



Application and Practice of “Student-Centered” Information-Based Teaching Mode in Automobile Maintenance Course

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Abstract. Teaching style of traditional classroom is ineffective, with less interaction between teacher and students, and students’ enthusiasm for learning is low. Therefore, in order to improve teaching effect and realize two-way interactive learning, “student-centered” information-based teaching mode combined with multimedia teaching platform and information technology, is introduced in automobile maintenance course, supplemented by case analysis, project-oriented and other teaching methods, build multivariate evaluation model, intuitively grasp students’ learning dynamics and realize closed-loop control of teaching. Gradually guide students to actively participate in learning process, improve the level of students’ car maintenance work, it will ultimately improve core skills and comprehensive quality of student.

Keywords: student-centered · information-based · teaching mode · multiple evaluation model · automobile maintenance

1 Introduction

In the current classrooms of higher vocational colleges, there is generally a lack of interaction between teacher and student, atmosphere of classroom is not active and teaching effect is not good. In order to understand classroom teaching situation in detail, some scholars organized researchers to observe classroom teaching situation of a higher vocational college by using the method of attending lectures. 30 classrooms were randomly selected, 1604 students have chosen courses. There were 1352 people in the classroom, attendance rate was 84%. Performance of the students in classroom is shown in Table 1. Attendance rates of different grades is shown as follow: 95.6% in first grade, 80.7% in second grade, and 68.7% in third grade. A survey by MYCOS also shows that 70% of students think that teacher’s lectures are unattractive and monotonous. It is difficult to achieve the purpose of improving quality of teaching.

Based on above investigation and analysis, traditional classroom teaching mode and traditional teaching materials are no longer suitable for current requirements, it must be improved in terms of teaching principles, teaching methods, and teaching content.

Table 1. Classroom behaviors of surveyed students in a university (Xiaojuan Lin [Owner-draw])

1,604 students enrolled in courses, 1,352 students attended		
Classroom behaviors	Number of people	Percentage
Seriously listen	725	45
Taking notes	233	15
Playing mobilephone	69	4
Sleep	109	7
Absent-minded	270	17
Doing something else	177	11
Arrive late	160	10
Leave early	36	2

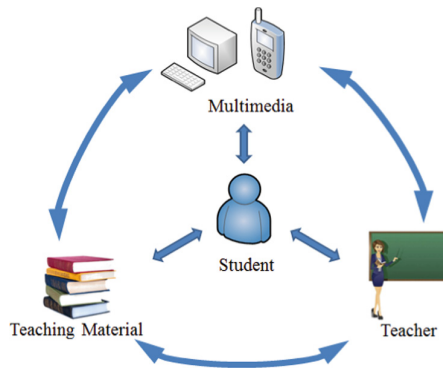


Fig. 1. The relationship between elements in “student-centered” information-based teaching mode (Xiaojuan Lin [Owner-draw])

2 Introduce “Student-Centered” Information-Based Teaching Mode

“Student-centered learning” teaching method, originated from British educational institutions, and is an active learning method carried out by means of discussion, practical operation. In the “student-centered” teaching classroom, Students are main body with groups as units, teacher is facilitator. According to the tasks assigned by teacher, group members have free discussions, division of labor and cooperation, and get problem solution.

In the “student-centered” information-based teaching mode, relationship among teacher, teaching materials, teaching media and students is shown in Fig. 1.

Teacher: “Student-centered” means to make students become active learners, and teacher should appropriately guide them to realize transformation from “teacher impart knowledge to students” to “let students discover and create knowledge by themselves”, that is from “teaching mode” to “learning mode”.

Teaching materials: Teacher mainly provide content for students’ learning and design the way of presenting content. They need to collect and organize a large number of teaching materials, teaching content and teaching resources. Students also can select, reorganize teaching materials and learning resources. All teaching materials are processed and uploaded to teaching platform.

Teaching multimedia: Teaching media creates a suitable learning environment for students to learn, which can provide a large amount of knowledge content or different types of drills and exercises that students need. At the same time, students can choose learning tasks according to their learning foundation, and there is a two-way interaction between media and students. [1].

College students have a high level of informatization and are good at using terminals such as mobile phones or computers to obtain information. In order to improve teaching effect and realize two-way interactive learning, “student-centered” information-based teaching mode combined with multimedia teaching platforms and information technology, is introduced in automobile maintenance course, supplemented by case analysis, project-oriented and other teaching methods combined with multiple teaching modes, fully consider students’ needs and learning hobbies, guide students to actively participate in learning process. Gradually improve work level of students’ automobile maintenance, it will ultimately improve core skills and comprehensive quality of students’ employment.

3 Research and Practice Content

3.1 Information-Based Teaching Mode

Automobile maintenance course aims at cultivating qualified talents for automobile maintenance with practical ability and innovative spirit. It actively explores and constructs that how to combine information technology to realize student-centered teaching method.

The specific implementation process is as follows:

Session 1: Teacher prepare teaching materials, students preview before class.

Before class, students are reminded to watch videos of automobile maintenance knowledge, learn relevant knowledge points in advance, and complete exercise self-test on the platform. It help students to build autonomous learning ability and good study habits. At the same time, it also helps teacher to understand the mastery of students’ knowledge points before class. For students’ weaker knowledge points, teacher should pay more attention and lay a foundation for completing training tasks in classroom, and timely communicate with students.

Session 2: Random selection session is set up in classroom.

In classroom, teacher set up a random selection session on platform. Because of the uncertainty of random selection, most students will concentrate on their studies. For the weaker knowledge points were found after random inspection, teacher will carry out intensive learning on it.

Session 3: Assign roles to groups and complete practical training.

Set up division of labor among team members on platform in advance. In classroom, team leader assigns roles and tasks to team members to ensure that everyone participates in training tasks. Teacher pays attention to observation and guidance, helps students in time. Successfully complete training tasks.

Session 4: Submit assignment on platform and mutual scoring between students.

After students completed training tasks, they fill in the work order and submit it to platform. To improve the participation of students, different groups can grade the work orders, share training experience, which is equivalent to re-analyzing training tasks, consolidating knowledge again. Finally, team scores given by students and teacher.

3.2 Project-Based Teaching Content

Highlight the application and skill of automobile maintenance courses, and fully meet requirements of higher vocational “application-oriented and necessary” and “employment-oriented”.

3.2.1 Project-Based Teaching Content

According to meet job requirements of company for automobile maintenance, the entire auto maintenance workflow is projectized and set up as a series of sub-modules. Sub-modules are further refined into several small tasks, students can complete their small tasks in groups. “student-centered” information-based teaching mode enable students to participate in classroom with higher enthusiasm than before, which help students truly master relevant knowledge and skills. The module setting of course are shown in Table 2.

3.2.2 Typical Work Tasks Run Through Teaching Content

Knowledge objectives in project are run through training tasks. Design of teaching content is based on the scene of real automobile maintenance.

For example, sub-item in” Maintenance of chassis “—brake system inspection and maintenance, teacher set the time sequence on platform to play three teaching situation videos. Students learn practical knowledge of sub-item through scene simulation. Implementation process is as follows:

Table 2. Project-based teaching content (Xiaojuan Lin [Owner-draw])

Job of Automobile Maintenance	Module	Learning assignment	Study time(hour)
	1	Maintenance business reception	4
	2	Use of maintenance tools	6
	3	Maintenance of automotive electrical equipment	12
	4	Maintenance of engine	10
	5	Maintenance of chassis	14
	6	Practical examination	2
	Sum		48

Play situational video 1: A customer’s vehicle came to the store for routine maintenance. The customer reported that his car often felt unable to brake during driving. Sometimes, the vehicle continued to drive for a short distance after stepping on brake pedal, and brake pedal felt elastic. Preliminary diagnosis has ruled out the reasons for brake master cylinder and vacuum booster pump. As an automobile mechanic, please check and maintain the brake system for this phenomenon.

Teacher guidance process: Whether the brake fluid is sufficient; Quality of brake fluid; When to refill or replace brake fluid; How to change brake fluid.

Training task 1: Inspection and replacement of brake fluid.

Play situational video 2: For situational video 1, you had replaced brake fluid and emptied it. After drive test, you found that the car situation improved, but brakes were still too soft. Braking distance obviously exceeded the maximum braking distance and it was accompanied by sharp brake metal friction. Assuming the cause of brake distribution failure is excluded, please check or replace brake pads of four wheels.

Teacher guidance process: How to judge the serious wear of brake pads? Brake pad selection specifications.

Training task 2: Inspection and replacement of disc brake friction linings.

Training task 3: Inspection and replacement of drum brake friction linings.

Play situational video 3: For the situations of Video 1 and Video 2, after replaced brake fluid and brake pads, you try to park the car on a ramp and found that there is a sign of car rolling when handbrake was applied. You assumed that this car is a mechanical parking brake failure, please restore the performance of parking brake system.

Teacher guidance process: Structure and principle of parking brake mechanism; Performance test and adjustment method of parking brake.

3.3 Build Multivariate Evaluation Model

As shown in Table 3 and Table 4, the total score of course consists of process assessment (60%) and summative assessment (40%).

Table 3. Content of process assessment (Xiaojuan Lin [Owner-draw])

Examination item	Examination content	Assessment requirements	Percentage of total
Classroom participation	Attendance	No late arrival or early departure; No absenteeism	5%
Performance in classroom	Attitude and Discipline	Dress neatly and listen carefully; Positive thinking; Positive answering questions	15%
Task form	Fill out task form	Submit in time and fill in correctly	20%
Practical performance	Contents of task form	Task plan was correct; Tools were used correctly; Operation process was correct; Task was completed well	20%

Table 4. Content of summative assessment (Xiaojuan Lin [Owner-draw])

Examination item	Assessment point	Assessment method	Assessment requirements	Percentage of total
Final exam	Automobile maintenance process	Practical examination	Wear meets the requirements; Tools were used correctly; Maintenance tasks were completed correctly	40%

Classroom activities such as classroom discussion, questioning, answering, and in-class exercises are carried out with the help of teaching platform. Because score evaluation consists of students' mutual evaluation and teacher evaluation, students actively participate in classroom, realize effective learning. Teacher can view learning dynamics of each student, as shown in Fig. 2, to know the mastery of each module of course at any time, as shown in Fig. 3.

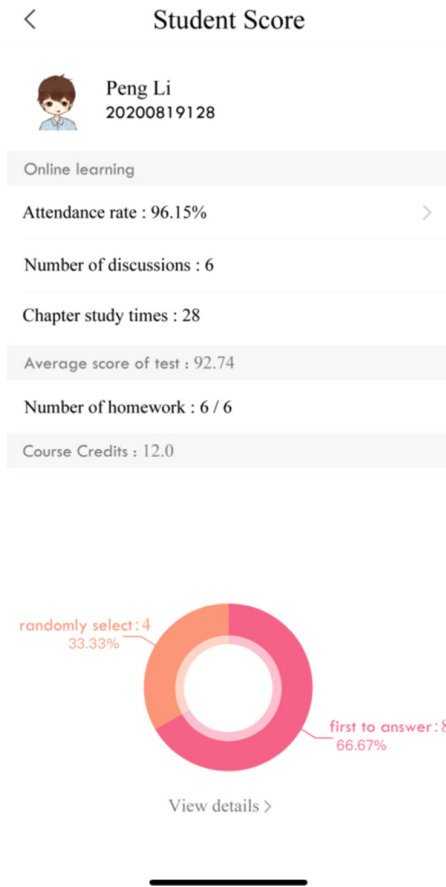


Fig. 2. Individual student score details (Xiaojuan Lin [Owner-draw])

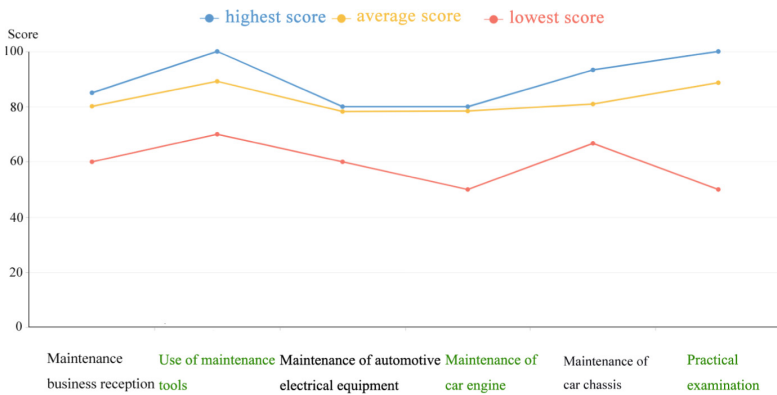


Fig. 3. Class scores for each module in course (Xiaojuan Lin [Owner-draw])

4 Conclusion

“Student-centered” information-based teaching mode was introduced into automobile maintenance course, classroom atmosphere was better, and enthusiasm of students were greatly improved. Students are no longer just receivers of classroom knowledge and information, but actively participate in entire learning process and form a good teaching interaction with teacher. Teaching effect has been effectively improved. Automotive maintenance students won third prize of 2019–2020 Provincial Vocational College Skills Competition, and teaching team won honor of Teaching Quality Excellence five times during the period of 2019–2021. Evaluation report of MyCOS shown that job adaptability of graduates from Automotive Inspection and Maintenance Technology is as high as 93%.

To sum up, the application and practice of “student-centered” information-based teaching mode in Automobile Maintenance course emphasizes students’ independent learning and independent thinking, which meets requirements of vocational education in new era and is conducive to cultivating innovative high-skilled talents urgently needed by society.

Acknowledgment. Thanks to team members for assisting with the teaching research. Thanks to the help of external funds, Research and Practice Project of Educational and Teaching Reform in Guangdong Province “Student-centered Application Research in the Professional Courses of Automobile Maintenance-Taking the Course Teaching of Automobile Maintenance as an Example” (Project ID: GDJG2019017), and Research and practice project of school-level education and teaching reform” Classroom Revolution Based on ‘Four New’——Take ‘Hydrogen Fuel Cell Structure and Maintenance’ as an example” (Project ID: 2021JG-028).

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