

Driving with Partial Driving Automation Systems: Developing Effective Training that Drivers Will Use

INTRODUCTION

Technologies that partially automate some aspects of driving are becoming increasingly common in vehicles. These technologies have the potential to make driving more comfortable and possibly safer. However, it is important for drivers to understand the capabilities as well as the limitations of these technologies in order to use them safely. Previous research has shown that formal instruction improves drivers' understanding of these technologies; however, most drivers do not seek nor receive formal instruction. Instead, most drivers learn mainly by trial and error.

This project employed a multi-phased approach, centered on principles of adult learning, to investigate features of formal training that would increase the likelihood that drivers would choose to engage with and complete the training. First, the research team held a workshop to solicit input from a multidisciplinary group of experts on a variety of possible approaches to training. Next, concepts were developed for several different approaches to training, and drivers' reactions to them were assessed in focus groups. Finally, an on-road experiment was conducted to investigate drivers' actual engagement with various forms of training materials that were made available to them.

METHODOLOGY

A one-day workshop was convened to gain insights from a multidisciplinary group of experts regarding the most promising approaches to fostering driver engagement in formal training about partial driving automation technologies in vehicles. Prior to the workshop, the research team developed four training concepts:

- A booklet or flip-book
- A video played on a screen in the vehicle's center stack while the vehicle is parked
- An in-vehicle demonstration by a live person
- Interactive in-vehicle training designed to be performed while driving

Workshop participants' general perspectives regarding training content, delivery mode, potential efficacy, and knowledge gaps, as well as their reactions to these training concepts, were gathered through presentations,

TECHNICAL REPORT:

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ABOUT THE AAA FOUNDATION FOR TRAFFIC SAFETY

Founded in 1947, the AAA Foundation for Traffic Safety in Washington, D.C., is a nonprofit, publicly supported charitable research and educational organization dedicated to saving lives by preventing traffic crashes and reducing injuries when crashes occur. Funding for this research was provided by voluntary contributions from AAA/CAA and their affiliated motor clubs, individual members, AAA-affiliated insurance companies, and other organizations or sources.

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discussion, and breakout groups. Results were used to develop draft training modules.

Next, four focus groups were conducted with drivers who owned vehicles equipped with partial driving automation systems. The focus groups investigated participants' experience learning to use partial driving automation systems, their general thoughts on training for such systems, and their reactions to the draft training modules.

Finally, an on-road study was conducted to assess drivers' voluntary engagement with training in a realistic setting. The design of the training modules was informed by the previous phases of the project. Participants were recruited for a study in which they were told they would drive a new electric vehicle. They were instructed to drive a 2023 Ford Mustang Mach E (which they were told was a prototype vehicle being studied) on a simple 107-mile route and to use the vehicle's partial driving automation system. Training materials developed by the research team were made available, but participants were not explicitly instructed to use them. Half of the participants had access to an in-vehicle video that could be watched while the vehicle was parked. The other half had access to a series of short interactive training messages, which the driver was invited to play at preset locations along the route. All participants also had access to a simple flip-book placed on the front passenger seat. Participant engagement with the training was assessed using in-vehicle cameras and other data collection tools as well as a post-drive survey.

KEY FINDINGS

Results suggest that interactive in-vehicle training may be a promising approach to increase drivers' engagement with formal instruction about safe and proper use of partial driving automation technology.

In the workshop, the experts highlighted the following:

- Strengths and weaknesses of each training approach, and the importance of capitalizing on the strengths of each one
- The importance of ensuring that any training approach is consistent with key principles of adult learning and motivation

In focus groups, participants had the following reactions:

- Reported learning mainly through trial and error, and that they did most of their learning about the vehicle's technology in the vehicle itself and/or with family or friends
- Rejected the idea of an in-person demonstration (e.g., from dealership personnel), despite their preference for learning in the vehicle
- Expressed that they wanted training to be broadly available, self-paced, easy-to-use, and to improve the transparency of how the technology works

In the on-road study, results showed the following:

- Participants were significantly more likely to report using the interactive training than the video or the flip-book
- More than 80% of those who were given access to interactive training completed most or all of it, and the majority appeared to pay attention to it
- In the post-drive survey, the majority of participants (66%–74%) said that they would use each of the types of training examined if it were available in a rental car

Several limitations should be noted. Development of market-ready interactive in-vehicle training would pose many challenges. In this study, the research team took great care to ensure that the training would not be excessively distracting, plotted a fixed route expected to have only light traffic, and programmed the training to begin at specific locations deemed safe (e.g., driving straight, no merging traffic). Such safeguards would be important but challenging to implement in a more general use case. While the study attempted to create a realistic setting to examine drivers' voluntary engagement with training, more research is needed to determine the extent to which drivers would actually engage with similar training in a true real-world context. Finally, this research focused on measuring drivers' engagement with training; training efficacy was not examined and requires additional research.