Simulator Training Improves Driver Efficiency: Transfer From the Simulator to the Real World

Safety, maintenance, and fuel economy play crucial roles in the success of truck fleet operation. High-fidelity simulation offers the potential for providing a cost-effective method for improving drivers' performance. But what are the crucial elements to include in simulation and how effective is the transfer of training from the simulator to the real world? Here we report the results of a simulation study conducted by GE I-Sim to quantify the improvement in fuel efficiency for CDL truck drivers.

Forty drivers were selected from a local commercial trucking company that maintained precise records on drivers' history, fuel efficiency, type of vehicles driven, and trucking routes. These drivers participated in a two-hour training program that incorporated a combination of 19% lecture, 24% computer-based training, and 57% simulator training. The training focused on ways to optimize shifting to maximize fuel efficiency (e.g., progressive shifting, double clutching, timing, and appropriate gear selection). Transfer of training was assessed over a five-week interval following training using measures of fuel consumption obtained by the driver in their own vehicle driving their normal route.

Training increased fuel efficiency by an average of 4%, $F(1,39)=25.8$; $p<.01$; Cohen's $d=1.63$. An analysis across the five weeks following training indicated that the benefits of training persisted throughout the post-training interval. In fact, there was no measurable loss of training over the 5 weeks. These benefits of training were obtained even for the subset of drivers who changed vehicles after training, indicating that drivers learned a general skill that transferred from one vehicle to another. Additional analyses focused on which drivers benefited the most from training. We sorted the drivers into one of two groups, based on pre-training fuel efficiency (i.e., above and below the median). Our analysis indicated that those drivers with the lowest pre-training fuel efficiency benefited most from training (with over 6% improvement in fuel efficiency), while those with the highest pre-training fuel efficiency did not benefit significantly from training, $F(1,38)=6.9$, $p<.01$; Cohen's $d=0.85$. Apparently, drivers above the median were closer to asymptotic levels of performance and had little room left for improvement.

Together, our data validate the transfer of simulator training to real world driving, as drivers incorporated the methods of optimal shifting into their driving practices. Moreover, the benefits of training appear to be durable and tend to benefit most those drivers whose performance was initially below the median on fuel efficiency.

Cost-benefit analysis suggests that simulator-based training provides an effective means for reducing operating expenses for commercial trucking, particularly so for less skilled drivers.