Preliminary Study on Teaching Reform of Automatic Welding Practice Based on K5 Teaching Method

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Abstract: With the continuous development of automation technology, the teaching of automation technology in colleges and universities currently plays an important role. For example, in the process of automated welding practice, students are required to complete the practical hands-on ability of automated welding technology through the orderly teaching, and master the relevant theories of automated welding technology.

1. Introduction
In the practical teaching process, the school has invested a large amount of human and financial resources and material resources to ensure that practical teaching and theoretical teaching can be combined with each other. Therefore, in the process of teaching reform of automated welding practice, the teaching process begins to use the perspective of human-computer interaction interface, and the actual equipment operation of automated welding robots is widely used in the training center for teaching students.

In response to this subject, students are required to adopt the K5 teaching method to carry out simulation practice and practice. More students have the opportunity to exercise and practice, saving a lot of investment in the automation welding practice. Throughout the teaching environment, the leading role of teachers has been brought into play, and the role of students' cognitive subjects has also been reflected. Realize the goal of cultivating applied welding talents for the new era. According to the relevant regulations of the current colleges and universities for the reform of basic education curriculum, it is required to implement quality education, focus on improving students' innovation and practical ability, and focus on cultivating students' practical ability. This has become an important mission and task of basic education for engineering majors. It is the current goal of educating people to cultivate practical talents for the future and to cultivate compound talents for tomorrow's science and technology. A lot of practice and exploration have been carried out in many aspects such as the training of basic subjects and the cultivation of students' practical ability. The engineering colleges have already carried out a lot of practical work. For example, the School of Welding of Materials College conducts automated welding practice teaching for students in school, strengthening students' learning foundation through the innovation of talent cultivation ideas, and cultivating strong ability and high-quality application talents. Through the practice teaching reform, the level of practical education and teaching will be continuously improved, the spirit of scientific innovation will be highlighted, the automation welding talents will be continuously strengthened, and the employment and unemployment skills and comprehensive professionalism will be adopted to face the society.
2. Current Status of Automated Welding Practice Teaching

In the practice of automated welding practice, schools often invest a lot of manpower, material resources and financial resources to ensure the smooth implementation of practical teaching. However, due to various restrictions, many colleges and universities have to reduce the number of practical teaching links. This is a very helpless reality in the current teaching of automated welding, and it also hinders the continuous improvement of students' practical ability. With the continuous development of simulation technology, technologies such as visual presentations have gradually been introduced into teaching. Some colleges and universities have introduced the K5 simulation method in the practice teaching of automatic welding, using the combination of physical simulation and artificial intelligence technology, implementing numerical simulation technology exercises, reaching the teaching goal of simulating the actual welding process, saving for the practice of colleges and universities. With funds and materials, it also creates more practical exercise opportunities for students, cultivates students' interest in learning, and can effectively reduce various safety accidents.

When students are doing the first welding, they often have fears. Through the opportunity of practicing exercise, they can build the confidence of the students and comprehensively improve the quality of the students. For automated welding education, this approach has greatly improved the quality of teaching.

3. Overview of K5 Teaching Mode

The so-called K5 teaching method is to use the existing equipment of the training center, such as an automated welding robot, to pre-adjust the equipment, and weld the weldment in the attitude of the welding torch. For the end point and reference point of the space transition point, advance Walking, the parameters and position of each point are automatically calculated by computer, and recorded quickly [1]. It is K5 that is a feature of the teachings. The welding robot will perform repeated viewing angles according to the pre-planned path. When the automated welding program is re-run, the combination of artificial intelligence and physical simulation and numerical simulation techniques achieves the goal of simulating an automated welding process.

By incorporating the K5 teaching method into the teaching of automated welding, the leading role of the teacher has played a role in enhancing the cognitive subject role of the students, and at the same time allowing more students to have time to exercise. Moreover, the welding materials and equipment used in the traditional teaching environment are not needed in the new practical teaching environment, thus greatly saving the use of materials and equipment. Through practice, students have a better grasp of the welding concept, which can deeply understand the welding theory, and gain a lot of experience in practice through practical experience, overcome the fear of the first welding, establish the confidence to engage in welding work, and let the students realize education and learning for welding is employment-oriented.

The traditional teaching methods, although emphasizing interdisciplinary and inclusive, do not meet the standardization of single subject teaching, which involves several issues: first, the evaluation mechanism is not clear; second, the supporting teachers can not keep up, the business expansion speed has an impact. This combination of production, study and research has brought the distance between the curriculum and the post closer.

The reform of the K5 teaching model, such as the hardware-based entrepreneurship project, is the key to achieving “research,” “production,” and “learning.” The focus is on R&D and implementation. For teaching, the threshold for getting started is not too high; in addition, the pursuit of continuity between product iterations is more applicable.

For example, in the automated welding course, modular robots were introduced to teach the real robots programmed during the student's practice. With free apps and compatible tablets or smartphones, students can manipulate and learn programming everywhere. The sensors on the robots enable them to react to the surrounding environment. The robot can be programmed with the corresponding APP, and there are 5 supporting apps, corresponding to the professional theory, learning level and operation mode: according to the given instructions, the action, path, etc. given in the operation interface are simple. With
the settings and links, the robot can act according to people's direction.

According to the introduction, programmable robots have been widely used in classroom teaching. It ensures that students are not trapped in the “island of teaching” but introduce others into the experience. According to the core learning points defined by the American Calculator Teachers Association, a complete K5 programming teaching system, including class hours and supporting teacher manuals, was introduced to solve the evaluation mechanism. In terms of domestic teachers, some institutions in China also adopt forms of cooperation with third-party institutions: for example, training institutions and excellent cooperation, while in public schools, they cooperate with East China Normal University to complete the training and output of teachers. [2]

4. Teaching Model Formation
Taking a science and technology university as an example, in the process of automatic welding teaching, in order to avoid excessive consumption, and some students who do not listen to the lectures have accidents in the practice link, the practice teaching has been adopted into the K5 teaching method, avoiding the practice. A small number of students who did not listen to the operation mistakes in the link, and raised a lot of students fear the first welding, self-confidence, and greatly saved the capital investment.

4.1 Introducing The K5 Teaching Method
In the practical course, students who require welding must practice the basic methods and methods of automated welding. Pass the ordinary manual welding arc and then learn to automate the welding. This integrated practical teaching has cultivated students' innovative practical ability and engineering quality, which is very helpful for students to form good labor concepts and theories. Students build a safe and innovative society and a sense of competition and they also have a deep understanding of the teaching objectives and teaching content.

The development of teaching content can include the following contents, which are included in the simulation practice teaching work:

The first is to perform straight-line welds, the second is to perform arc welds, the third is to perform T-shaped welds, the fourth is to perform arc-sensing and pattern-welding procedures, and the fifth is to perform pre-transfer operations on different locations. The content is formulated, taking into account the employer's job requirements for the students, and developing a talent training and talent training program that meets the needs of the employer, so that the school's talent training objectives can be combined with the needs of the enterprise, avoiding the blindness of talent cultivation.
4.2 Preparation of Teaching Facilities

A specially equipped CNC welding robot training system was set up, and the welding robot training room was set up. At the same time, students of 2 to 3 classes could be accepted to carry out simulation training on the machine. The K5 teaching system includes a welding robot and an advanced servo control system that allows the robot to simulate real-world scenarios and perform acceleration in the best environment. The online working time is longer, and the simulated welding robot has a wider range of motion, flexible operation, higher safety protection function, better system stability, and convenient use by students. K5 uses AGM to run offline, realizes human-computer interaction in robot control. The main components include the serial port and the host computer, which is small in size and easy to use. The programming process realizes the actual control, adopts the 3D CAD design, the ergonomic standard is greatly improved, and has good controllability [3].

The software part is composed of a control axis. The control axis includes a plurality of propaganda angles, which can be rotated from 200 degrees to 720 degrees, which increases the range of motion and workspace of the robot. The software system adopts the method of engineering development, and perfectly the diagnostic function of the robot control system. The system is clearer and the reliability is higher. It is very convenient to guide the students. The hardware part includes the main calculator and the programming angle view. The CPU is used to calculate the structure. The main computer completes the motion planning of the robot. The servo system uses the asynchronous communication and the main control logic to perform the corresponding operation through the serial port. With the function of digital IO, the display of information and the input function of buttons are effectively completed. Welding robot training has a good virtual simulation experimental environment and field experimental conditions. For the hardware and software facilities in the teaching reform, teachers with rich experience need to be instructed, which is conducive to the smooth implementation and implementation of the practical teaching work, and provides a strong guarantee for the teaching work.

4.3 Automated Welding Practice Teaching

Using the method of automatic welding simulation teaching, the teacher will demonstrate the different types of weld automation welding, and explain the process and method of the simulation operation. Welding students should use AGM for offline K5 drills during the practice of automated welding. Through the drills, students can understand the settings of the automatic welding parameters. In the online simulation operation, the students can understand the method process through practical operation, and can link the abstract theory with the actual things, and further understand the meaning of the automatic welding. Through the simulation of hands-on operation, valuable experience has also accumulated in the link. Through heuristic teaching. K5 is that the teaching method is no longer limited to the explanation in the classroom, but allows the students to explore and discover through the online thinking on the teaching device, understand the structural problems of the automation welding parameters, and the related links of the welding process, the welding of the products in order to predict the quality. Students can think about problems in the classroom, conduct in-depth research on the issues under the class, and propose solutions.

Through this series of teaching methods, students can leave a more vivid and accurate impression and deepen their understanding of automated welding problems. In the process of automated welding practice teaching, there is a follow-up tracking feedback system. Through the experimental teaching reform simulation map, we can clearly see that the K5 teaching method is used to carry out the teaching reform of automatic welding practice, paying attention to the re-enactment of teaching content, introducing teaching facilities, reforming the teaching model, and realizing the welding automation course. At the same time, students in the school can also conduct grades when conducting experiments. According to the teaching needs of the school, the employment situation of the students and the quality of personnel training feedback from the employer, the corresponding rectification plan is proposed, and the ways and methods of the teaching reform of the automated welding practice are finally determined.

5. Teaching Reform Effect
By introducing the K5 teaching method into the teaching of automatic welding practice, in the simulation practice, the successive experiments of grading are carried out, and the satisfaction degree obtained is very gratifying. Guided by the viewpoint of automated welding teaching and intelligent education, the teacher boldly and tentatively adopted the K5 interactive teaching method in classroom teaching. In the explanation of the basic theory, the teachers have carefully designed a large number of questions, students can freely express different opinions, and students can also ask relevant questions at any time for discussion. In the automatic welding process, the body building and brain programming part of the welding intelligent robot are analyzed, and the different components and functional parts of the robot are discussed and designed, and finally the effective control and selection are realized. In this way, the students will naturally integrate into the whole process of teaching activities, fully experience the feeling of learning the protagonist, mobilize the students’ interest and enthusiasm, and achieve a good teaching effect.

In the way of investigation, the graduates of the K5 teaching method were followed up with follow-up work feedback, and the results obtained by tracking and researching and summarizing were used. The results show that the K5 teaching method used by the welding graduates has a high degree of recognition among students, and the talent training model has been recognized by the company. The company's certification of welding talents, and constantly increased cooperation, also has a very good role in promoting the school automation welding professional curriculum system.

6. Conclusion
The teaching mode is called the coursework that constitutes the course. It is very important to choose teaching materials and improve the teaching staff. In the exploration of teaching mode in our country, through continuous research, we have found that through stable teaching research and the setting of teaching procedures, we have formed a certain strategic system. By adopting a combined teaching model, we can truly lay a solid theory for cultivating talents. The foundation is beneficial to improving the quality of teaching and transporting talents. According to the survey results, after the teaching reform and innovation of K5 teaching method, the employer's satisfaction with the students in school has reached more than 80%, which has improved the employment rate of recent graduates, and also played a certain role in promoting the development of the school. Through the integration of K5 teaching method and automatic welding teaching work, the college also summarized a set of effective training programs for automatic welding professionals, and conducted welding practice teaching for many universities to explore a channel. Local economic construction services, continuous input of talents, truly achieve the combination of learning and learning, the combination of production, study and research, the zero distance between the curriculum and the post.

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