To what extent does automated technology have a focus in today's driver training?

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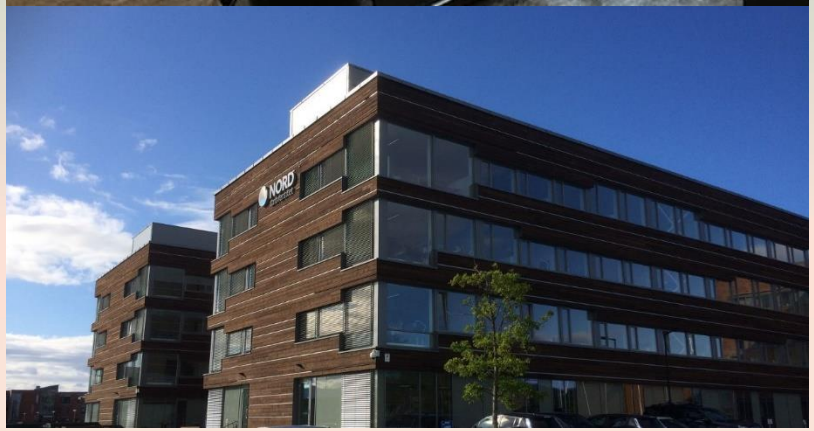
200 students to be trained traffic teachers'

-Road Traffic rules
-Pedagogical subjects
-Skill training
-Psychology
-Technical competence
-Technical development



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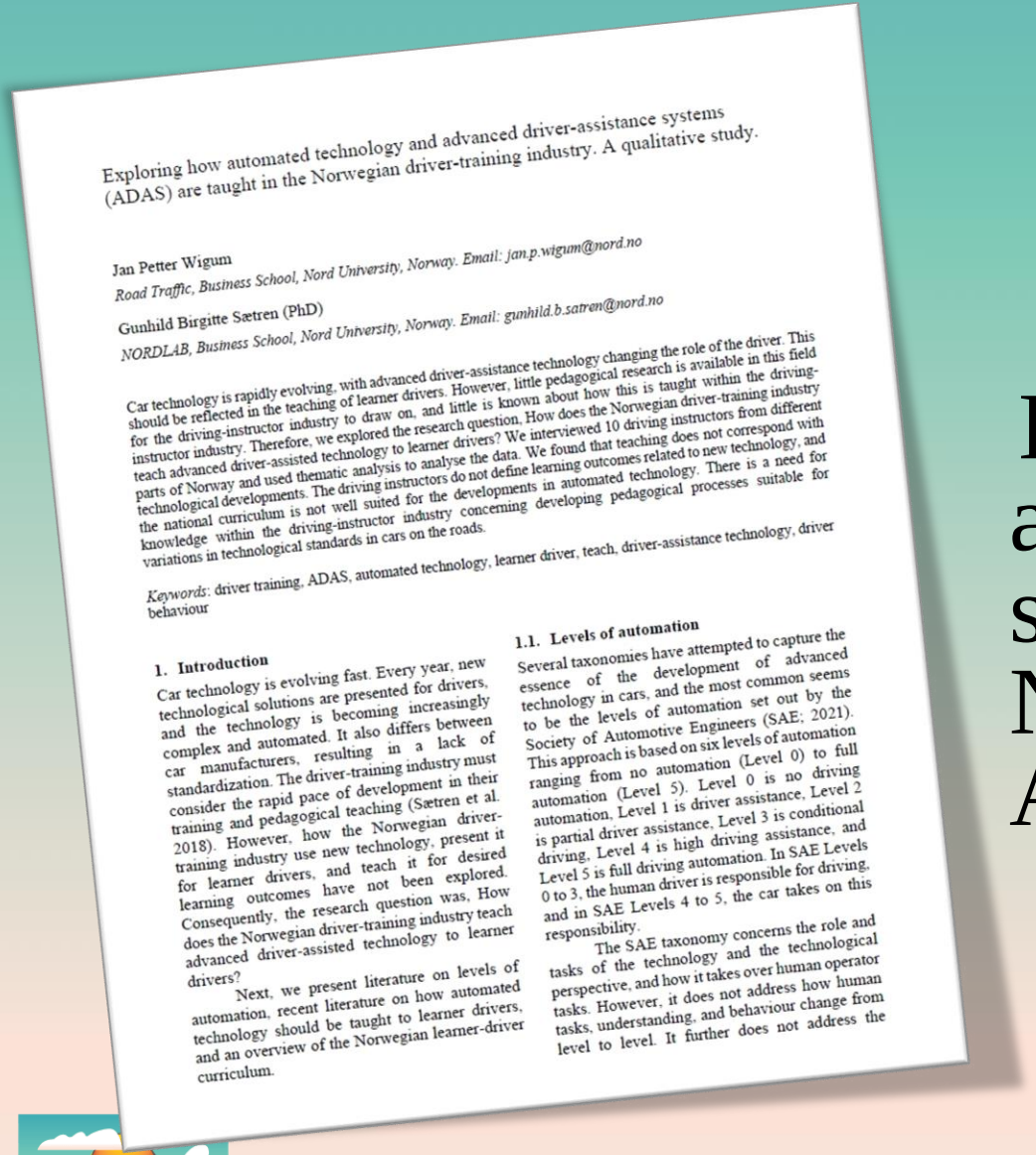

Exploring how automated technology and advanced driver-assistance systems (ADAS) are taught in the Norwegian driver-training industry. A qualitative study.

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Car technology is rapidly evolving, with advanced driver-assistance technology changing the role of the driver. This should be reflected in the teaching of learner drivers. However, little pedagogical research is available in this field for the driving-instructor industry to draw on, and little is known about how this is taught within the driving-instructor industry. Therefore, we explored the research question, How does the Norwegian driver-training industry teach advanced driver-assisted technology to learner drivers? We interviewed 10 driving instructors from different parts of Norway and used thematic analysis to analyse the data. We found that teaching does not correspond with technological developments. The driving instructors do not define learning outcomes related to new technology, and the national curriculum is not well suited for the developments in automated technology. There is a need for knowledge within the driving-instructor industry concerning developing pedagogical processes suitable for variations in technological standards in cars on the roads.

Keywords: driver training, ADAS, automated technology, learner driver, teach, driver-assistance technology, driver behaviour

1. Introduction

Car technology is evolving fast. Every year, new technological solutions are presented for drivers, and the technology is becoming increasingly complex and automated. It also differs between car manufacturers, resulting in a lack of standardization. The driver-training industry must consider the rapid pace of development in their training and pedagogical teaching (Sætren et al. 2018). However, how the Norwegian driver-training industry use new technology, present it for learner drivers, and teach it for desired learning outcomes have not been explored. Consequently, the research question was, How does the Norwegian driver-training industry teach advanced driver-assisted technology to learner drivers?

Next, we present literature on levels of automation, recent literature on how automated technology should be taught to learner drivers, and an overview of the Norwegian learner-driver curriculum.

1.1. Levels of automation

Several taxonomies have attempted to capture the essence of the development of advanced technology in cars, and the most common seems to be the levels of automation set out by the Society of Automotive Engineers (SAE; 2021). This approach is based on six levels of automation ranging from no automation (Level 0) to full automation (Level 5). Level 0 is no driving automation, Level 1 is driver assistance, Level 2 is partial driver assistance, Level 3 is conditional driving, Level 4 is high driving assistance, and Level 5 is full driving automation. In SAE Levels 0 to 3, the human driver is responsible for driving, and in SAE Levels 4 to 5, the car takes on this responsibility.

The SAE taxonomy concerns the role and tasks of the technology and the technological perspective, and how it takes over human operator tasks. However, it does not address how human tasks, understanding, and behaviour change from level to level. It further does not address the

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Relevant content in the curriculum defines various areas in which new technology can be implemented

Test

Level 4

Level 3

Level 2

Level 1

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Methods

- A qualitative design for this study, conducting semistructured individual interviews and using thematic analysis to analyze the transcribed interviews
- The informants for this study were driving teachers. For a varied sample, we invited driving teachers from different parts of Norway with varying experience in teaching learner drivers
- Due to coronavirus restrictions, the interviews took place digitally via Zoom Meetings or Microsoft Teams or telephonically. All interviews lasted 45–60 minutes and were transcribed for analysis
- Before the interviews, we developed an interview guide that consisted of themes and questions regarding how driving teacher implemented technology in their teaching

> *"What learning outcome is your objective for your learner drivers when you teach about new technology in cars?"*

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Results

Themes related to automated technology and advanced driver-assistance systems (ADAS) taught in the Norwegian driver-training industry

Category	Illustrative explanation
1 Level of training and learning	Training and learning do not align with technological developments.
2 Learning outcomes	The driving teacher does not define the learning outcomes besides the learner driver's experience.
3 Potential and limitations of the curriculum	The curriculum is vague on specific formulations that deal with technology. The concept of driver-support systems has a broad scope for interpretation.
4 Need for knowledge	The driving teacher recognizes a great need for new knowledge about technology but is uncertain about how to update such knowledge.

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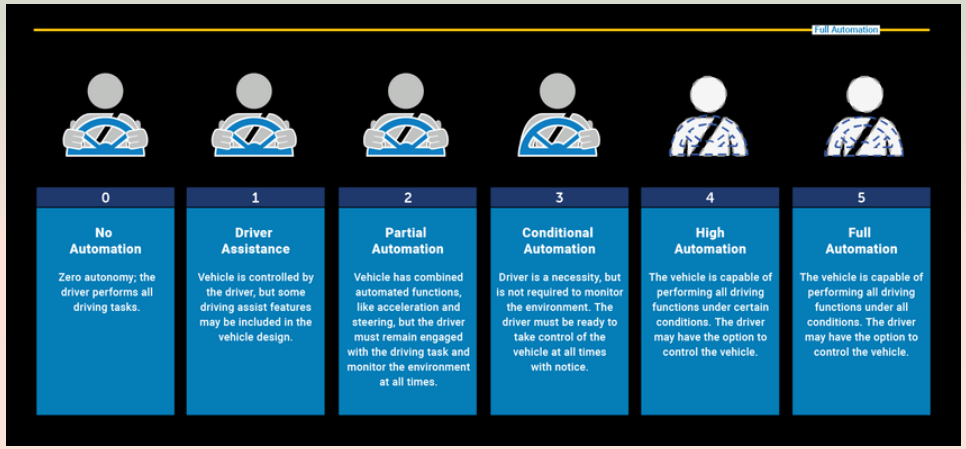

(3) (PDF) Assessing Alternate Approaches for Conveying Automated Vehicle "Intentions" (researchgate.net)

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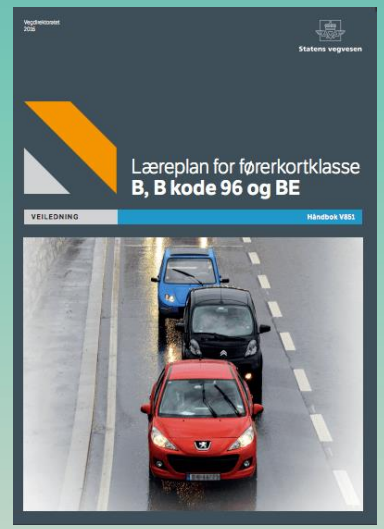

Potential and limitations of the curriculum

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The concept of driver support systems has a large scopes for interpretations

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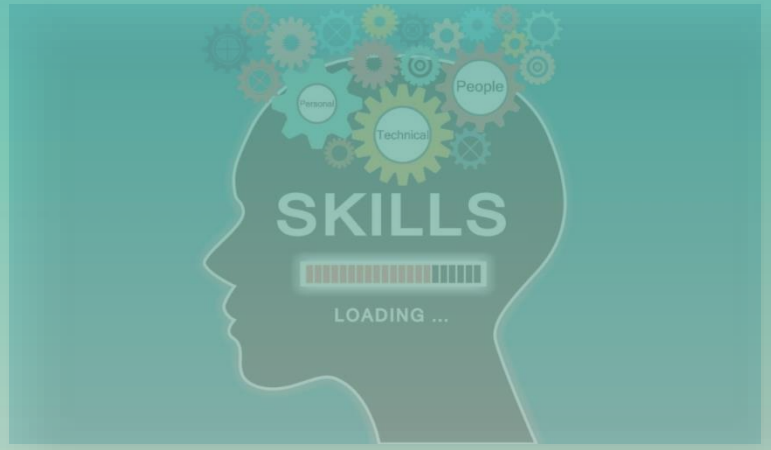

Need for knowledge

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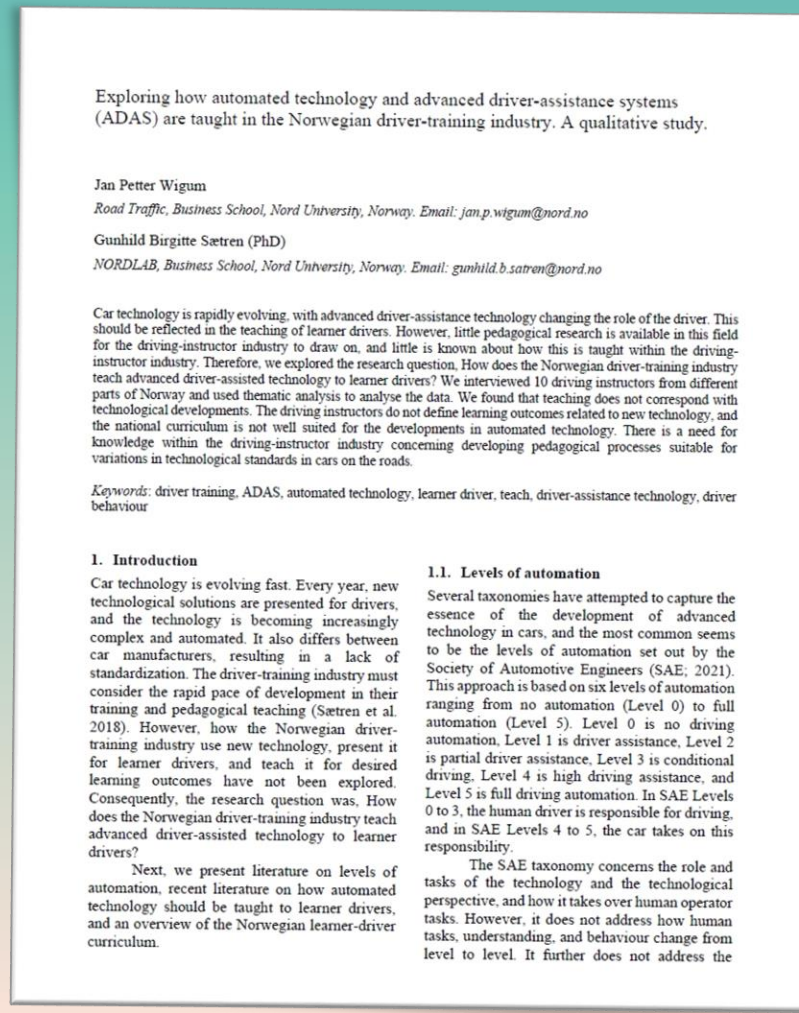
Conclusion

The driving-instructor industry is in the midst of great technological change. There is no formal way of updating instructors' knowledge; thus, there are large variations in teaching new technology based on instructors' own interest in keeping up to date with these technological developments.

Considering the variations in the technological standards in cars on Norwegian roads, these variations must be reflected in the driver-training programme as well.



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