Driving Simulator Vehicular in Brazil: Initial implementations in a Training Center for Drivers

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Abstract - The Brazilian Legislation determines the accomplishment of five classes in a Simulator of Vehicular Direction of compulsory form in the formation of the future conductors of the country. The theme is based pedagogically on the learning theories of Piaget and Vygotsky and is in line with the structure of the European Matrix DGE. The data from this study demonstrate a 27% increase in the approval rate of students trained in driving simulator in relation to untrained students in a Brazilian Driver Training Center. It also shows an increase of 18.5% in passing examinations in the first two attempts. Although several studies have shown positive results on the validity of the simulator in training of drivers and their theoretical and pedagogical foundations are clear and the legislation is incisively established, the reflections about these fundamentals are still recent in Brazil and they need more attention to reach the expected objectives .

Keywords: Driving simulator ; Virtual reality; Training of drivers; Traffic Safety; Enablement.

Introduction

The legal discussion about the use of simulators in the Brazilian qualification process began in the second half of the twentieth century (CONTRAN, 1976). Currently, Brazilian legislation establishes five (5) classes using a basic-level vehicular management simulator (SDV) as a didactic-pedagogical resource in a compulsory way in the training of future drivers in the country.

Studies indicate that training in a steering simulator has good Learning Transfer Rates of the lessons learned, and conventional training in conjunction with simulator training leads to a higher qualification of the learner (Hirsch, Bellavance and Pignatellelli 2011). Objective evidence in publications demonstrates the benefits of using simulation as a scientific and pedagogical procedure in the training of future drivers as well as professional drivers (Alen et al., 2013, Hirsch, 2015 and Kapppe, 2005).

For Morgan et al. (2011) these findings indicate the need for a minimum level of skills and abilities acquired with the support of the simulator to enter the next levels of learning. This argument is consonant with Vygotsky's theory, which argues that learning is necessarily linked to a social context, and as a complement to Piaget's constructivist cognitive theory, which understands learning to be largely a process of internal construction within the individual , although this can be socially motivated (Piaget, 1976; Vygotsky, 1981).

Through a review of the literature on the validity of the use of simulation in the training of new drivers.

this study aims to compare the results of the students trained in direction simulator compared to the untrained students in relation to the pass rate in the exams.

The Matrix GDE

Of Finnish origin, the GADGET matrix is a structure that describes the task of driving based on a hierarchy aiming at helping in the elaboration of school curricula of driving. The DGE Matrix guidelines have been widely recognized in Europe as a theoretical starting point for the development of driver education and training (PERÄAHO, KESKINEN and HAKAKA, 2003).

Level 4 "Goals and Skills for Life" is the highest hierarchical level and refers to personal motivations and tendencies in a broader conception. Level 3 "Driving Goals and Context" denotes a focus on the goals behind the driving and the context in which the task is performed. Level 2 "Domain of Traffic Situations" is related to the act of mastering driving in traffic situations. And Level 1 "Vehicle Maneuver" is focusing on the vehicle, its design and the way the driver performs the maneuvers.

Analyzing the current curricular contents established by the Brazilian regulations for driver training, we can identify that the training in driving simulators focuses on the characteristics in Level 1 of the DGE Matrix, in which the basic concepts of vehicle use are taught, for example , the contact, accommodation, location, knowledge and regulation of the equipment, among others important for the handling of the vehicle, and runs through level 2 with risk situations created, more complex

maneuvers to be performed, leaving to practice driving the refinement of the skills of these two levels.

Results and Discussion:

The didactic-pedagogical approach established for the classes in the simulator of direction in Brazil are distributed so that the teacher, in a first moment, prepares the student to receive the general orientations and the concepts that will be approached during the class. Then, the simulated session set in a period of 30 (thirty) minutes reproduces scenarios and traffic situations according to the pre-established pedagogical content. To conclude the lesson, we present the result obtained for the didactic correction of the mistakes that may be made by the student and the feedback of the driving and the learning.

The simulated situations should address the contents: basic concepts, learning to drive, learning from circulation, safe driving and risk situations.

In the city of Belo Horizonte the use of the simulation started effectively from April 1, 2016. We analyzed a sample of 929 students enrolled in a Driver Training Center with 493 students trained untrained in simulator and 436 students trained using the simulator as preparation for practical driving classes in real vehicle.

When analyzing the results of the practical exams of direction of all the students, it was verified the increase of 27% in the approval rate of the trained students in relation to the untrained ones. There was also an 18.5% increase in approvals in the first two attempts.

Conclusions/implications:

Although empirical and scientific studies point to simulation as an alternative to exposing students to traffic situations in a repetitive, controlled, risk-free manner, enhancing students' skills before going to driving practice in the vehicle, there is no consensus in Brazil about its relevance and many are the uncertainties about which pedagogical strategies adopted will be more effective. Given this, it is necessary to search for scientific answers to some questions, based on logic and evidence that leads us to the ideal mechanisms for a better process of training future drivers in the country. The students' perceptions regarding driving in the simulator, as well as the level of perceived discomfort during driving and the performance evaluation of elementary basic tasks at Levels 1 and 2 of the DGE Matrix are part of the studies complementary to this study and are necessary for understanding of the topic.

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