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# Factors influencing the training in the railway industry concept formation

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**Abstract**. The presentation analyzes the state of the education system applied in the railway industry, its methods, and provides recommendations for its improvement. The article also includes references to the history of education, mentions modern methodologies, and highlights prospective developments.

***Keywords*****:** *modern learning; e-courses; virtual reality; metavisual; metastation; railroad*

## 1. INTRODUCTION

The railway industry is a complex and fascinating organization with its own peculiarities, challenges, advantages, and disadvantages. The management aims to effectively oversee the company and its personnel, while the employees aspire to work safely for a growing organization.

Before formulating the important factors influencing quality education from our perspective, let's recall the stages of the formation of the education system and how knowledge was transmitted from generation to generation.

## 2. THE EVOLUTION OF KINDS OF TRAINING

History shows that humanity has developed unevenly. Milestone inventions or technological achievements have served as evolutionary leaps. Each new leap in development, starting from the invention of the stone axe, demonstrated how those who kept pace with the times were in a winning position compared to those who were not in a hurry. The metal axe triumphed over the stone one, firearms defeated metal armor, and the invention of shipbuilding and the steam engine made England the ruler of the seas and a global power in the nineteenth century. Those who did not keep pace with the times found themselves on the sidelines of global progress and development.

Fig. 1. Education in primitive times

I believe that the moment when a child of prehistoric times observed what adults were doing (such as making fire, obtaining food, and creating various tools) can be considered as the very first form of training. Then the child would imitate those actions, thereby acquiring basic survival skills in harsh conditions. These were the very first practical lessons.

The increase in life expectancy allowed one person to transmit their knowledge to multiple students simultaneously, and those students, in turn, spread the knowledge through their own pupils. With the emergence of writing, the transmission of accumulated knowledge from generation to generation became easier, eliminating subjective perception in knowledge transmission. Here we can already see examples of lecture-based education with a subsequent writing of abstracts.

Fig. 2. Education in medieval times

The invention of printing significantly changed the world, as knowledge transfer became much simpler and was no longer confined to a specific territory. It became possible to share knowledge with other countries and continents. For a long time, books were the most effective method of information dissemination. Books traveled independently from authors (teachers) and passed on knowledge to those who desired it. This method assumes the presence of an proactive student who chooses any teacher. An enlightened individual could organize production by telling workers what to do.

Fig. 3. Production at the beginning of the 20th century

Technological progress and conveyor production became significant factors in changing the requirements for workers. Responsibilities were divided into specific zones, and employers began to demand clear work functions execution from employees at particular production stages. Productivity and production cost depended on this. The active implementation of robotics began to result in the reduction of unskilled workers, while the value of skilled individuals increased. Engineers started receiving education in institutes, while manual workers typically underwent on-the-job training, with the introduction of the first educational courses and trainings for them.

Fig. 4. Modern automotive manufacturing

The recent invention that we have witnessed together is the application of computers in education, specifically the networking of computers via the Internet. Information has ceased to have boundaries and is now transmitted rapidly over long distances. Technical articles on websites or video tutorials on the construction and maintenance of devices have become widely disseminated among users. The most effective means of learning through computers has become online courses. This method allows for the delivery of narrow, specialized knowledge that is relevant at the moment. The main advantage is that the learning process can be conducted remotely, and the assessment of knowledge level can be delegated to the computer.

## 3.ACCELERATION IS THE FOUNDATION OF MODERN WORLD DEVELOPMENT

The advancement of information technologies in the early 21st century erases temporal boundaries that define new educational technologies, as they rapidly transform. Effective methods evolve while less effective ones recede into the background. Visualization and accessibility of information retrieval come to the forefront, thanks to smartphones. The younger generation is accustomed to receiving information quickly and acquiring skills in an understandable, gamified form.

We have all become accustomed to the ability to quickly search for information through our phones, computers, and tablets, and we prefer to receive it in the form of short video clips on the topic of interest. Additionally, I believe we have all grown accustomed to the constantly increasing level of service in our surroundings. The consumer votes with their feet and moves away from those who do not keep up with progress.

A modern person who is going to learn or is getting a job also wants everything to be easy, fast, and, most importantly, interesting. They want to attend engaging lectures where everything is memorable and participate in practical seminars. They want competent mentors to explain the proper way to service specific machinery.

## 4.TRAINING SYSTEM IN RAILWAY TRANSPORTATION

The foundation of training in railway transportation lies in technical classrooms. Lecture sessions are held on record using posters and stands.

The second most common method of training remains the e-learning, which combines lectures, audiovisual learning materials, and the completion of tests to assess comprehension. The popularity of this form of education is increasing, and the 2020 pandemic has made remote electronic courses almost the main tool for training workers and students.

Practical exercises are conducted at a limited number of training sites where individuals can get acquainted with infrastructure devices and remember the order of technical maintenance. Additionally, individual sessions are conducted at workplaces with a mentor (instructor).

Books on railway exploitation are technically complex and are mainly used by students in preparation for exams.

The established and used training system helps the railway to train specialists who ensure the safety of railway transportation, the stability of its work, but it cannot be considered as modern and effective one.

The effectiveness of the teaching method can be evaluated using Dale's Cone of Experience.


Fig. 5. Edgar Dale's pyramid of learning effectiveness

## 5. INTEGRATION OF MODERN TEACHING METHODS INTO THE TRADITIONAL EDUCATION SYSTEM

According to our interaction experience, we know that most educators want to capture more attention and enhance material retention. The most effective recommendation in this case would be to incorporate modern technologies into traditional teaching methods.

An example of this is gamification and visualization of educational content. Adding 3D atlases to lectures, where the lecturer shows the structure of a train carriage using an interactive model instead of posters or photographs. Students can explore the structure and possible malfunctions from anywhere in the world. By including interactive scenarios in electronic courses, students can practically apply the acquired information without being on actual railway tracks. Learning becomes more engaging, the duration of training is reduced, and the effectiveness of learning significantly improves.

In cases where methods alone are insufficient for effective remembering of processes, we are offering to utilize Virtual Reality (VR) simulators. The development costs for such simulators are substantial, but the use of virtual reality in training is highly effective for practical reinforcement of the learned material. Realizing the significance of this type of training, we are developing a universal virtual constructor to rapidly and effectively create modules for railway personnel training.

## 6. PROSPECTIVE DEVELOPMENTS IN THE EDUCATION SYSTEM

We support the viewpoint that modern trends in communication, shopping, learning, and engaging youth are moving towards the online realm. Soon, we will become accustomed to buying items, conducting online conferences, and learning in virtual universes.

To visualize the training of students in educational institutions, we are developing a virtual MetaStation in the form of a gaming platform. At this station, you can familiarize yourself with the device of the station, its elements, switches, switch electric drives, rails and their connections, with the device and operation of the railway crossing through a computer or virtual reality helmet. Also, inside the Meta-Station, you can take briefings, electronic courses, individual virtual reality modules in various disciplines, or recreate stressful situations (accident, electric shock, train crash) in order to work out the worker's procedure.

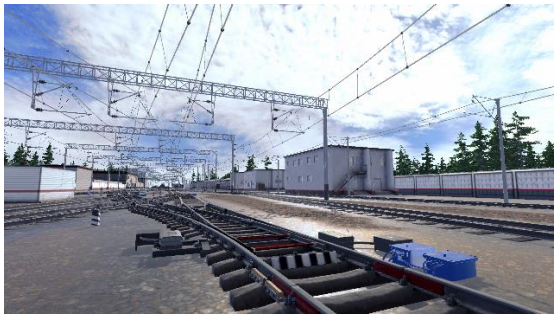

Fig. 6, 7, 8 Metastation developed by Novatrans

Teachers also have the ability to access data on their students' learning progress, such as the courses or modules they have completed and the grades they have received. The virtual station is accessible from almost any internet-connected computer.

## CONCLUSION

The railway is a large company with its sometimes-cumbersome organizational structure. However, recently we have seen positive changes as it strives to provide better services for passengers and shippers, and tries to provide workers with better working conditions. Using modern training methods within the framework of the concept of personnel development, you can effectively educate students, attract new employees to your enterprise and optimize their work processes, reducing costs and minimizing production risks.

## References

Electronic materials:
https://skillbox.ru/media/education/piramida-deyla-pravda-li-chto-obuchenie-na-praktike-luchshe-lyuboy-teorii/