiveness. Therefore, the team learning mode is still needed and suitable for the current situation, in order to improve the weaknesses of female college students in learning, so that they can adapt to the requirements of professional and social .

In the process of practice teaching word about the major of computer science and technology, digital media technology and other specialties in the School of Data and Computer Science of Shandong Women's University, combining with the actual situation of our school and also making use of the situation , our project team has made some research and construction on the team learning mode suitable for our college, and put it into a lot of practice. In order to improve the universality of team learning and run for a long time, this paper mainly discusses other computer practice teaching links besides professional courses.

2. Implementation of Team Learning Model

2.1 The building of the team

Since the autumn of 2015, the predecessor of the School of Data and Computer Science, the School of Information Technology (hereinafter referred to as "our college"), has implemented the

"academic tutorial system" for undergraduates. That is, from the students entering school to graduating, a special professional teacher acts as their academic tutor and gives them continuous guidance in the fields of professional learning, expanding activities of professional field competitions and so on, graduation design and graduation internship.This measure is very beneficial to students' professional learning. In 2017, it was extended to nine secondary colleges of the whole school, and a series of rules and regulations concerning the duties, assignment, assessment and reward of academic tutors were issued. As a result, the number of students led by our academic tutors has been guaranteed, and it has become the duty of every full-time teacher to serve as an academic tutor. According to the students' situation and their personal wishes, some of the students led by several teachers of the our project team entered the learning team and began the practice of team learning, which formed a basic guarantee for the formation of the team.

In order to manage and carry out team learning effectively, according to students' grade and professional skill level, and combining with students' personal wishes, the students participating in team learning are divided into three stage groups: A, B and C. The vast majority of the students in each stage group are girls, and each stage group has different learning tasks. Stage Group A is generally for the first and second grade students, who have limited professional knowledge and less time to study after class. They are mainly for the students who are willing to participate in the ACM International College Programming Competition (hereinafter referred to as ACM-ICPC). Stage Group B is for the second and third grade students, as well as the students who have time to participate in the fourth grade. They have a relatively complete professional knowledge system, and have a willingness to participate in various disciplines such as teacher research, the discipline competition of software design and Internet +, and applying for students' academic topics project. Stage Group C is for the graduate grade students.If there is a large number of people in a stage group, it will be divided into several small teams with a scale of 3 to 5 people, according to the task situation, and the specific team learning will be carried out in the form of small teams. With the passage of time, the freshmen will enter the team and leave the school after graduation. The members of each stage group will take the turns form of Stage Group A to Stage Group B and Stage Group B to Stage Group C.

2.2 The arrangement of learning tasks

Table 1 The Implementation of Team Learning Mode for Different Stage Groups

	Stage Group A	Stage Group B
learning vision	1.To enhance professional basic literacy and further strengthen the practical ability of coding; 2.To form a good awareness of teamwork; 3. On the basis of proficient ability of programming and algorithm designing, to strengthen the ability of computing thinking and solving practical problems.	1.To promote and expand the comprehensive application ability of professional knowledge; 2.To promote and expand the ability of solving practical problems and innovative awareness; 3. To strengthen and overcome difficulties with a strong awareness of teamwork.
task arrangement	1.Weekly normalization task of small team: At least 5 questions are completed on OJ of Shandong University of Technology and other universities; and all the completed questions are sent to the team group, so that the members of small team can supervise each other; 2. During the pre-competition training period of ACM-ICPC, the intensity of the task is increased, and the weekly competition and post-competition supplementary questions are organized.	1.Small teams involved in teachers' scientific research: responsible for data collection, product performance testing and other specific tasks according to teachers' time schedule; 2. Small teams participating in subject competitions or applying for students' academic topics project: According to the announcement of the competition or declaration, the tasks should be divided into stages and completed on time.
process supervision and inspection	Mutual supervision of small team members & regular inspection by teacher	Small teams report to teacher actively

Because the establishment of team model is still in the exploratory stage, the specific learning arrangements are only made for Stage Group A and Stage Group B according to the tasks of different stages. The main tasks of Stage Group C students are graduation internship and graduation thesis and design, so as to hope that they can further play and display the learning contents of the previous two groups, generally no longer arrange additional learning tasks. According to the internship or graduation design situation, students spontaneously decompose and solve specific tasks in the form of teams.

This paper only describes the specific learning vision, task arrangement, process supervision and inspection methods of Stage Group A and Stage Group B as shown in Table 1. There is a certain cohesion and promotion relationship between Stage Group A and Stage Group B. Compared with Stage Group A, the learning tasks in Stage Group B are generally more comprehensive and task-intensive, but the gain of teachers' assistance will be reduced. After a year or so of team learning in Stage Group A, the students of Stage Group B generally adapts quickly to new learning tasks.

2.3 The task decomposition within a small team

Task decomposition within a small team does not have a fixed way, which can be treated specially according to the task of the team. But the general decomposition process has the following steps. (1) Small team discussion. After receiving the team tasks, each small team first conducts brainstorming discussions, through which the difficulty, feasibility, technical solutions, members' general division of labor, time process and so on are gradually clarified, and preliminary discussion result documents are formed; (2) Discussion optimization involving teachers. The preliminary discussion result document is sent to the teacher for review, and if be approved, it can be implemented immediately; if the teacher has objection, the small team can be organized to discuss with the teacher again to revise and optimize the results of the previous discussion. In this discussion, the teacher can also integrate into the small team with the highlights of other small team's discussion result; (3) Implementation according to the optimized discussion results.

2.4 The process supervising and inspecting of team learning

The formation of learning teams is voluntary, so most of the members can take action consciously and actively, especially when they see that the senior grade students in the team have made some achievements. However, there are still very few members who show inertia or instability. Therefore, it is necessary to supervise and inspect the process of all members. The supervision and inspection are carried out in two ways mainly.

(1) Mutual supervision among members. Through the division of labor and the confirmation of time process, it is clear what work each person needs to accomplish at a certain time point. If there is a reluctant member in a small team, this member may be abandoned by the team before accepting the task next time. (2) Regular or irregular supervision and inspection by teachers. Teachers supervise a small team as a whole by checking periodic results and team's active reporting to the teachers according to the task situation.

2.5 The effectiveness of team learning

Since the establishment of the learning team in spring of 2016, after three years of exploration and practice, the members who have experienced team learning have gained good training and growth, which is embodied in the following aspects.

(1) Promotion of professionalism. Team members generally have good professional awareness and thinking ability. They are enthusiastic, active and clear-cut in their study of various professional courses. Senior grade students in the team are highly valued in employment units and postgraduate colleges after graduation.

(2) Promoting the awareness of cooperation. Team members have deeply realized the strength from other team members. They are familiar with each other and cooperate with each other. They form the habit and consciousness of communicating and discussing when they meet specific problems. Through cooperation, they can reduce the difficulty of problems. They can also support

each other in their daily study and life. The promotion of cooperation consciousness has laid a good foundation for members to adapt quickly to the behavior mode of enterprises and institutions in the future and postgraduate colleges.

(3) Enthusiasm and self-esteem improved significantly. In team discussions, each member can express their own opinions and listen to other people's different opinions carefully. When they encounter difficulties in learning or competition, they can think and persevere. Members are generally open-minded, willing to communicate, treat people kindly.

(4) Improvement of the ability to solve practical problems and innovation consciousness. Some members have successfully participated in the application for patent or research projects of teachers, and some have participated in many disciplines competitions and other activities. While the understanding of professional knowledge is more profound, it is more important to enhance their ability to use professional knowledge to deal with specific problems.

3. Vertical Training of Team Learning Model

In the process of developing team learning, the necessary vertical training of each small team in a certain stage group has roughly gone through three stages as shown in Figure 1.

In the basic support learning stage, different ways can be adopted according to the different ultimate target of the student team. For example, two small teams in Stage Group A will eventually participate in the ACM-ICPC competition, so each member will be required to learn the basic knowledge of the relevant courses such as *Basic Programming* and *Data Structure*. A small team in Stage Group B will eventually participate in teachers' research on the direction of data mining, so it is not enough to rely solely on the study of professional courses. It is necessary to refer to the reference of the research direction. It is also necessary for teachers to give thematic lectures in this direction to the small team members in order to help them grasp the related concepts and algorithms quickly.

Team learning training stage refers to the teacher-assisted team learning, sometimes with the final stage of independent team learning without obvious time division and integration. Team members are undergraduates, so their learning ability and knowledge system are limited. Team learning is basically carried out under the impetus of teachers' stage task arrangement and regular supervision and inspection.
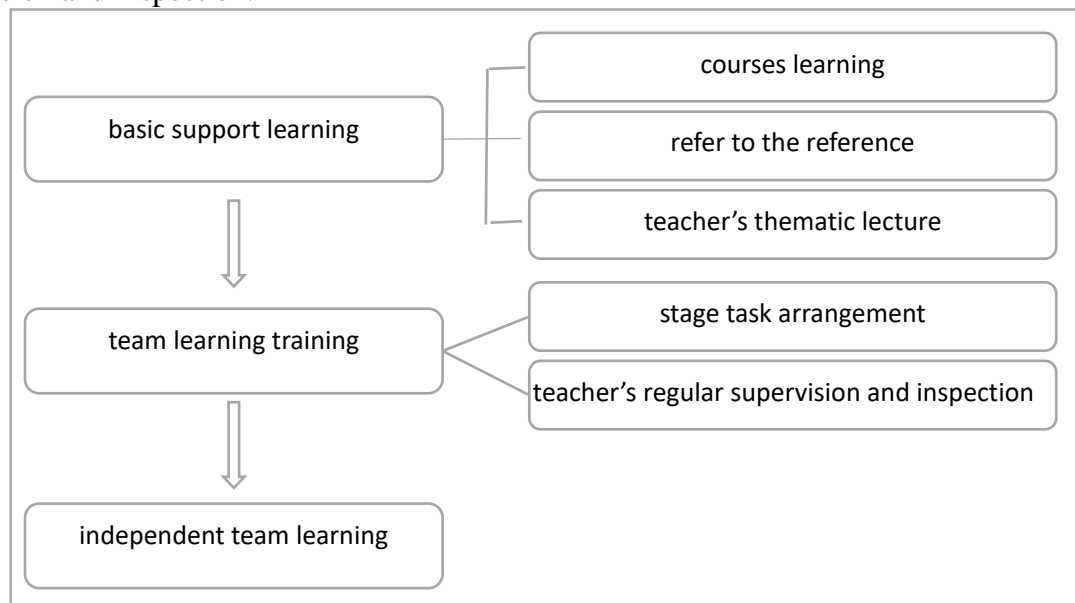

Figure 1 Vertical Training of Team Learning Model

In the whole process of team learning training, "task-driven" approach is adopted. That is to say, the final task state is marked at the beginning of each stage. This final task state is not only the direction of students' action, but also the criterion to test whether team learning achieves periodic

success.

4. Conclusions

The development of team learning mode has changed the original single learning mode between teachers and students in university, which only listens to class and does homework after class. Team learning can last more than three years of undergraduate study, make full use of students' after class time, organize more in-depth, more comprehensive, more creative and autonomous learning effectively. This learning mode makes the participating students improve their learning ability, learning methods, team consciousness and innovation ability, and improves the training system, so that the participating students can benefit from many aspects.

Acknowledgements

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