Chapter 23
Ergonomic Design of a Driver Training Simulator for Rural India

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ABSTRACT

Simulator training forms an integral part of driver training in rural India. As the majority of the simulators are imported from the Western world, they do not mimic the actual road conditions of rural India. This often leads to mismatches in the would-be drivers' perceptions of the Indian traffic and creates problems later on in their career, which is manifested in the form of increased driver errors and at times fatal road accidents. This research looked in the user interface of such simulators and usability perspective and came up with two concepts for these drivers that closely resemble the Indian rural traffic scenario.

INTRODUCTION

Hired cars (taxi) have become popular in the rural areas of Gujarat state in India for commuting, leading to an increased demand for taxi drivers. To improve the lifestyle of the rural population, the local government in Gujarat state of western India has taken an initiative. Their focus is to improve upon the transportation facilities for the people in these areas. The first step is to increase the number of hired cars (known as taxi locally) in different routes. This was a long standing demand of the people as buses and similar modes of public transportation are not popular in this part due to variety of reasons like high operational cost, absence of metallic roads etc. Thus there is an increase in demand of taxi drivers. To train the driver's new car driver training schools are opening up in these areas. This is serving two major purposes; first improving the connectivity between different places and second providing employment opportunity for the local youths. The youths are also keen on taking up driving as a mode of earning as it is lucrative when compared to agricultural work (which requires lot more physical labor) and many

DOI: 10.4018/978-1-5225-7368-5.ch023

are supplementing their income from agricultural work by driving part- time. The local government has come up with schemes for providing soft loans to these youths for purchasing their own cars. The cars that ply in these areas are the standard cars manufactured indigenously in the country and the government rule does not permit cars of any other manufacturers to ply in these routes.

As training and issue of licenses for these drivers necessitate the applicant to go through successive training on simulators followed by training on the roads, simulator training is becoming an important aspect of the driving schools. The simulators are mainly imported from the western world and are installed in the schools. Hence the novice drivers are trained on a simulator, which does not give them that confidence of driving on rural Indian roads, which are different from the western world. On repeated requests from the trainers, alumni of the driving schools, novice drivers, and other stake holders, ergonomic analyses of the existing simulators were done to reveal mismatches in the traffic conditions of the rural India and the western roads. There were various problems with the existing configuration related to comprehension (88%), readability (92%), navigation (89%), error messages (96%) and feedback menu (69%). Based on users feedback new simulators were designed.

BACKGROUND

Around 65% of the total population in India lives in the rural areas. Growth and prosperity of the country is largely dependent on these areas, with employment for the local youth becoming a challenge (Mukhopadhyay, 2006). It has been reported that (World Bank, 2000) 74% of the rural population in India are still not integrated into the national economy due to lack of proper transportation facilities. Thus better transportation in rural India is a necessity as it gives the rural people an opportunity to travel for different purposes like health, education, social purposes and services (Ramaswamy, 1998). Thus focusing on rural local youths as taxi drivers.

It has been established that simulator training plays an important role in the training of a novice driver. For example it was found that while training car drivers on a simulator, the simulated environment was (Underwood et al., 2011) capable of increasing the hazard perception of drivers, thus indicating its criticality in driver training. There have been quite a few studies to indicate that the data from simulator training was very close to that of training in actual environment (Hallvig et al., 2013, Antonsen et al., 2014, Chan et al., 2010, Hallvig et al., 2013). For example in a comparative study (Hallvig et al., 2013) on sleepy driving on the real road and the simulator it was found that for both real and simulated driving the response to night driving appeared to be similar for subjective sleepiness and sleep physiology. In a study on the effect of landscape, different objects and landmarks on the driving behavior, it was found that the presence of any object on the road had a speed reducing effect which was in line with the simulator data. It was further established in the same study that different objects, land marks and landscapes affected the driver behavior in similar manner, both on the simulator and in the actual environment. Similarly another group (Antonsen et al., 2014) reported that open landscapes encouraged the drivers in actual environment to drive fast, and the drivers reported less stress compared to other conditions of the road. This was again very similar to the data obtained on the simulator. Another utility of the driving simulator is that it is useful (Chan et al., 2010) in evaluating certain driving attributes of the novice drivers like hazard anticipation, speed management, and attention maintenance. So these studies indicate that driving simulators are an essential tool in the training of novice drivers. For the training to be ef-