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Identification of Training Topics for the Improvement of the Relevant Cognitive Skills of Technical Operators in the Railway Domain

Authors : Giulio Nisoli, Jonas Brüngger, Karin Hostettler, Nicole Stoller, Katrin Fischer

Abstract : Technical operators in the railway domain are experts responsible for the supervisory control of the railway power grid as well as of the railway tunnels. The technical systems used to master these demanding tasks are constantly increasing in their degree of automation. It becomes therefore difficult for technical operators to maintain the control over the technical systems and the processes of their job. In particular, the operators must have the necessary experience and knowledge in dealing with a malfunction situation or unexpected event. For this reason, it is of growing importance that the skills relevant for the execution of the job are maintained and further developed beyond the basic training they receive, where they are educated in respect of technical knowledge and the work with guidelines. Training methods aimed at improving the cognitive skills needed by technical operators are still missing and must be developed. Goals of the present study were to identify which are the relevant cognitive skills of technical operators in the railway domain and to define which topics should be addressed by the training of these skills. Observational interviews were conducted in order to identify the main tasks and the organization of the work of technical operators as well as the technical systems used for the execution of their job. Based on this analysis, the most demanding tasks of technical operators could be identified and described. The cognitive skills involved in the execution of these tasks are those, which need to be trained. In order to identify and analyze these cognitive skills a cognitive task analysis (CTA) was developed. CTA specifically aims at identifying the cognitive skills that employees implement when performing their own tasks. The identified cognitive skills of technical operators were summarized and grouped in training topics. For every training topic, specific goals were defined. The goals regard the three main categories; knowledge, skills and attitude to be trained in every training topic. Based on the results of this study, it is possible to develop specific training methods to train the relevant cognitive skills of the technical operators.

Keywords : cognitive skills, cognitive task analysis, technical operators in the railway domain, training topics
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