Enhancing driver education with driving simulators: what do novice drivers perceive as effective?

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Abstract

Technology developments, and particularly driving simulators, provide an opportunity to bridge the gap between research and practice in driver training. However, few studies investigate how young people are likely to engage with technologically-augmented driver education using driving simulators. This study surveyed novice drivers aged 18 to 20 with provisional driving licenses (N=273) and investigated their perceptions of what medium and high fidelity simulators could be effective at if included in a driver education course. We found that, despite a large focus on procedural skills, novice drivers thought that simulators could be used also for higher level skills, and that it aligned with their expectations about driver education, which suggests that enhancing this countermeasure with driving simulators would be accepted by novice drivers.

Background

Previous research suggests that conventional driver education may improve a range of driving skills but most evaluations show it to have a negligible impact on crashes (Beanland, Goode, Salmon, & Lenne, 2013). This shortcoming can be partly explained by the lack of emphasis of conventional training on the perceptual and cognitive skills required for safe driving (Watson, 2003), despite research suggesting good practice should largely focus on training such higher level skills. This highlights a misalignment of the perceptions of what should be taught during driver training from various stakeholders. The Goals for Driver Education (GDE) was developed to provide guidance about the types of skills that should be considered to increase the effectiveness of formal driver education (Berg, 2006). It has also been shown that driving simulators can be effective for training higher-order cognitive driving skills (Pollatsek, Vlakveld, Kappe, Pradhan, & Fisher, 2011), suggesting that they could be used to enhance driver education. However, research also indicates that it is important to consider end-user perceptions of technology (King & He, 2006) in order to ensure their uptake. The aim of this study is to examine novice drivers' perceptions about what driving simulators could be used to teach, and how this relates to their beliefs about what should be taught in a driver education course, in order to understand whether driving simulators are likely to be an effective facilitator for aligning driver training with state of the art research.

Method

Provisional drivers (Queensland P1 and P2) ($N = 273$; $M_{age} = 18.8$ years [$SD = .8$]; 76% female) completed an online survey about driver education and driving simulators. Participants were recruited via university research participation pools, social media, email lists, recruitment flyers and word-of-mouth. Using the GDE as a framework, likert-type questions examined perceptions about what skills and attributes formal driver education should focus on developing, considering the difference between medium and high fidelity simulators. Regression analyses were used to identify which levels of the GDE novice drivers perceive as the most effectively trained with driving simulators.

Results

The results (see Table 1) indicated that novice drivers thought that all levels of the GDE should be taught in formal driver education, but placed more importance on Levels 1 and 2. Similarly, they perceived simulators to be most efficient for these lower levels. Regression analyses highlighted that the more novice drivers reported that it was important to train GDE Level 2 (interactions in traffic), the more the use of a medium fidelity simulator was likely to be effective at enhancing such training (β = .20; t = 2.6, DF = 270, p = .001). Similar results were observed for high fidelity simulators (β = .19; t = 2.5, DF = 268, p =.012). Alternatively, the results suggest that the more they thought driver training should focus on teaching Level 3, the less they thought a driving simulator of any kind would be effective (β = -.10; t = -1.8, DF = 268, p =.070). Overall, novice drivers thought that high fidelity simulators would be more effective than medium fidelity ones (β = 3.9 versus β = 4.6; t = 15.9, DF = 270, p < .001).

Table 1. Perceptions of the skills that (i) driver training should focus on, and (ii) driving simulators are effective at training

	Level 1: vehicle manoeuvring	Level 2: mastery of traffic situations	Level 3: goals and context for driving	Level 4: goals for life/ skills for living
Skills that driver education should focus on (Likert scale 1-5)	4.0 [SD=.7]	4.3 [SD=.7]	3.7 [SD=.9]	3.8 [SD=.9]
Skills that simulators can effectively train (Percentage [95th confidence interval])	30.3 [24.7 - 35.9]	27.9 [22.5 - 33.3]	25.2 [20.0 - 30.4]	18.8 [14.1 - 23.5]

Conclusion

Young drivers in this study believed simulators could be used to train a range of skills, although most commonly those related to Vehicle Manoeuvring (Level 1) and Mastery of Traffic Situations (Level 2). The negative relationship between Level 3 and simulator effectiveness indicates that young drivers believed simulators would be less effective at educating motivational aspects of driving less related towards the immediate driving task. These results align somewhat with previous research examining perceptions of simulators (Rodwell et al., 2017; Rodwell et al., under review). Importantly, while novice drivers thought that high fidelity simulators would be more effective, medium fidelity ones – which are more likely to be used by driver education organisations (Lang et al., 2007) - were also considered as very effective. This suggests that driving simulators are likely to be accepted by novice drivers in a technologically-augmented driver education program, and could be an effective facilitator to increase training of higher level driving skills.

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