Route learning for novice train drivers typically consists of initial classroom-based instructions followed by on-the-job training under the guidance of tutor drivers. Whilst simulators have the potential to provide complementary off-the-job support, their adoption and integration in the train-driving curriculum is not pervasive. This is despite their well-recognised strength as an optimal learning environment for the mediation of structured practice opportunities and provision of effective feedback.

This paper describes a research project that is currently underway to prototype a novel simulator-based learning aid for the development of trainee drivers' route knowledge. The underlying concept is driven by a recent study that found a lack of congruency between route schematic displays used in simulators and the expert train drivers' mental model; thus suggesting that their utility as a device to aid learning needs further optimisation. A review of literature on the use of expert cues to accelerate competency development also suggests a shortage of empirical studies that have investigated their implementation in the development of simulation-based training for train drivers. More broadly, the research knowledgebase does not disclose many route learning simulators that have been specifically designed with the novice train drivers' needs in mind.

The proposed conceptual design for the route learning aid comprises an augmented-virtual reality environment for the out-of-cab vision display in a train-driving simulator, featuring CGI of the route superimposed with critical cues obtained from expert train drivers. The style of augmentation for the corresponding expert cues is still under investigation and could be implemented in one of two ways: (1) a direct approach that highlights the cues; or (2) a reduction in the overall route fidelity in a way that heightens the visibility of the critical elements. The chosen strategy will be established through empirical evidence gathered during the course of the research. For the pilot prototype design, these scaffolds will be displayed for initial training in a baseline driving conditions whereby characteristics of the route, train, environment and associated risks are identified as normal or typical.

The prototype design incorporates a mixed-methods research and development framework. In its initial stage, a series of field studies will be conducted to gather information on route learning strategies and expert route knowledge dataset from a number of Australian rail operators. This is currently in progress and preliminary results from this undertaking will be shared in the paper. The next phase will involve an iterative development cycle, followed by an evaluation of the produced prototype against an archetypical simulator display and route map.

The overall aim of this research project is to investigate how simulators could be utilised for route learning through a constructivist approach to competency development and by greater integration in the curriculum, including: structured practice opportunities during initial stages of training and parallel rehearsal support for on-job training, improvement in the blending of theoretical and practical aspects of the syllabus, and the development of criteria mental model references of route knowledge for competency-based training and assessment needs.