Thinking about the Practical Teaching Reform of Equipment

Bin Deng¹, Yamin Hu¹, Jingjing Wang¹ and Yahui Hu²

1. Air defence early warning equipment department, Air Force Early Warning Academy, No.288 Huangpu Road, Wuhan, Hubei
2. Computer and Network Section, Air Force Early Warning Academy, No.288 Huangpu Road, Wuhan, Hubei
Email: 247747703@qq.com

Abstract. This paper focuses on the demand of equipment application guarantee for talent cultivation under the new situation, researches on the practical teaching reform of equipment, analyzes the necessity of practical teaching reform of equipment under the new situation, probes into the current situation of equipment teaching practice, and based on this, studies in-depth the thinking and direction of practical teaching reform of equipment from the perspective of teaching mode, teaching platform construction and teaching team construction and other three aspects put forward specific reform measures to provide reference for the comprehensive plan of practical teaching reform of equipment, so as to promote the quality of teaching and personnel training.

1. Introduction

With the development of a large number of new equipment, the work task of the equipment has changed a lot. Compared with the old equipment, these new equipment use has the following three characteristics. First, the new equipment has more working modes, diversified functions and complicated parameter settings, which requires the staff to have a deeper understanding of the equipment, to be able to reasonably select and optimize the working parameters of the equipment according to the actual situation, so as to give full play to the performance of the equipment. Second, large scale integrated circuits, computers, high-performance components, and "mechatronics and hydraulics" integration are widely used in new equipment. Therefore, it is necessary to adjust the focus of equipment technical support, and change the traditional support mode which focuses on fault repair into one which focuses on both fault repair and maintenance. The third is that new equipment adopts new technology in a large amount, the connection between systems becomes complex, the role of traditional troubleshooting experience is declining, and comprehensive maintenance mode needs to be adopted, which depends on the excellent maintenance ability and quality of technical support personnel.

These remarkable characteristics, which are different from the performance of the old equipment, require the new equipment talents to have a more solid and wide caliber professional theoretical basis, better basic maintenance skills, stronger ability and quality of independent learning and independent analysis.

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2. Analysis of the Current Situation of Practical Teaching of Equipment

2.1. Basic Situation of Practical Teaching of Equipment
In the past five years, with the support of the relevant system and policies of the college, through the joint efforts of all teaching groups, we have preliminarily completed the preparation of the practice instruction for multiple types of equipment, ensuring the full coverage of the current practice teaching supporting materials for all equipment teaching classes, and providing a basic guarantee for the standardized development of practice teaching. A number of simulation practice platforms and simulation practice software have been built, which provides a software system environment for equipment practice teaching to carry out simulation practice of relevant content, and provides a foundation for further development of equipment practice based on network information system.

Generally speaking, its current teaching basic situation is better and can stand the test of practice. But at the same time, it must be clearly seen that in the key stage of China's reform constantly pushing forward in depth and in an all-round way and equipment leaping development putting forward new demands for personnel training, the teaching content of equipment practice teaching needs to be further optimized, the teaching mode needs to continue to innovate, and there are still weaknesses in the practice teaching ability.

2.2. Main Problems in Practical Teaching of Current Equipment

2.2.1. It is Difficult to See Clearly the Demonstration of Practical Operation and Meet the Practice Time.
Traditional equipment teaching has the following difficulties: first, the operation demonstration is difficult to see clearly. Many contents of practical teaching are carried out on the equipment. The equipment space is usually relatively small, limited by the operation space, it is often difficult for students to see the operation demonstration of teachers, and the teaching effect is not ideal. Second, the internal structure is difficult to understand. The internal structure of many key components on the equipment is complex. In order to make the students familiar with the internal structure of each key component, the most direct and effective way is to let the students disassemble and assemble these components. However, these components are difficult to disassemble in the equipment during the practice, so the students can neither see nor touch them, and their internal structure is difficult to understand. Third, the internship time is hard to meet. At present, the number of equipment used for teaching in Colleges and universities is small, but there are a lot of students taking equipment courses. When carrying out equipment practice teaching, 40-50 students often share one equipment. Due to the limited equipment space, each internship can only accommodate 3-7 people, so it must be implemented in groups. Limited by the number of equipment, the bottleneck problem of "more people and less machines" in practical teaching will exist objectively for a long time, and it is difficult to solve in a short period of time.

2.2.2. The Practice Teaching Platform is not Systematic, and the Practice Subjects are Difficult to be Deepened.
The first is the lack of the actual environment simulation platform, the actual environment is difficult to obtain, and the equipment practice teaching is difficult to deepen. In order to meet the needs of reality, equipment teaching, especially practical teaching must be close to reality. However, in the equipment practice teaching, due to the lack of electromagnetic, meteorological, geographical, objective and other practical environment platform, it is difficult to effectively carry out the practice teaching. Second, the lack of hydraulic and mechanical transmission system teaching platform, transmission system practice teaching is difficult to deepen. In order to meet the requirements of rapid use, most modern transmission mechanisms adopt the "mechatronic hydraulic integration" automatic control technology. Because of the complex structure, high precision and difficult maintenance of the components of the "mechatronic hydraulic integrated" automatic control system, it has become a bottleneck problem in improving the equipment support ability of the equipment users. At present, in the current equipment teaching of our college, there is no corresponding teaching platform. In order to
improve the pertinence of equipment practice teaching, it is necessary to further strengthen the
construction of maintenance and test platform such as hydraulic equipment maintenance platform,
mechanical transmission mechanism, etc., so as to provide conditions for carrying out corresponding
practice teaching.

2.2.3. Teachers have Little Practical Experience and Short Ability Level. With the development of
new equipment technology system, new requirements are put forward for the equipment, which
requires that the equipment must be able to play its full role, use its full function and guarantee its
whole process. For this reason, the new syllabus clearly points out that a course should further
strengthen practical teaching. This requires that teachers must go deep into the equipment using units
to carry out practice in combination with the equipment, understand the mechanism and improve skills
in practice. However, at present, teachers in the use of short time, less practical experience, in the
following aspects to varying degrees, there are weaknesses. First, the practical operation experience is
insufficient, and the measures and methods are not comprehensive. Most of the teachers have a short
working time in the using units, even some of them have no working experience, lack of perceptual
knowledge of the geographical environment and electromagnetic environment of the equipment, are
not familiar with the actual environment, and lack of practical optimization operation experience,
which leads to incomplete understanding of technical measures, incomplete mastery of optimization
methods, and difficult in-depth practice teaching. Second, there is little practical experience and
unskilled operation skills. Although the relevant units hold corresponding activities every year, due to
the lack of system and mechanism, few or even no teachers participate in each year, resulting in the
lack of practical operation experience for the comprehensive application of technical measures of new
equipment by most teachers, resulting in the unskilled operation skills and the difficulty of in-depth
practical teaching and learning.

3. Practical Teaching Reform Measures of Equipment

3.1. Innovate Practice and Optimize Practical Teaching Mode of Equipment

Follow the growth law of equipment talents, improve the equipment application mode system in
accordance with the practice process of in-depth research, pilot exploration, comprehensive promotion
and gradual solidification.

3.1.1. Combining Virtual Teaching with Real Teaching to Break the Bottleneck of Traditional
Teaching Difficulties. In order to effectively solve the difficulties of operation demonstration, internal
structure and practice time in practical teaching, optimize the practical teaching mode of equipment,
adopt the teaching strategy of "combining the virtual with the real, supplementing the real with the
virtual", make full use of the virtual practice, solve the difficulties in traditional teaching, and improve
the teaching efficiency. First, understand the characteristics of virtual practice teaching. Virtual
practice of equipment can establish a hardware and software operating environment on the computer
to partially or completely replace the real installation practice link. Students can complete various
practical subjects as in real equipment. In the virtual reality technology, the efficient simulation
technology can let students immerse in the real environment, achieve the effect of immersing
themselves, and realize the experience of replacing the real with the virtual. The second is to grasp the
organizational process of the practical teaching mode. The practical teaching mode of the combination
of virtual practice and real practice is carried out in accordance with the three steps of "virtual practice
- real practice - intensive practice". In the actual teaching, it can be carried out in groups and in
parallel.

3.1.2. Teaching According to the Post, Highlighting the Integration of Technology, and Training the
Comprehensive Quality of Thumping Students. According to the guiding ideology of "teaching
according to the post, technology integration and comprehensive integration", the teaching of "post
experience" type of equipment based on practice is carried out, and the technology integration is
highlighted from the following two aspects in the teaching process.
The first is to teach according to the post, first to divide and then to combine. First of all, in the early stage of the equipment class, the training is carried out according to the professional direction. A professional direction focuses on the study of equipment theory and technical knowledge, organization practice, management skills and equipment use; a professional direction focuses on the study of new technology theory and equipment knowledge, equipment maintenance skills. Secondly, using the opportunity of practical teaching and comprehensive practice in equipment class, carry out the "post experience" type synthetic practice. The second is to divide the stages and elaborate and practice. The organization and implementation of equipment "post experience" teaching should be divided into three stages: centralized teaching, on-board practice and comprehensive practice. That is to say, first of all, group by major, strengthen the theoretical basis of equipment practical use, guarantee and maintenance, operation and use, and focus on strengthening the post foundation of corresponding personnel and improving the post ability; second, let students strengthen the practice practice of corresponding posts according to the actual post requirements, and focus on operating, using and maintaining equipment according to the characteristics of the equipment to give full play to the best performance of the equipment; third, in the first two On the basis of stage training, through integrated practice, the students can fully understand the post requirements, deeply understand and grasp the application and maintenance guarantee of equipment under the practical conditions, and exercise and beat the students under the complex simulation conditions through the "post experience" in a short period of time.

3.2. Construction of Four Modernizations and Construction of Practical Teaching Platform for Equipment

"Four modernizations" is characterized by index, network, simulation and intensification. According to the teaching platform construction idea of "real loading + semi real loading simulation + software simulation", the "three-level linkage" practice base of the whole machine, subsystem and component is built, the simulation practice teaching platform is built, the multi-element integrated teaching platform system is formed, and the teaching efficiency is effectively improved.

3.2.1. Build "Three Level Linkage" Equipment Practice Base. Relying on the practice workshop, we will build a "three-level linkage" practice base of complete machine, subsystem and component. One is to install double field and multi screen interactive and remote control equipment on all teaching equipment for the maintenance of the whole machine, introduce the practice site of all teaching equipment into the classroom, and integrate the two fields for mutual control and interaction, so as to realize the "integration of theory and practice", expand the practice space, and effectively solve the problems of difficult operation demonstration and internal structure existing in the practice of the whole machine and subsystem of traditional equipment Solve the problem. Second, in the subsystem maintenance, use the model equipment decomposed by the workshop to carry out cognitive skills practice such as system composition and structure check for the subsystem. In addition, the hardware in the loop simulation platform can be used to test the performance parameters, which will lay a foundation for the practice of actual measurement. Third, in terms of component maintenance, make full use of the relevant platform to carry out maintenance skills learning of relevant components.

3.2.2. Build an Information Network Simulation Practice Teaching Platform. According to the new requirements of practical teaching content, promote the application of "a simulation platform", build a realistic practical environment as soon as possible, and effectively solve the difficult problems of the previous equipment in practical teaching environment. In addition, the college can build a network information platform with neighboring units. Through the platform, on the one hand, the college equipment teachers can use the advantages of teaching resources to implement remote video guidance for the equipment support work of neighboring units; on the other hand, they can also obtain equipment information resources through the platform, so that the teachers can regularly sort out and summarize, and timely enrich and update the practical teaching content.
4. Conclusion
This paper analyzes the current situation of equipment practical teaching and discusses the reform measures of equipment practical teaching. In the next step, corresponding reform experiments will be carried out gradually in the practical teaching of equipment. In the teaching practice, relevant measures will be further tested, experience will be accumulated, reform measures will be improved, and reference will be provided for the practical teaching of equipment.

5. Reference
[1] Dong Liyan, Wang Yan. The multiple roles of teachers in College English teaching from the perspective of Rosenthal Effect [J]. Journal of Hebei Agricultural University: agriculture and Forestry Education Edition, 2007, 9 (4): 36-38
[2] Fan Guiju, Guo Jing. Some ideas on improving the teaching quality of theoretical mechanics [J]. China Electric Power Education, 2011 (27): 180-181
[3] Zhang Yazhen. An effective way to promote the professional development of University Teachers: peer cooperation [J]. Journal of Zhejiang Shuren University, 2011, 11 (5): 61-66
[4] Yu Bencheng, Wang Yong. The significance of the application of modern education technology to the improvement of education quality [J]. Xue weekly, 2012 (1): 20