Chapter 88
Power Dispatch Communication Training Based on Multimedia Animation

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Abstract In recent years, with the rapid development of electric power industry and electric power knowledge, it has become the top priority task to make the electricity staffs to master the power professional knowledge. Through investigation and analysis of the status of electric workers and staff training in recent years, this paper brings up a training approach based on multimedia animation in order to solve the problems of high cost, poor efficiency, and effectiveness. This paper aims to construct an electric power training system based on multimedia animation technology to reduce the training cost and improve training effect. In the implementation of a power bureau, the use of multimedia animation training has achieved better results.

Keywords Multimedia animation technology · Power dispatch communication · Staff training

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88.1 Introduction

Power grid enterprises are technology-intensive where the scientific progress and technological innovation has a particularly important role in grid security, stability, and economic operation. With China's economic boost, the growth trend is running from resource-intensive to technology-intensive and the traditional industries are facing the needs of upgrading and transformation. In the power industry, it is required to provide secure, stable, reliable, diverse, and personalized services while demand for power supply is growing. As a result, investing in human resources is of strategic significance for the grid enterprise development since there are issues to be solved in the quality and structure of manpower pool in grid companies.

The electric power communication network ensures the safe and stable operation of the power system and it is known as the one of the three most important guarantees of power system security and stability. Additionally, the electric power communication network is the foundation of power grid dispatch automation, online market and management modernization and the significant infrastructure of to ensure power grid to ensure operation's safety, stability, and economic operation. Most power companies in the world, which obtain the resources to develop communication technology, have constructed their own power system communication network due to the requirements of reliability, speed, and accuracy of information transmission. Therefore, to strengthen the knowledge and training of staffs' power communication is imperative under the rapid development of communication technology in the electric power industry.

Computer technology and multimedia technology have become part of everyday life in modern society. With the computer multimedia technology, especially the continuous development and integration of training technology, multimedia power dispatching and communication training has become the main technology of the modern power industry personnel's training. Multimedia power training is under rapid development and its advantages of advanced technology and powerful functions represent the trend of the development of modern education and training.

88.2 The Features of Power Dispatching and Communication Multimedia Animation Training

Multimedia Technology applies computer text, graphics, images, sound, animation, video, and other information processing to achieve the establishment of logical relations and human–computer interaction technology [1]. Multimedia technology is widely applied in various fields as well as in the field of training. The training practice shows that the application and promotion of multimedia technology helps to improve training efficiency ease the problem of the lack of and trainers and increase the training techniques [2].

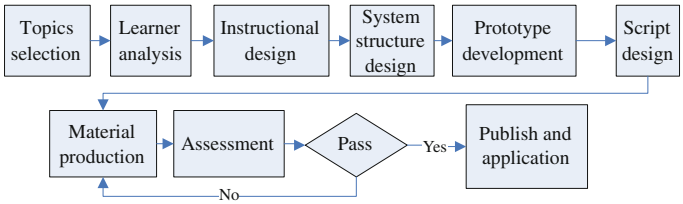

Fig. 88.1 Production processes of multimedia animation courseware

Multimedia animation techniques are widely used in advertising and news industries, which give the audience a stunning visual and sound effects and clear understanding of the expression of animation [3–5]. Multimedia animation techniques have the following advantages compared to and traditional training techniques: (1) transform the traditional teaching methods and visualize the abstract knowledge, motivate the trainees' interests on learning; (2) visually demonstrate some processes which are hard to observed in normal conditions; (3) increase the amount of information, training hours and teaching efficiency.

The production of multimedia animation courseware process is generally divided into the following sections: (1) topic selection, which are selected from the representative issues of power dispatching and communication professional knowledge; (2) instructional analysis, instructional design, system structure design, prototype development, script design, material production, assessment evaluation; (3) publish and application of the test. The detailed processes see Fig. 88.1.

The power industry is ongoing a rapid development and technological revolution which increase the demands on staffs' quality [6]. The fast updating and high complexity of electric power communication knowledge makes the staffs with low education, therefore, enhancing the training is the only way to solve this problem. The structure of power dispatch communication professional knowledge training system is shown in Fig. 88.2, in which the dispatch communication professional knowledge system is divided into six modules, namely standards and

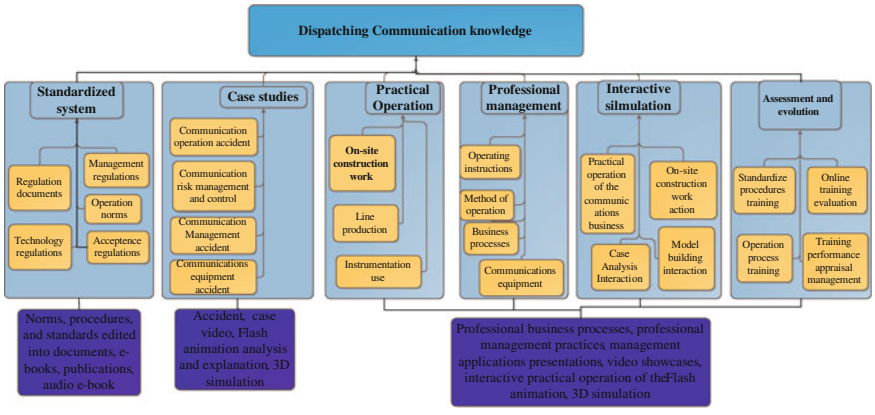

Fig. 88.2 Structure of dispatch communication professional knowledge system

regulations, case studies, practical operation, professional management, interactive simulation, examination and evaluation.

The use of multimedia animation and computer technology enrich the power dispatching and communication training, mobilizing the trainees' learning enthusiasm and motivation. The power dispatch and communication training helps to create a relax power training environment, so that the training effect will be greatly improved. The power dispatch and communication training has the following features compared with traditional training.

88.2.1 Conducive to Knowledge Acquisition

Multimedia power training effectively transform the knowledge into a visualize form and the interactive training combine the training content with the trainees' knowledge which helps the trainees to capture the training content, thus motivate the trainees' learning enthusiasm [7]. Moreover, multimedia power training reproduces the scene and demonstrates the knowledge visually to achieve the vivid training effect by the combination of sound and visual effects.

88.2.2 Conducive to Personalized Power Training

The traditional training is teacher-centered, ignoring the independent development of each trainees and trainees' personality is ignored with the same training content and exercises. Multimedia power dispatching and communication training makes the personalized training possible in which the trainees can obtain the knowledge more easily and thoroughly.

88.2.3 Conducive to Improve the Quality of Power Training

Multimedia animation presents power training content from multiple perspectives which thoroughly break down the complex knowledge, reduce the information processing and conversion, thereby greatly enrich and enhance the performance and appeal of the training. Moreover, using multimedia animation helps to achieve multi-channel information input and construct staffs' knowledge, improve the efficiency of training and reduce training time.

88.3 Characteristics of the Multimedia Power Training Courseware

In order to better promote the application of multimedia technology in the power dispatching and communication training, we should change the traditional training idea, training mode and training methods in line with the actual situation of the employees in electricity industry. It is also urgent to develop a set of multimedia technology-based electric power dispatching and communication training courseware to enhance the training effect of power dispatching and communication knowledge.

The structure of power dispatching and communication knowledge animation courseware is shown in Fig. 88.3, where the courseware demonstrate the tedious power dispatching and communication knowledge by e-books, video, 3d simulation, flash animation, flash interactive animation, etc.

This project combines a variety of multimedia technology to produce combining electric power dispatching and communication knowledge courseware which is relatively rare in the industry. Additionally, this project covers the advanced mainstream multimedia animation techniques and has the following unique advantages:

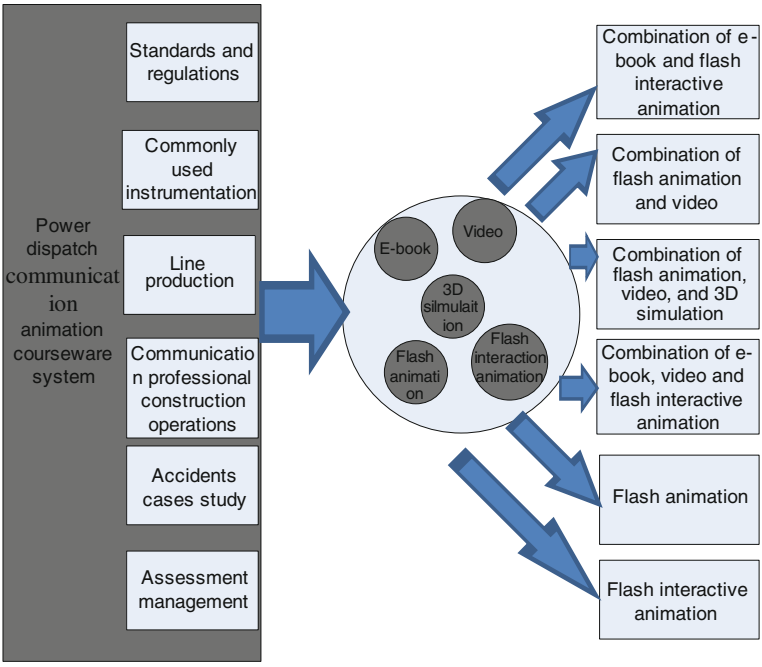

Fig. 88.3 Animation courseware system of power communication expertise

88.3.1 To Ensure the Safety of the Trainees and the Power Grid

Multimedia technology provides convenience and advantages for the training in power grid operation; for example, the multimedia courseware produces a risk-free, low economic loss experiments and operation training through simulation. The courseware has the similar with real experiments and operations and the simulation courseware is reusable and can be repeatedly used as risk-free and low economic loss experiments and operations, which is an efficient approach for training. If the operations of training may be cause risks and economic losses will be not allowed in power grid operation.

88.3.2 Easier to Understand the Basis of Theoretical Knowledge

Using multimedia animation techniques in power training helps trainees to better learn and understand the basic theoretical knowledge. Animated courseware demonstrates by text and pictures create an in-depth explanation by audios and complete revision questions by human–computer interaction. Hence, the training knowledge is absorbed more quickly and easily. The courseware also combined with a variety of multimedia technology, such as e-books, flash animation, video, 3d simulation and human–computer interaction technology in order to enhance learning effect.

88.3.3 Absolute Advantages in the Practical Operation Teaching

The multimedia training courseware is able to simulate the use of various instruments actual construction process of power dispatching and communication. For example, in the power dispatching and communication, we often need to use the test equipment and to produce a variety of communication cable, and if the staffs only read the operation documentation, operation instructions or even there are pictures for the actual operation, the operators may not quickly grasp the key operations. The multimedia technology demonstrates the whole operation process, which helps the trainees understand the training content and techniques easily so that the operators will reduce the chance of disoperation and material loss to achieve cost savings.

88.3.4 Systematic

Currently, the power dispatching and communication training of is short of corresponding teaching materials and courseware, especially for the existing and new power dispatch communication equipment where the e original supporting training courses cannot meet the demand for technology development. For these reasons, the existing training courses do not use the published materials, instead, the trainers write their own courseware for training. These scattered courseware as a teaching material has many drawbacks the bottleneck of the training development. To solve the above problem, multimedia animation training arranges animation courseware and forms the systematic training programs through the development of training plan.

Multimedia animations training courseware also constructs the management platform and establishes an upgrading and maintenance team: the maintainers maintain the normal operation of the platform, and verify the accuracy and real-time of the knowledge, the operators can modify the working steps and methods according to the latest construction process.

88.4 Applications

88.4.1 Multimedia Animation Courseware

This animated courseware is produced using a variety of mainstream multimedia technology; in the actual animation courseware production process the producers often combine a variety of animation techniques, which contribute to demonstrate the knowledge from multi-dimensions. There are various ways of the combination of multimedia animation techniques, such as flash animation combined with video. For example, the communication professional construction operation courseware, which uses e-book combined with flash interactive animation and video and 3d simulation technology, its features are as follows:

(1) Illustrations of content explanation; (2) Explaining the use of instrumentation by hyperlinks; (3) Human–computer interaction test; (4) Embedded functional test video explanation.

88.4.2 Multimedia Animation Effect

88.4.2.1 Reduce Training Costs

The implementation of multimedia animation technology training in the pilot power supply bureau multimedia animation technology has achieved good results, where was a increase in trained personnel's technical level, the training costs were

greatly reduced and thereby improved the economic benefits of the power supply bureau. The traditional training cost in the pilot power supply bureau including hiring lecturers, venues, accommodation and travel expenses, and the high cost of training new employees, new business and the new technology update. Hence, the cost of traditional training is increasing year by year. The preliminary statistics shows that the growth rate is 20 %. The pilot power supply bureau's traditional training expenses curve is:

$$y = 70 \times \left(1.2^{(x-2009)}\right) \tag{88.1}$$

where x is the year and y is the training expenses. Whereas multimedia animation training costs, including the courseware production and modification costs and new animation courseware production costs. Within all the expenses, only the first production cost the largest amount of money and it is one time input while the new content and upgrading of the animation courseware production costs will increase each year, and the preliminary statistics shows that the growth rate is 20 %. In the power bureau, the training cost of the multimedia animation expenditure curve is:

$$y = 20 \times \left(1.2^{(x-2009)}\right) \tag{88.2}$$

When $x = 2009$, $y = 80$; when $x > 2009$, $y = 20 \times (1.2^{(x-2009)})$. where x is the year, y is the training expenses. The following table shows the costs of the two training approaches and the follow up expenses in the next 2 years of the pilot bureau.

Table 88.1 shows that from 2009 to 2014, the pilot power bureau spent 6.94 million Yuan and 227 Yuan respectively on traditional training and multimedia animation training, the former one is more than three times as much as the latter one. Moreover, the multimedia animation training's advantage on costs appears more remarkable in the following years of usage.

Below is the comparison of the traditional training and multimedia animation training expenses based on Table 88.1 comparison chart.

In Fig. 88.4, we can see that in the pilot power bureau, the cost of traditional training is rapidly rising year by year whereas the multimedia animation training costs is high in the first year due to expense on animation courseware production but the cost is low in other years and it is much less than traditional training costs.

88.4.2.2 Improve the Effectiveness of Training

The assessment method of multimedia animation training is incomparable with the traditional assessment methods. The assessment of multimedia animation training randomly selected topics from thousands of questions on the training platform which involve extensive knowledge, abundant content and display forms. The traditional assessment can only tested through paper-based assessment while multimedia animation training combined with computer technology; manage

Table 88.1 Costs in each year

Years	Traditional training costs (10,000 Yuan)	Multimedia animation training costs (10,000 Yuan)
2009	70	80
2010	84	20
2011	100	24
2012	121	28
2013	145	34
2014	174	41
Total	694	227

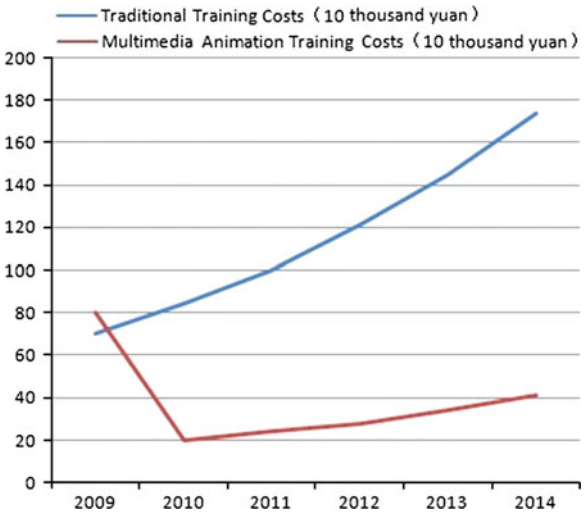

Fig. 88.4 The costs of training implementation in the pilot bureau

assessment questions through training platform. The assessment is integrated of multimedia animation that the assessment questions are displayed in various forms, including traditional examination questions, animated action response questions, and questions and answers with animation. Through the study of the implantation of the training in pilot bureau, we can observed that the participants absorb and mastery new knowledge more easily and their practical operation skills are enhanced greatly.

88.5 Conclusions

The paper put forward a multimedia animation technology-based power dispatching communication professional training system through the analysis of the weaknesses of traditional training system and the demand of power dispatch development and

training. In practice, the use of multimedia technology optimized the training structure system which therefore helps the learning and understanding of knowledge for trainees.

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