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Improvement of the system of professional and job-specific personnel training using digital technologies

5.2.6. Management

ANNOTATION

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Relevance of the research topic. In the context of the digital transformation of organizations and changing requirements for job functions, there is a growing need for personnel training linked to specific work tasks and measurable results. The acceleration of technological change, updates to regulations, and the digitalization of business processes require the human resource management system to identify gaps in professional performance in a timely manner and ensure employees' readiness for independent work.

Traditional mentoring methods, e-learning, and immersive technologies have different capabilities and limitations. At the same time, criteria for combining these methods, organizing practical training, and assessing outcomes remain insufficiently formalized in human resource management practice. Therefore, the managerial task is to make a reasoned choice of training methods taking into account the content of the job task, the employee's initial level of preparation, the risk of error, and the organization's resource constraints.

The need to develop corporate training is confirmed by Russian studies of business digital transformation. The materials of the Institute for Statistical Studies and Economics of Knowledge (ISSEK), HSE University, used in the dissertation, note a shortage of specialists in information and communication technologies and insufficient digital skills among employees for the introduction of new technologies.[1] This increases the importance of in-house training, which makes it possible to align training content with actual changes in professional activity.

This task is of particular importance in financial-sector organizations, where service quality depends on the accuracy of regulated actions and professional interaction with clients. Mentoring makes it possible to master real work situations, but it requires the time of experienced employees and is accompanied by differences in approaches to explanation and assessment. E-learning courses facilitate the dissemination of standardized materials, but do not in all cases provide practical training in job-related behavior.

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[1] HSE University, ISSEK. Availability of Personnel for Digital Transformation: Business Assessments. Business Digital Transformation Monitoring. 2024. URL: https://issek.hse.ru/news/906312383.html.

The use of virtual reality expands the possibilities for repeatedly reproducing professional situations in a controlled environment. A trainee can work through a scenario step by step, receive feedback, and repeat actions until the established criterion is achieved. At the same time, the outcome of VR use is determined by the content of the scenario, instructional design, initial preparation, and the conditions under which the technology is used. International systematic reviews considered in the dissertation confirm the need to take these conditions into account when evaluating immersive learning.[2]

The relevance of the study is determined by the need to develop a managerial approach that integrates diagnosis of initial preparation, selection of a combination of methods, reproducible practice of job-related actions, and a subsequent personnel decision. Comparison of performance, time, and economic indicators makes it possible to assess the feasibility of using digital technologies and the conditions for scaling training within an organization.

The degree of scientific elaboration of the problem. The theoretical foundations of work organization, management, and professional development of personnel are presented in the works of A. Fayol, F. Taylor, E. Mayo, M. Mescon, and other foreign researchers. Their provisions form the basis for considering training as a managerial activity related to the distribution of functions, coordination of actions, and requirements for work outcomes.

In the Russian literature, issues of personnel management and human resource development are addressed in the works of T. Yu. Bazarov, A. P. Egorshin, M. I. Bukhalkov, I. A. Batkaeva, and other authors. Issues of vocational education, training, and the use of digital tools are reflected in the studies of V. I. Blinov, A. Yu. Baranova, E. V. Kashtanova, and D. K. Zakharov.[3] These works

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[2] Conrad M., Kablitz D., Schumann S. Learning effectiveness of immersive virtual reality in education and training: A systematic review of findings // Computers & Education: X Reality. 2024. Vol. 4. Article 100053. DOI: 10.1016/j.cexr.2024.100053.

[3] Bazarov T. Yu. Psychology of Personnel Management: Textbook and Practical Course for Universities. Moscow: Yurait, 2021. 381 p.; Kashtanova E. V., Zakharov D. K. Digital Transformation of the Corporate Training System // Personnel Management and Intellectual Resources in Russia. 2021. No. 1 (52). P. 37–43.

make it possible to consider employee training in connection with the organization of HR processes and changing qualification requirements.

Issues of the digital transformation of economic systems and human capital management are presented in the studies of I. L. Avdeeva, T. A. Golovina, A. V. Polyanin, A. E. Belolipetskaya, and other Russian researchers. The dissertation draws on their provisions concerning the development of digital platforms, changes in managerial tools, and the role of human capital under conditions of technological transformation.

Foreign studies by M. Conrad, D. Kablitz, S. Schumann, R. Bödding, S. A. Schriek, G. W. Maier, H. M. Tusher, S. Mallam, S. Nazir, M. Poupard, and co-authors are devoted to the effectiveness of immersive learning, the development of professional skills, cognitive load, and the conditions for designing virtual learning environments.[4] These works examine the capabilities of the technology and the factors limiting the transfer of obtained results between different learning tasks.

Despite the considerable volume of research, a managerial mechanism linking the requirements of a specific job task and an employee's initial level with the choice of training methods, practical training, measurement of the result, and a subsequent personnel decision remains insufficiently developed. The need to formalize this relationship determined the purpose, objectives, and content of the dissertation research.

The object of the dissertation research is the system of professional and job-specific personnel training in commercial organizations; practical testing was carried out with respect to financial-sector organizations.

The subject of the research is organizational and managerial relations and methods arising in the implementation and evaluation of professional and job-specific personnel training using traditional and digital technologies.

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[4] Tusher H. M., Mallam S., Nazir S. A Systematic Review of Virtual Reality Features for Skill Training // Technology, Knowledge and Learning. 2024. Vol. 29. P. 843–878. DOI: 10.1007/s10758-023-09713-2; Poupard M., Larrue F., Sauzéon H., Tricot A. A systematic review of immersive technologies for education: Learning performance, cognitive load and intrinsic motivation // British Journal of Educational Technology. 2025. Vol. 56. P. 5–41. DOI: 10.1111/bjet.13503.

The purpose of the dissertation research is to develop and substantiate theoretical and methodological provisions and applied tools for improving the system of professional and job-specific personnel training based on a combination of traditional and digital methods, including virtual reality, reproducible practice of job scenarios, and objective assessment of training outcomes.

To achieve this goal, the following tasks were addressed in the study:

- to clarify the content and place of professional and job-specific personnel training in the human resource management system, distinguishing personnel training, professional and job-specific training, and professional and job-specific communication;

- to develop criteria and an algorithm for selecting a combination of traditional and digital methods of professional and job-specific training depending on the job task and the employee's initial level of preparation;

- to develop and test a management model for professional and job-specific personnel training using VR technology, ensuring reproducible practice of job scenarios, recording of results, and feedback for managerial decision-making;

- to develop a mechanism for assessing training outcomes, including accuracy, errors, number of repetitions, achievement of the success criterion, mentor and trainee time, total training cost, savings, ROI, payback period, break-even point, and the scaling effect.

The theoretical and methodological basis of the study comprises the works of Russian and foreign researchers in the fields of personnel management, human resource management, vocational training, digital transformation, and immersive technologies. Training is considered as a managed cyclical process whose content and result are determined by the requirements of a specific job function.

The study used theoretical, logical, and comparative analysis, interviews, questionnaires, testing, and experimental comparison of training formats. Quantitative results were processed using descriptive statistics; Welch's t-test and the standardized effect size Hedges' g were used to compare time in the first

experimental stage. The economic evaluation was performed as a calculation model taking into account the cost of working time, development, equipment, support, and the scale of use of the solution.

The research information base consisted of regulatory legal acts, scientific publications, monographs, conference materials, and Internet information resources. The dissertation uses materials from the official websites of the Bank of Russia, the Ministry of Science and Higher Education of the Russian Federation, the Ministry of Digital Development, Communications and Mass Media of the Russian Federation, as well as analytical reviews by RBC, Interfax, and TASS.

The empirical basis includes the results of interviews, questionnaires, and testing of financial-sector employees, as well as materials from the development and testing of the Wizard of Sales VR simulator. The experimental comparison of training methods involved 22 participants. A separate organizational pilot covered 25 employees from five offices. These stages had independent objectives; data from the two samples were analyzed separately and were not pooled.

Compliance of the dissertation with the Passport of the scientific specialty. The dissertation research was carried out within scientific specialty 5.2.6 "Management" and corresponds to clause 23 "Theoretical and methodological foundations of personnel management. Economic and social objectives of human resource management. Human resource management technologies" and clause 26 "Organization management in the context of digital transformation. Strategies and methods of business digital transformation".

Scientific results obtained by the author personally:

1. The content of professional and job-specific personnel training has been clarified as a managed cyclical process within the human resource management system, including identification of the gap between the required and actual level of performance of job functions, selection of a training method, practical training in professional actions, measurement of the result, and adoption of a personnel decision. Unlike approaches that reduce training primarily to the transfer of knowledge and development of competencies, the author's position establishes a

direct relationship between training and a specific job function and the results of its performance.

Training as a managerial process and professional communication as one of the possible objects of skill development have been distinguished. The approach is focused on standardizable job-related actions; communicative customer-service scenarios serve as the area of practical testing.

2. A combined approach to organizing professional and job-specific personnel training has been developed, differing from general blended learning by the presence of a formalized managerial procedure for selecting a training method. The combination of mentoring, on-the-job training, e-learning, role-playing methods, and VR practice is determined taking into account the type of skill, initial preparation, cost of error, need for simulation, required repeatability, mentor involvement, possibility of objectively recording the result, duration, and training capacity.

3. A management model for professional and job-specific personnel training using VR technology has been developed and tested and implemented in the Wizard of Sales simulator. The model differs in the construction of a managerial cycle: a job task, a parameterized professional scenario, repeated reproducible VR practice, recording the performance of scenario elements, feedback, retraining, or a personnel decision. The scenarios are adapted to banking service and sales operations and can be modified by an administrator without changing the program code.

The tested version implements a pre-defined dialogue tree and trigger words that determine transitions between the stages of the scenario. Speech recognition functions as an interface component ensuring verification of the prescribed speech elements. The specialist responsible for training sets the scenario content and, based on the resulting statistics, decides on repeated practice, adjustment of the task, or involvement of a mentor. Machine learning and generative response generation are not among the tested functions of the simulator.

4. A mechanism for assessing the results of professional and job-specific training has been developed, integrating performance, time, and economic indicators. The first group includes scenario execution accuracy, errors, number of repetitions, stability of the result, and achievement of the success criterion. Time evaluation includes training duration and the time expenditures of the mentor and trainee. Economic evaluation takes into account the cost of working time, development, equipment, and support, the total cost of training, savings, ROI, payback period, break-even point, and the scaling effect.

The mechanism is used to decide whether an employee is ready to perform a job task independently, requires repeated training, or needs additional mentoring. The success criterion is established in advance by the organization. In the experimental comparison, a threshold of 90% correctness in reproducing the scenario was used; this threshold is a condition for completing the task and does not substitute for the group's mean accuracy.

At the first stage of the experiment, the mean time to reach the established criterion was 54.27 minutes using VR and 109.45 minutes under traditional training. The reduction in time was 55.18 minutes, or 50.42%. Mean subjective satisfaction with training reached 4.82 out of 5 for the VR format and 3.80 for the traditional format. These indicators characterize the conditions of the study and are considered separately: the survey-based assessment is not independent evidence of an increase in labor productivity.

The reliability and validity of the research results are ensured by an analysis of Russian and foreign scientific works, the application of a set of general scientific and special methods, the consistency of solving the stated tasks, and comparison of information obtained through interviews, testing, questionnaires, and testing of the simulator. The developed provisions are reflected in the author's scientific publications.[5]

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[5] Golikova G. V., Ivanov S. A. Adaptive Model of Professional and Job-Specific Personnel Training Based on Digital Analytics and Immersive Technologies // Innovative Economy: Information, Analytics, Forecasts. 2026. No. 7. P. 60–71. DOI: 10.47576/2949-1894.2026.7.7.007.

In the first period of the experimental comparison, the difference in training duration was statistically significant: Welch's $t = 10.82$; $p < 0.001$; Hedges' $g = 4.44$. The conclusion applies to the sample studied and the specific scenario. The small sample size and the characteristics of its formation limit the generalization of the results to the entire population of financial-sector employees.

After the training formats were switched, the second period had a crossover structure. A primary dataset with participant identifiers is required for a rigorous assessment of period and sequence effects. The separate five-office pilot is not combined with the experiment involving 22 participants. Sales dynamics are treated as an accompanying indicator because they could have been influenced by external and organizational factors; sales growth is not included in the direct monetary effect of the calculation model.

Theoretical and practical significance of the dissertation research. The theoretical significance of the research consists in the development of provisions of human resource management with regard to professional and job-specific personnel training. Its content has been clarified as a cyclical managerial process linked to a job function; criteria for selecting a combination of traditional and digital methods have been formalized; and the place of VR tools in the system of training and personnel decision-making has been determined.

The practical significance of the research lies in the development and testing of the Wizard of Sales VR simulator, which makes it possible to model typical professional situations, repeatedly practice standardized job scenarios, modify their content by an administrator, and record training results. The computer program is registered with Rospatent; Certificate No. 2024690600 dated December 16, 2024.[6]

The developed tools can be used in designing employee training programs, standardizing service scenarios, and monitoring errors and repetitions. Training results serve as a basis for selecting further training, additional mentoring, or confirming readiness for independent work. The use of the approach in insurance,

[6] Ivanov S. A. Computer Program "Wizard of Sales" (VR Simulator for Developing Employees' Communication Skills). Certificate of State Registration of a Computer Program No. 2024690600. Russian Federation. Registration date: 16.12.2024. Rospatent.

retail, telecommunications, and other sectors with standardizable professional situations requires industry-specific adaptation and independent validation.

For the calculation scenario involving the training of 420 employees annually over five years, the cost of one training session decreases from RUB 7,296.67 to RUB 4,853.98, i.e., by RUB 2,442.69, or 33.48%. Initial investment amounts to RUB 970 thousand; annual support costs amount to RUB 600 thousand. The total five-year economic effect is approximately RUB 5.13 million, the calculated ROI is approximately 50.32%, and the simple payback period for the initial investment is approximately 9.54 months.

These indicators characterize a model of scalable application of the solution under the specified cost parameters and a volume of 2,100 training sessions. The calculated break-even point is approximately 184 employees per year. The economic effect should be assessed taking into account the actual number of trainees and the costs of working time, development, equipment, and support; the calculation scenario does not substitute for the results of experimental testing.

Certain provisions and conclusions of the study can be used in the educational process when teaching personnel management, human resource management, and the digital transformation of organizations, as well as in developing advanced training programs for specialists responsible for corporate training. The applied recommendations are primarily focused on standardizable job scenarios in financial-sector organizations.

Approbation of research results. The results of the dissertation research were presented and discussed at international and All-Russian scientific and practical conferences, including "Digital Region: Experience, Competencies, Projects" (Bryansk, 2022), "International Plekhanov Readings" (Moscow, 2023), "Digital Economy: Problems and Prospects for Development" (Kursk, 2025), and "Management and Social and Humanitarian Knowledge in the Context of Global Transformations" (Voronezh, 2026). Practical approbation was associated with the development and use of Wizard of Sales for practicing professional communication and assessing employee training outcomes.

Publications. Based on the research conducted, 11 scientific papers with a total volume of 4.11 printed sheets were published (the author's contribution is 3.6 printed sheets), including 5 articles in peer-reviewed scientific journals included in the list of the Higher Attestation Commission of Russia. In addition, one intellectual property result was registered — the "Wizard of Sales" computer program.

Structure and content of the dissertation. The dissertation consists of an introduction, three chapters, a conclusion, a bibliography comprising 248 sources, and appendices.

