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Technical Railway Schools and Railway Trade Courses

News from the archives
The article in Rail Business [Zheleznodorozhnoe Delo] published 110 years ago, in 1911, analysed in detail the organisation, in modern terms, of professional training and high vocational education of railway employees. Besides, it contains the opinion on curriculum, range of taught disciplines, qualifications, competences, and skills.

Keywords: history, railway, training, vocational school, technical school, training courses.

In his solid work «Railway Confusion», the experienced railway employee N. P. Verkhovskoy expresses the correct thought: «management of railways is entitled with a very special task, which in its seriousness constitutes alpha and omega of the entire railway business – this is precisely development of a systematic organisation of schools and courses, so widespread that not a single railway job position of any technical nature, in the universal sense of the word, might be occupied on the railways by anyone other than a person specially trained to get it». It is absolutely true. Not to mention the higher and middle railway agents, even the lower ones must be sufficiently developed, well-literate and with special knowledge to correctly understand and conscientiously, confidently perform their complex and difficult duties of a technical nature. Of the list of lower, but very responsible, positions, it is necessary to indicate: in the track maintenance service – the positions of senior railway foremen, road foremen, artel elders (senior workers); in the service of rolling stock and traction – steam locomotive drivers and their assistants, foremen, fitters (headmen) of section workshops, drivers of permanent cars of workshops and water pumps, technical agents for transfer of wagons, inspectors of wagons, etc. To train young people who, after completing the course and internship,

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can occupy the listed positions, the Government opened technical railway schools, according to the regulation of 1886. At present, there are 41 technical railway schools. This, a very small number of schools, graduates from their walls a very small and completely insufficient number of persons holding technical positions on the railways. And preparation for practical, conscious activity of graduates of technical railway schools is insufficient. Technical railway schools during their existence have provided many workers in the railway field. Some of them turned out to be very useful for the business, and for some, and, in my opinion, much larger part, it is difficult to consider what, in fact, technical schools gave them. Outstanding in their abilities, former students at technical railway schools should be placed along with good engineering practitioners, for example, in Bologoye of Nikolaevskaya railway, in workshops for overhaul of steam locomotives, master technician K. M. Mikhailov is excellent in engineering for major repairs of steam locomotives. But most of the «technicians» (former pupils of railway schools) have little special railway training, their literacy and general development are very mediocre. Those who graduate from the course of technical schools are inclined to emphasise that they have received a special education and, therefore, in their opinion, they should receive more benefits for promotions and perform easier service. I remember many such claims of «technicians» from my own practice. For example: I assign an assistant driver from the «technicians» to a steam locomotive with coal heating (in the presence of coal and oil steam locomotives); the «technician» comes up with a statement that I should not have appointed him to the difficult job on a coal locomotive, and that is only because he graduated from a technical school. Such an employee does not at all consider the fact that often during a big traffic there is no time to sort out which of the agents to appoint to difficult work, and which to simpler job. Besides, the provision of special privileges to «white-handed technicians» is inconvenient and makes a negative impression with the employees. Apparently, in technical schools, there is an incorrect formulation of the business and a discrepancy between teaching programs and the goal of providing advanced technicians for occupying lower railway positions. The curricula do not contain general education subjects, except for mathematics, which is taught in the smallest amounts. Due to this, the «technicians» are underdeveloped and poorly literate. It might be supposed that at the expense of general educational subjects, special subjects are passed well and can be practically applied in the future: steam mechanics and structures of steam locomotives, railway business, telegraphy, etc., but it is not so in reality. Further, it is bad that the students are not divided according to specialties, into those preparing for the activity: 1) in the traction, and 2) in the track maintenance service; time is not enough, only three years, meanwhile, all students must study in the same amount specialties of both track maintenance service, and of traction service. The results are deplorable. To prove the latter, I will point out the following phenomenon, which I noticed in practice: at examinations in the traction service regarding the positions of assistant drivers, the right to independently control a steam locomotive, the right to accompany trains (passenger) of high speed – to questions regarding arrangement of steam locomotives, their operation, etc. – «technicians» answer no better than ordinary locksmiths of locomotive workshops who have not received any special technical education. And those «locksmiths», or former locksmiths and now practicing agents who got familiar with available manuals for the locomotive service of Bem, Artsish, Kuznetsov, Golubev, etc., and treated the matter with interest and attention during the repair of locomotives, – reveal a more thorough, efficient, and conscious acquaintance with arrangement of a steam locomotive than «technicians». As for acquaintance with the methods of repair, in various cases of breakdowns of parts of the locomotive, then, of course, former locksmiths have got more of it than «technicians». From what has been said, it must be concluded that the special knowledge of the «technicians» on design of a steam locomotive is far from satisfactory. A little knowledge, suitable for business, according to the opinions of competent persons, is given by technical schools in other special subjects. A lot of time is spent by

students at technical schools for practical classes in carpentry, blacksmith's and locksmith's crafts. With a rational formulation of the business, practical exercises should be of great benefit. But unfortunately, the results are bad here too. Technical schools produce very bad locksmiths, while in the traction service at lower technical positions, for example, of drivers and their assistants, there should be persons who know well the locksmith trade. One involuntarily has to give preference to practitioners-drivers and their assistants over «technicians», especially since the best locksmiths distinguished by their work and other merits (perfect sobriety, diligence, and so on) are admitted to the exam to apply for the position of assistant driver.

The organisation of business in technical schools and teaching programs are obviously unsatisfactory. I will not dwell on the project of desired transformations of railway schools, but I will only point out what unsatisfactory organisation of the business has led to. The need for the developed technicians at lowest positions is great in the railway business, while technical railway schools do not satisfy the needs, therefore, I think, on various railways, both public and private, special courses have appeared for preparation of persons suitable to occupy various lower technical railway positions. The Ministry of Railways and administrations of many railways and individuals have decided to meet the urgent challenge. I do not have an exact list of various courses, but I list only those that were discussed in the literature that fell into my hands. For training of railway workshop masters, Warsaw-Vienna Railway has long since opened 4-year courses in Zhbikov. At Kozlov station, Ryazan-Ural railway administration opened a school for training of experienced workers of various occupations. There are evening courses on the Southwest railways. Excellent St. Petersburg railway courses were opened for training traffic agents, also were opened trade courses on the former Kharkov-Sevastopol railway, telegraph schools on the former Yugo-Poltava railway, railway courses for training traffic agents on Ryazan-Ural railway along with similar courses on the South-Western and Transcaucasian railways, a telegraph school on Riga-Oryol railway, evening courses for repair workers on Tashkent railway, etc.; this information is obsolete and incomplete.

The Ministry of Railways has developed a special provision on craft courses. Based on this provision, in January 1904, 2-year trade courses were opened at Bologoye station of Nikolaevskaya railway, at the locomotive overhaul workshops. It seems that nothing has appeared in the newspapers about these courses yet, so I will dwell on the description of their functioning in detail. It is possible that at present the matter has changed in some details; I can give accurate information for the years 1904–1905, when I was a teacher of special subjects, head of graphic arts and secretary of the Pedagogical Council of these courses. The course is attended by young locksmiths and students of locomotive workshops. Admission to the courses is carried out according to the entrance exam in the Russian language and arithmetic. The age of first-year students ranges from 17 to 20 years old (young people are adults, and conscious ones). The number of students was equal (in 1904–1905) to 20–22 per each course. Most of the students before admission studied at the local lower school, many of them completed the full course (6 parts; some left after studying the 6th, 5th and 4th parts). Regular daily classes in the courses are held during the workshop hours – on those days of the week when work is done in the workshops, from 4 to 6 pm and on Sundays and holidays from 12 to 2 hours. On Sundays, descriptive general subjects are taught in both courses: the law of God and national studies; course listeners are released half an hour before the start of the course to go home; in that half hour they must wash their face and hands and put on a clean dress. The courses have their own special premises, although they are insufficient in size (and hence, the limited admission of students). The local head of the traction service section oversees the courses (he is also the head of overhaul workshops for steam locomotives). The teachers are three technology engineers from the traction sectional administration, and three teachers are from the local city school. Classes are held from September 1 to June 1. In 1905, the exams and the first graduation of the students were done in May (with intensified

studies in the second year, up to 4 hours a day – in the last months), i.e., ahead of time, due to the fact that there was a special need for driver assistants for the section, and all those who graduated from the courses in 1905 were tested as driver assistants immediately after completing the course. It is interesting to summarise what and to what extent the students of the courses managed to get acquainted with over the past two years. In the first year the following subjects were taught: the law of God, the Russian language, national studies, arithmetic, geometry, drawing and drafting; in the second year – except for the subjects of the first year: metal technology and technical physics. As for the law of God, the students have passed in two years, in an shortened form, but thoroughly: the history of the Old and New Testaments, Divine services, the catechism and the history of the church. In the Russian language, to which special attention was paid, they went through: etymology, short syntax, brief concepts from the theory of literature. The students have acquainted with the best works of Russian literature, wrote many essays, – for the most part they expounded the content of the read works of Russian literature in their own words. In national studies they have acquainted with the geography of Russia, in connection with acquaintance with the industry and trade of various regions of Russia, and a brief Russian history. In arithmetic they have learnt operations with prime and named numbers, simple decimal and periodic fractions, proportions, percentages, a simple triple rule. For two years, students have solved a lot of problems in all sections of arithmetic and the calculation of algebraic formulas. Problems of a special nature were also solved, for example, calculating the traction force of a steam locomotive, calculating a premium for fuel for steam locomotive crews, etc. Planimetry and stereometry have been learnt in geometry. The stereometry has been learnt in brief and without proofs. Many calculation and construction problems have been solved by the course attendees as well. In drawing, it has been achieved that the students have a decent command of a pencil. The students have been taught drawing techniques, and they made many drawings of simple machine parts. When drawing the details, the teacher familiarised them with the design features of these machine parts; the students learned to read the drawings in a decent manner. The course students were briefly introduced to the technology of metals. Physics was taught under the name «technical physics» in parallel with mechanics and special subjects. The following has been mastered: forces, balance of solid, liquid, and gaseous bodies, heat, balance of forces using examples of simple machines. Many problems have been solved regarding specific weight, leverage theory, etc. The students have been given introductory notes on special subjects: steam boilers, their main types and parts of a steam engine, and the division of steam engines into main types. The acquaintance with steam engines and boilers has been made in brief and only to prepare the students for a detailed acquaintance with the structure and operation of steam locomotives. The teaching on construction of steam locomotives was carried out according to the factory drawings, and visually – on the steam locomotives of the site and according to models, for example, an excellent model of steam distribution in a steam locomotive in $^{1}/_{10}$ of the life size was made, and it was demonstrated in motion. Special information was given about refuelling steam locomotives, flushing, etc. The results achieved by the courses have been quite satisfactory. The courses have made underdeveloped and semi-literate young people sufficiently developed and, of course, literate, able to express their thoughts orally and in writing freely and sensibly. The railway received theoretically trained practicing locksmiths who, having received the positions of locomotive drivers and others, will be quite satisfactory agents. Many thanks must be said to the Administration of Nikolaevskaya railway for furnishing the courses very well, supplying them with all the necessary teaching and drawing aids, accessories, and books. Taking into account the good results achieved by Bologoye courses, one can express the wish that similar courses be opened on all railways. After all, their maintenance is very inexpensive, and the benefits are enormous.

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***(Zheleznodorozhnoe delo [Railway Business]*, 1911, No. 48, pp. 313–315)** ●