

The Teaching Reform of Computer Network Course Based on TBL Teaching Mode

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Abstract

This paper aims to discuss the teaching reform of Computer Network under TBL (Team-based learning) teaching mode. By analyzing the problems existing in the traditional teaching mode, this paper puts forward the TBL teaching mode which takes teamwork and problem solving as the core, and deeply studies how to apply TBL mode in the course of Computer Network to improve students' learning effect and interest.

Keywords

PBL; Teaching reform; Computer network.

1. Introduction

1.1. Research background and significance

The traditional teaching method can not meet the current learning needs of students, so this paper puts forward the reform of educational projects under the TBL teaching mode. Change the teacher-oriented, students passive learning status quo, using TBL mode to achieve the student team as the center, problem-oriented, project-driven concept. In the part of theory and skill practice, through student team communication, students can increase their interest in learning, improve their ability to solve problems and the application of network technology, and lay a good foundation for the application and maintenance of network in work.

The application of TBL teaching method to the course of Computer Network can enrich the content of teaching reform, improve the theoretical system of teaching method, and provide certain reference for the relevant theoretical research of teaching, so it has certain academic value.

In the era of information development, the requirement for talents is not only to have a solid theoretical foundation, but also to emphasize the comprehensive ability to adapt to the society and solve the contradictions and conflicts in life. Therefore, the undergraduate applied talent education is centered on social needs and employment-oriented, emphasizing on the basis of fully respecting the main position of students, and strengthening the cultivation of students' practical operation ability and team cooperation ability. Therefore, TBL education reform is of great significance.

1.2. An overview of TBL teaching model

TBL (Team-Based Learning) is a new adult teaching model which is gradually emerging and innovating on the basis of PBL. It helps to promote the teamwork spirit of learners, pays attention to people's creativity, flexibility and practical characteristics, and combines teachers' teaching and students' discussion. Before 2002, foreign scholars called this teaching mode "Team-learning". In 2002, Michaelsen and other scholars named this model "Team-Based Learning", and it has been gradually promoted and applied in the teaching of medical courses in European and American developed countries, and its role in improving students' learning efficiency and comprehensive quality has been initially confirmed. The implementation steps are described as follows: 1) Preparation before class: the teacher first delimits the learning

scope, and then the students form a team to preview before class; 2) Classroom discussion: first, the group representative spoke, and the same problem was discussed among the groups. Finally, the teacher elaborated and drew conclusions. 3) Teaching evaluation: theoretical assessment, teachers evaluate students, and students fill in feedback questionnaires.

Domestic research on TBL started relatively late. According to the data given by HowNet, China began to contact this field in 2001, but the amount of related literature began to rise sharply until 2008, mainly to explore how to integrate TBL into China's educational practice. The research directions of domestic journal literature on "TBL" can be roughly divided into the following two: the first is the comparative analysis and integration research between TBL and other teaching methods or teaching models; The second is the application and effect research of TBL in various subject education fields. From the results of the retrieved papers, in the existing literature, the largest proportion of the field is medical education and medical edge disciplines, followed by higher education related courses.

2. The problems of traditional teaching mode

The course of computer network is one of the core courses of software majors, computer network technology majors and big data majors. The course is highly theoretical, abstract and comprehensive. It is a difficult course for teachers and students to learn. In the teaching process, there are still some problems in the current teaching methods, and there is still a gap in order to achieve the course objectives. Through the analysis of the problems, there are mainly the following points:

(1)Traditional teaching mode. The knowledge of computer network is trivial, and the course basically uses the teaching method based on theory, which greatly weakens the students 'practical ability. When they encounter practical problems, they have no way to start, and can not meet the requirements of undergraduate colleges and universities to cultivate students 'practical ability.

(2)The students are not very interested. In the teaching process, teachers are always dominant, and students passively absorb knowledge, resulting in weak interest in learning. The ability assessment of students still uses the results of the final examination to evaluate the grade, and students are not very enthusiastic.

(3)Theoretical teaching is disconnected from practical application. In the teaching process of computer network, theory and practice are generally separated seriously. Sometimes the design of experimental courses is blind and has no goal. Students do not know how to apply the courses in practical work after finishing the experiments.

3. The principle and characteristics of TBL teaching mode

TBL teaching mode (Team-Based Learning) is a teaching method based on teamwork learning. Its principle and characteristics are as follows:

(1)Team-based Learning model: The TBL teaching model uses small teams of students as the base unit to encourage interaction and cooperation among students. Members of each team share responsibility, learn and solve problems together.

(2)Problem-driven Learning: The TBL teaching model stimulates students' interest and motivation to learn by introducing real-life problems and challenges. Students need to solve problems through cooperation in teams and follow the assigned learning tasks and learning objectives.

(3)Role play and interactivity: The TBL teaching model encourages students to play different roles and share personal knowledge and experiences in teams, thus facilitating team

cooperation and discussion. Through the discussion and analysis of problems, students can think and solve problems from different perspectives to increase interactivity and participation.

(4)Active learning and autonomous learning: TBL teaching mode cultivates students' autonomous learning ability through teamwork and problem solving. Students actively acquire knowledge more from practice and interaction, and improve problem solving skills and critical thinking.

(5)Feedback and evaluation: The TBL teaching model focuses on timely feedback and evaluation. Students in teams receive real-time feedback and guidance by discussing and solving problems with each other. At the same time, teachers can also evaluate and guide the learning process and outcomes of students by observing teamwork and individual performance. The TBL teaching model provides a learning environment with positive interaction and high engagement through teamwork, problem driven, and role play. It emphasizes the initiative and autonomy of students, and develops students' cooperative ability, critical thinking and problem solving skills. At the same time, TBL teaching mode can also improve students' interest in learning and academic achievement.

4. The Course Design of Computer Network Based on TBL Teaching Mode

4.1. Course objectives and content are determined

Determine the learning objectives of the Computer Network course, such as understanding the basic concepts of computer networks, mastering the principles of network communication and network protocols, etc.

Determine the content arrangement of the course, including network architecture, network protocol, network security and other aspects of knowledge.

4.2. Student team formation and role assignment

The students are grouped into small teams, and each team has a moderate number of people to ensure that the ability level of the team members is balanced. Each team can have different roles, such as team manager, documentation writer, presenter, and so on.

4.3. Designing Problem-driven Learning Tasks

A series of team tasks were designed to motivate students to engage in cooperative learning and problem solving based on practical problems related to the network.

Each task can include steps such as research, analysis, discussion, and reporting to encourage students to apply what they have learned to solve practical problems.

4.4. The process by which the team discusses and solves problems

Determine the specific process of team discussion and problem solving, including problem raising, team discussion, scheme design and result report. Each team member should participate in the discussion, jointly develop the solution, and provide the corresponding justification and explanation.

4.5. Teacher roles and guidance strategies

The teacher plays the role of the instructor in the TBL teaching model to encourage the teamwork and problem-solving skills of the students.

Provide necessary learning resources and guidance, monitor student learning progress, and provide timely feedback and evaluation.

4.6. Assessment methods and learning outcomes

Diverse assessment methods, such as team reports, individual reflection and group excellence, were designed to comprehensively evaluate student learning outcomes. Students are

encouraged to assess each other and evaluate the contributions of team members, promoting collaboration and cooperation within and outside the team.

Through the design of Computer Network course based on TBL teaching mode, students can deeply understand network technology in team cooperation, and improve their skills and ability by solving practical problems. In addition, students are able to develop soft skills such as communication, collaboration and leadership, laying a solid foundation for future career development.

5. Teaching practice and effect evaluation

5.1. The implementation process of TBL teaching model

5.1.1. Course design and goal setting:

Determine the learning objectives and content of the course, and clarify the knowledge and skills that students should have. The characteristics of the subject and the needs of students are analyzed to determine the course content and organizational structure suitable for TBL teaching. Design a series of team tasks related to computer networks to encourage students to collaborate in teams to solve practical problems. Tasks can include network design, protocol analysis, network security walkthroughs, etc.

5.1.2. Student team formation and role assignment:

(1) Group discussion and collaboration: Divide students into small teams, usually consisting of 3-5 students each. A team discussion session was set up to encourage students to share ideas, exchange views in teams, and jointly develop solutions such as network design, protocol analysis, and network security drills. The teacher can provide question guidance to guide the discussion direction of the students.

(2) Team role assignment: Assign different roles to students, such as team manager, recorder, reporter and so on, to ensure that each student has a clear task and responsibility in the team. At the same time, students are encouraged to rotate roles to cultivate different abilities.

5.1.3. Pre-learning:

Before the course, students are provided with necessary pre-study materials and guidance, so that students can understand the basic concepts and knowledge in advance. Students can be asked to discuss and share pre-learned understandings in teams to stimulate learning interest and guide learning focus.

5.1.4. Group Stage:

(1) Team building and rule setting: Help the team to establish a good atmosphere of cooperation, and set some team rules, such as mutual respect, active participation, etc.

(2) Team task allocation: According to the course design, specific learning tasks are assigned to each team in groups. Ensure that each member has a clear mandate and responsibility.

(3) Team discussion and Problem Solving: Student teams discuss, solve problems, and present their thought processes and solutions in class. The teacher can play the role of a mentor, leading the group discussion and providing necessary support and guidance.

5.2. Methods for evaluating student learning outcomes

(1) Team presentation and evaluation phase: Each team needs to present their solution, discuss results, or report results to the class. Assessment elements can include problem analysis, rationality and innovativeness of solutions, argumentation process, etc. Teachers and peers can evaluate and give feedback, providing guidance and suggestions to facilitate further student thinking and improvement.

(2) Individual reflection and Peer Assessment: Students are asked to perform a personal reflection after the team task to assess their own contribution and performance in the team, as well as the contributions of other members of the team. At the same time, peer assessment is encouraged to allow students to evaluate and give advice to each other.

(3) Team performance evaluation: Observe and evaluate team performance in team activities, including organization and coordination ability, team communication and collaboration ability, etc. Students are encouraged to evaluate the performance of the whole team and provide sound feedback and suggestions.

(4) Student Achievement Presentation: Regularly organize students to present their achievements in team projects, such as organizing learning sharing meetings, demonstrating project solutions, etc. The mastery of the students during the learning process was assessed by observing student presentations and listening to feedback from fellow students.

By comprehensively considering the methods of team report assessment, individual reflection and peer assessment, group outstanding performance assessment, and student achievement display, we can comprehensively evaluate students' learning outcomes and ability development based on TBL teaching mode in computer Network course. The assessment process should focus on giving students timely feedback, guidance and encouragement to promote their continued progress and motivation to learn. The implementation process emphasizes teamwork and problem solving skills development of students, but also requires teachers to play a guiding and supporting role to create a positive, interactive and cooperative learning environment. This teaching mode continuously improves students' learning effect and ability development through practice and reflection.

6. Conclusion and prospect

TBL based teaching mode is of great significance to the educational reform mode of Computer Network, so the following conclusions are made:

Improve students' learning enthusiasm: TBL teaching mode can stimulate students' active learning interest and enthusiasm through teamwork and practical tasks, and improve their learning motivation.

Enhance students' problem solving ability: TBL teaching mode focuses on cultivating students' problem analysis and solving ability. Through activities such as teamwork, discussion and practical tasks, students are able to fully develop their thinking skills and innovative abilities.

Improve students' teamwork skills: TBL teaching mode emphasizes teamwork, encourages students to collaborate, communicate and cooperate to solve problems, and cultivates students' teamwork awareness and collaboration skills to lay the foundation for their future work and life.

In the later stage, with the reform of TBL teaching mode in Computer Network, combined with the current teaching mode, the following prospects can be summarized:

Digitization of educational resources: With the development of science and technology, the "Computer network" education based on TBL teaching mode can strengthen the digitization of educational resources, provide online learning platform, experimental environment and teaching tools to meet the personalized learning needs of students.

Interdisciplinary teaching integration: The teaching of Computer Networks can be integrated with other disciplines to provide students with a more comprehensive learning experience. For example, computer networking is combined with related disciplines such as network security and cloud computing to cultivate students' comprehensive abilities.

Emphasis on practical and innovative education: The future "Computer network" education can pay more attention to practice and innovation, encourage students to participate in projects,

research and innovative practice, and cultivate students' innovative thinking and problem-solving ability.

Teacher role transformation: Based on TBL teaching model, the role of teachers will be more transformed into mentors and facilitators, guiding students' learning and teamwork, providing timely feedback and guidance, and stimulating students' learning interest and potential.

To sum up, the educational reform of "Computer Network" based on TBL teaching mode can stimulate students' learning interest and improve students' problem-solving and teamwork ability. In the future, the digitization of educational resources, interdisciplinary integration, the strengthening of practical and innovative education and the transformation of teachers' roles will bring more opportunities and challenges to the education of Computer Network.

Acknowledgements

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References

- [1] Li Ying. Teaching Reform of Computer Network Experiment Course under PBL Teaching Mode [J]. Computer Products and Circulation,2020(04):267.
- [2] Zhuang Yongfeng. Discussion on Teaching Reform of Computer Network Technology Course in Secondary Vocational Schools [J]. Learning Weekly,2023(30):40-42.DOI:10.16657/j.cnki.issn1673-9132.2023.30.013.
- [3] Liu L A Z Y. Computer Network Course Teaching Reform Based on Flipped Classroom Model[J]. Frontiers in Educational Research,2019,2(1).
- [4] Liu L,Zou Y,Shi Y, et al. Teaching Reform of Computer Network Course for Engineering Applications[J]. Advances in Educational Technology and Psychology,2018,2(1).
- [5] Hong Z. Research on the Teaching Reform of Linear Algebra in the Mode of Cultivating Application-oriented Talents[J]. Journal of Educational Research and Policies,2023,5(7).
- [6] ZHUANG L. On the Reform of Computer Education Based on the Network Teaching Mode[J]. Advances in Educational Technology and Psychology,2021,5(6).