ATLANTIS PRESS
Advances in Computer Science Research (ACSR), volume 76
7th International Conference on Education, Management, Information and Mechanical Engineering (EMIM 2017)

Exploration and Practice of "Four - Piece Integration" Teaching Model of Automobile Structure

Enyuan Zhang[1,a], Yongming Kang[1,b] and Fengyu Sun[1,c]

[1]College of Automobile & Civil Engineering Beihua University Jilin, Jilin Province, China

[a]zey9815 @163.com, [b]1347571304 @qq.com, [c]307427728 @qq.com

Keywords: Automobile structure; Four - piece integration; Teaching model; On-site teaching; Flipped classroom; Network teaching

Abstract. According to the teaching characteristics of automobile structure, introduced a new "four - piece integration" teaching model, and application and practice of the teaching model. This teaching model integrates and optimizes the original automobile structure curriculum system, comprehensive classroom teaching, on-site teaching, flipped classroom, network teaching and many more the advantages and strengths of a variety of teaching methods application in the teaching of automobile structure course. Practice has proved that, the teaching effect is good, which is of great significance to the exploration and practice of curriculum reform.

Introduction

"Automobile structure" is a theoretical and practical strong professional courses, is one of the core courses of automobile specialized, such as transportation and automobile service engineering. It takes automobile assembly and parts as main line, introduce the structure of each assembly and parts of the automobile, and function its working principle, so that students master the structure and working principle of the automobile, training students' ability to analyze the characteristics of automobile structure and working principle.[1] With the continuous expansion and deepening of teaching content, and compress the hours of specialized courses, in order to achieve higher standards of teaching requirements, and can make full use of modern teaching resources, it is necessary to carry out the teaching reform of the automobile structure course.[2]

Constructing New Teaching Model

In recent years, domestic universities are active in the field of automotive talents education, the extensive discussion on the training program and curriculum reform is carried out, and some progress has been made in the course of automobile structure. In the teaching content, teaching means, teaching methods, practice and other aspects of the teaching reform to improve the teaching quality and teaching efficiency.

The widespread use of multimedia courseware for teaching, it has obvious advantages to enhance the vividness and image of teaching, to increase the amount of information in class teaching, to save class hours and so on. However, multimedia courseware teaching has its own limitations, students can not remember the key points and difficulties, affecting the teaching effect. We should combine traditional teaching methods with modern teaching methods, and serve the classroom teaching. At the same time, automobile structure is also a very practical professional course, the combination of theoretical teaching and practical teaching can deepen the understanding and mastery of knowledge. Network teaching as a new teaching method is more and more applied to teaching, campus network has gradually developed into an effective educational carrier, which has become an important resource for auxiliary teaching, it has the characteristics of large amount of information, strong interaction and wide coverage. The use of campus network to create a network classroom, build a network of independent learning platform, can be more effective for the automobile structure services.[3,4]

In summary, we recognize that a single teaching method is not conducive to students to master knowledge, and according to different teaching content using a variety of media, integration of

tradition and modernity, diversified teaching methods of the combination of theory and practice, the formation of classroom teaching (multimedia teaching and on-site teaching), flipped classroom, disassembly and assembly training, network teaching "four-piece integration" teaching model, will be more conducive to improving teaching effectiveness.

Constructing a New Curriculum System

The "four-piece integration" is based on the students as the center, the knowledge as the foundation, the ability training as the main line, and the quality as the goal, enable the students to master the automobile technology from the aspects of principle, structure and assembly, constructing a new automobile structure course system.

First, clear the basic requirements of teaching, adjust the syllabus and teaching content, remove old knowledge and replace new knowledge, reasonable arrangement of experimental time, focus on cultivating practical ability, elaborate the basic structure of the new domestic and imported sedan engine and chassis, at the same time, it introduces the new structure and new technology. In order to cultivate practical ability, in addition to on-site teaching, but also through the automobile disassembly and assembly training to improve, and students are more interested in learning, teaching effect can be improved.

Besides, in order to give full play to students' autonomy, we use the school campus network, design and development of automobile structure network environment teaching auxiliary system, the system mainly includes the following modules: teaching resources, teaching management and communication between teachers and students. In order to cultivate students' ability of individual learning and collaborative learning, we assign homework and thinking in the network class, students can always click on the learning content to understand the concept of ambiguity, and can easily use the concept and difficult modules to query their own understanding of the problem, or online communication with students and teachers.[5]

Practice of "Four - Piece Integration" Teaching Model

"Four- piece integration" teaching model of automobile structure has been applied in teaching practice.

Multimedia Teaching and On-site teaching. We set up the automotive structure classroom in the automotive structure laboratory, that is in the automotive structure laboratory furnishings tables and chairs, computers, projectors and other multimedia teaching facilities, at the same time, there are traditional teaching facilities such as blackboard platform, conduct on-site teaching in various automotive parts. Practice shows that, the new teaching methods have both images and text, have sound and picture, the teaching content intuitive, vivid, display on the screen. Structure, movement route, principle, etc. be absolutely clear, enlivened students' thinking. Such as: when talking about the structure and principles of the four-stroke gasoline engine, use animation to look at the overall structure, and then decomposition, assembly. For the explanation of the principle, teachers use the traditional blackboard painting four stroke gasoline engine schematic diagram, let the students think, encourage students to discuss each other, inspire students' potential, to achieve the interaction between teachers and students. And then through the laboratory experimental equipment for on-site practical demonstration, to achieve the organic combination of theory and practice, so that teachers can integrate the advantages of the two teaching methods, acquire better teaching results.

Laboratory is the place of enlightenment for the students to establish the perceptual knowledge, the theory and the practice of the textbook, and to study the structure of the automobile.[6] The students use the teaching aids in laboratory referring to teaching material for self-study, it spends the short time and harvest is relatively large. Promote the students to complete the sublimation from perceptual knowledge to rational knowledge, at the same time, cultivate students' self-learning ability and learning interest.

Flipped Classroom. The traditional teaching model is that teachers teach in class, arrange homework, let the students practice outside class. Different from the traditional classroom teaching

model, in the "flipped classroom" teaching model, students complete the learning of knowledge outside class, the classroom has become a place where teachers and students interact with each other, including answering questions, the use of knowledge, etc. So as to achieve better educational effect.

The popularization of internet and the application of computer technology in education, it makes the "flipped classroom" teaching model feasible and realistic. Students can use high-quality educational resources through the internet, no longer rely solely on the teacher to teach knowledge. The role of the classroom and the teacher has changed. It is the responsibility of the teacher to understand the problems of the students and to guide the students to use the knowledge.[7,8]

We innovate and reform the flipped classroom. In the process of multimedia teaching and on-site teaching, there is a flipped classroom after teaching each institution or system, let the students talk about the knowledge, enable students to fully understand and promote the knowledge.

Disassembly and Assembly Training. There is a practical teaching segment about two weeks after multimedia teaching and on-site teaching to the students of automotive service engineering and transportation professional. In this segment, in the first let the students know the structure of the automobile, and then on-site disassembly. Dismantling the work is completed, and then assembled back. Such as from practice to theory then from theory to practice to mobilize the enthusiasm of students to learn and enhance the teaching effect, it improves the students' practical ability.

Network Teaching. Network teaching is the form of using network to transmit, interact or guide, it is the teaching and learning of teachers and students through the internet and the world wide web. It is the learners to acquire learning resources through the internet. Interact with learning content, teachers and other students through the internet. learner get learning support services in the learning process.[9]

We make full use of the campus network hardware resources, a set of modules such as teaching resources, teaching management and communication between teachers and students are established on the auxiliary teaching website of automobile structure. The network classroom provides students with a constructivist learning environment, at the same time, it can also be used as an auxiliary teaching tool for teachers' classroom teaching. The practice has showed that the network teaching platform make full use of the students' spare time help students make active learning instead of passive learning, improve the interaction and cooperation between students and teachers, students and students.[10]

Establish a Scientific Teaching Evaluation Mechanism. Because the "four-piece integration" teaching model is different from the original teaching model, so it is suitable for teaching evaluation model should also be innovative. Therefore, the assessment methods will be combined with knowledge assessment and ability assessment, that is using a variety of methods for assessment. Homework score accounted for10 percent, flipped classroom score accounted for10 percent, disassembly and assembly training score accounted for20 percent, final exam score accounted for60 percent.

Teaching Results. Based on the teaching practice in the past few years, shows that the "four-piece integration" teaching model made in the teaching practice that teachers and students satisfied with teaching results. Students' academic achievement and passing rate are obviously improved(Fig. 1), the distribution of results is also becoming more reasonable(Fig. 2).

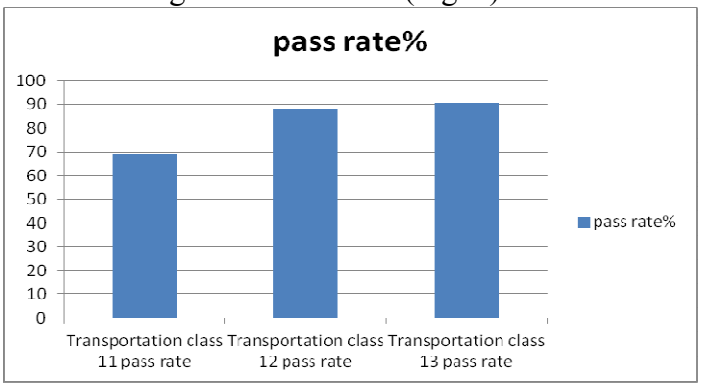

Figure 1. The passing rate of students majoring in transportation in recent 3 years

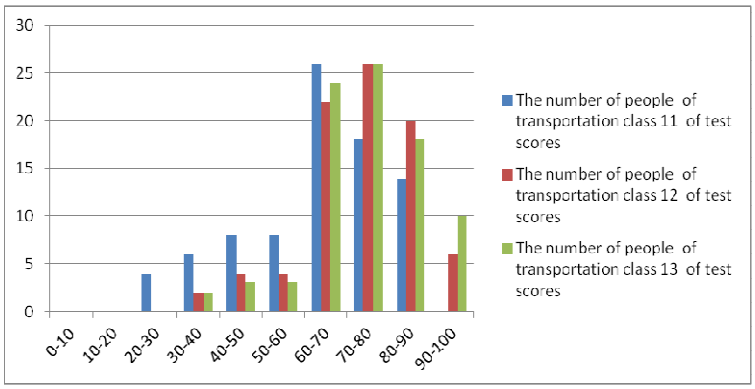

Figure 2. The score distribution of students majoring in transportation in recent 3 years

Conclusion

We take the lead in putting forward the concept of "four-piece integration", combined with classroom teaching, flipped classroom, disassembly and assembly training, network teaching. abstract thinking of traditional teaching, image thinking of multimedia teaching, making the intuition of practice teaching, autonomous learning in network teaching complementing, and complementing advantages, so as to achieve the optimization of teaching process and teaching effect.

The new teaching model received unanimously favorable opinion from the students, promoted the cultivation of students' thinking ability, enhanced self-learning ability, changed the attitude towards learning, and improved the learning initiative and enthusiasm.

References

[1] W.K. Shi: Automobile Structure (China Communication Press, China, 2013),p.1. (In Chinese).
[2] H.J. Zhang and H,K. Fan: Value Engineering, (2016) No.11, p.155. (In Chinese).
[3] Y.P. Zheng, M.S. Wan and B. Yang: Journal of Anhui Normal University (Natural Science Edittion), Vol. 35 (2012) No.2,p.146. (In Chinese).
[4] J. Han and J.H. Luo: Jiangxi Chemical Industry, (2016) No.12,p.199. (In Chinese).
[5] J. Pan: Shandong Industrial Technology, (2017) No.3,p.197. (In Chinese).
[6] H.W. Han and H.Z. Tian: Education Research, (2012) No.11,p.67. (In Chinese).
[7] C.L. Bu and Y.Y. Ma: Software Guide, Vol. 12 (2013) No.7,p.9. (In Chinese).
[8] Zh.T. Zhu,Y.Q. Guan and H.X. Qiu: e-Education Research, (2015) No.6,p.66. (In Chinese).
[9] W.Y. Zhang: Modern Distance Education Research, (2013) No.1,p.7. (In Chinese).
[10]T.T. Liu: Computer Knowledge and Technology, Vol. 13 (2017) No.3,p.123. (In Chinese).