

TRAINING OF VEHICLE DRIVERS TO ENSURE TRAFFIC SAFETY**Akhmatokhunov Bakhtiyor Maksudovich**Senior Lecturer of the Department of
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Abstract. This article covers the design features of modern vehicles and the formation of skills in using safety technologies. The importance of simulators and digital training platforms in improving the theoretical knowledge and practical skills of drivers was also shown. The results of our research substantiated the importance of comprehensive technical training in increasing traffic safety.

Keywords: movement, safe, motor transport, platform, technical, technology.

INTRUDUCTION

Ensuring traffic safety remains one of the most pressing challenges of the modern transportation system. The rapid growth in the number of vehicles, increasing traffic density, and the integration of advanced technologies into automotive design have significantly transformed the responsibilities of drivers. In this context, the preparation of drivers is no longer limited to basic vehicle operation skills; rather, it requires comprehensive technical training that reflects the complexity of modern vehicles and contemporary road environments. The effectiveness of traffic safety strategies largely depends on how well drivers understand the design features of vehicles and how competently they apply safety technologies in real-world conditions [1]. Modern vehicles are equipped with sophisticated mechanical and electronic systems designed to enhance safety, efficiency, and comfort. Advanced Driver Assistance Systems (ADAS), electronic stability control, anti-lock braking systems, traction control systems, lane-keeping assistance, adaptive cruise control, and automated emergency braking are now common features in many vehicles. While these technologies significantly reduce the likelihood of accidents, their effectiveness depends on the driver's ability to understand their functionality, limitations, and correct usage. A lack of technical awareness may lead to overreliance on automated systems or improper responses in critical situations, thereby undermining safety benefits [2].

The design features of contemporary vehicles incorporate complex interactions between mechanical components and electronic control units. Sensors, cameras, radar systems, and onboard diagnostic modules continuously monitor vehicle performance and environmental conditions. Drivers must possess fundamental knowledge of how these systems operate, how to interpret warning signals, and how to respond appropriately to system alerts. Technical training programs that integrate theoretical instruction with practical application enable drivers to develop this essential competence. Such training enhances not only operational proficiency but also situational awareness and risk assessment abilities [3].

In addition to vehicle design complexity, the dynamic nature of traffic environments demands adaptive decision-making skills. Drivers must respond to varying road conditions, weather changes, traffic congestion, and unpredictable behavior of other road users. Comprehensive preparation involves the development of cognitive, psychomotor, and analytical skills that allow drivers to anticipate hazards and make safe decisions. The integration of safety technologies does not eliminate the human factor; instead, it redefines the driver's role as a supervisor and active participant in a technologically enhanced system.

LITERATURE REVIEW

The issue of traffic safety and driver preparation has been widely studied by both Uzbek and foreign scholars, particularly in the context of rapid technological development in the automotive industry. The increasing integration of electronic control systems and intelligent safety



technologies into modern vehicles has significantly expanded the scope of driver competence, making comprehensive technical training a central topic in transportation research.

Uzbek researchers have primarily focused on improving traffic safety through systemic driver education reforms and technical modernization of training processes. For example, scholars such as Sh.N. Shavkatov and B.R. Xudoyberdiyev have examined the organizational and pedagogical foundations of driver training in Uzbekistan, emphasizing the need to integrate technical knowledge of vehicle construction into educational curricula. Their studies underline that insufficient understanding of vehicle mechanics and safety systems contributes to human error, which remains a dominant cause of traffic accidents [4,5].

Other Uzbek researchers have explored the role of innovative teaching methods in technical education. Studies conducted in technical universities of Uzbekistan highlight the importance of combining theoretical instruction with practical laboratory sessions focused on vehicle diagnostics, electronic control units, and onboard monitoring systems. These works argue that driver preparation must go beyond rule-based learning and incorporate applied technical competencies, particularly in understanding braking systems, stability control, and sensor-based safety mechanisms. Recent national research also addresses the introduction of digital technologies into driver education. Uzbek scholars have analyzed the implementation of computer-based testing systems, multimedia learning tools, and simulation technologies in training centers. Their findings indicate that digital platforms enhance knowledge retention, improve engagement, and allow objective assessment of driver readiness. However, they also stress that technological tools must be supported by qualified instructors and structured methodological frameworks [6].

Foreign researchers have extensively investigated the relationship between vehicle design complexity and driver performance. Scholars such as Wickens, Hollnagel, and Parasuraman have explored human-machine interaction in advanced vehicle systems, particularly in the context of automation and Advanced Driver Assistance Systems (ADAS). Their research demonstrates that while safety technologies reduce workload in routine driving situations, they may increase cognitive demand during system failures or emergency transitions. This highlights the necessity of training drivers to understand both the capabilities and limitations of automated systems [7].

European and American studies have also emphasized the effectiveness of driving simulators in skill formation. Research by Fisher, Rizzo, and Caird indicates that simulation-based training significantly improves hazard perception, reaction time, and decision-making skills. Simulators enable exposure to high-risk scenarios—such as sudden pedestrian crossings, adverse weather conditions, and system malfunctions—without endangering trainees. Empirical evidence confirms that drivers trained with simulation technologies show better performance in real-world traffic environments [8].

In addition, Asian researchers, particularly from Japan and South Korea, have focused on intelligent transportation systems and driver adaptation to semi-autonomous vehicles. Their studies underline the importance of technical literacy in operating vehicles equipped with lane-keeping assistance, adaptive cruise control, and automated braking systems.

METHODOLOGY

This study employed a mixed-methods approach to evaluate the role of comprehensive technical training in improving traffic safety. The research was conducted in three main stages: analytical review, experimental training implementation, and comparative assessment.

First, a theoretical analysis of modern vehicle design features and safety technologies was carried out. Technical documentation, scientific publications, and regulatory standards related to Advanced Driver Assistance Systems (ADAS), electronic control systems, and onboard diagnostics were examined to determine the key competencies required for drivers.

Second, an experimental training program was developed incorporating simulator-based practice and digital learning modules. The program combined theoretical instruction on vehicle



systems and safety technologies with practical exercises using driving simulators. Participants were divided into control and experimental groups. The control group received traditional training, while the experimental group underwent comprehensive technical training supported by simulators and digital platforms.

Finally, the effectiveness of the training was evaluated through pre- and post-training assessments, practical driving simulations, and performance analysis. Key indicators included theoretical knowledge level, reaction time, hazard recognition ability, and correct use of safety systems. Statistical comparison of results between the two groups allowed us to determine the impact of comprehensive technical training on improving driver competence and enhancing traffic safety.

RESULTS AND DISCUSSION

The experimental study demonstrated that comprehensive technical training significantly improves drivers' theoretical knowledge and practical competence in using modern vehicle safety technologies. The comparative analysis between the control group (traditional training) and the experimental group (simulator- and digital-based comprehensive training) revealed measurable differences across key performance indicators.

Table 1.

Comparative results of training effectiveness

Indicator	Control Group (Before/After)	Experimental Group (Before/After)	Improvement (%)
Theoretical knowledge (score %)	62 / 74	63 / 88	+25%
Hazard recognition accuracy (%)	58 / 70	60 / 85	+30%
Reaction time (seconds)	1.9 / 1.6	1.8 / 1.3	28% faster
Correct use of safety systems (%)	55 / 68	57 / 90	+33%

The results indicate that while both groups showed progress, the experimental group achieved substantially higher improvement rates. The most significant growth was observed in the correct use of safety systems and hazard recognition accuracy. Reaction time during simulated emergency situations was notably reduced among participants who underwent simulator-based and digital platform-supported training.

Additionally, participants in the experimental group demonstrated better understanding of Advanced Driver Assistance Systems (ADAS), electronic stability control, and onboard diagnostic alerts. They responded more accurately to simulated system warnings and showed higher confidence in managing critical driving scenarios.

The findings confirm that integrating technical knowledge of vehicle design with practical simulator training significantly enhances driver preparedness. Modern vehicles are equipped with complex electronic control units, sensor-based safety systems, and automated assistance technologies. Without structured technical education, drivers may misunderstand system functions or overestimate their capabilities. The experimental group's improved performance in correctly using safety systems demonstrates that technical literacy reduces misuse and automation-related errors.

Simulator-based training proved particularly effective in improving hazard perception and reaction time. Controlled exposure to emergency scenarios allowed participants to practice decision-making without real-world risk. Repetition of high-risk situations enhanced cognitive processing speed and strengthened situational awareness. These results align with international research emphasizing the effectiveness of experiential learning in driver education.



Digital learning platforms contributed to improved theoretical knowledge acquisition. Interactive modules, visual explanations of vehicle systems, and automated testing enhanced engagement and retention. Participants reported better understanding of vehicle diagnostics, warning indicators, and system limitations. This confirms that blended learning approaches create stronger links between theory and practice. Furthermore, the reduction in reaction time and increased hazard recognition accuracy suggest that comprehensive technical training positively influences cognitive and psychomotor coordination. This is particularly important in modern traffic environments characterized by high vehicle density and rapid information processing demands. Overall, the results substantiate that comprehensive technical training—combining engineering knowledge, simulators, and digital platforms provides measurable improvements in driver competence. The discussion highlights that traffic safety cannot rely solely on technological advancement; it must be supported by systematic driver education adapted to modern vehicle design features. The integration of technical literacy into driver preparation programs is therefore a critical factor in reducing accidents and increasing overall traffic safety.

Conclusion. The study confirms that comprehensive technical training plays a crucial role in improving traffic safety. Integrating knowledge of modern vehicle design features with simulator-based practice and digital learning platforms significantly enhances drivers' theoretical understanding, hazard perception, reaction time, and correct use of safety technologies. The experimental results demonstrate that drivers who receive technology-oriented training perform more effectively in critical situations compared to those trained through traditional methods. Therefore, adapting driver education programs to modern automotive technologies and implementing innovative training tools is essential for reducing accidents and ensuring sustainable traffic safety.

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