

# HUMANIST

Workshop on the application of new technologies to driver training

Brno, 26 – 28 January 2005

Session 3. Driver simulators: Perspective of stakeholders

Paper 3. 2 Jiří Pour, Traffic Academy of Bohemia

## **Historical overview of using driving simulators in Czech and Slovak driving schools**

Abstract:

Simple driving stands (mockups) which were completed with projection of slides, were used at first in centralised driving schools of the late Czechoslovak Republic. Simulator rooms with the slideprojection accompanied with audiorecorder, shadowgraph projection and 16 mm filmprojection were step by step introduced in all driving schools since the second half of sixties. Videoprogram about the use of AT 80 simulator will be projected here as a part of the presentation in context of the Multi-phase driving education.

..

To understand better our tradition in the branch, allow me to recall a bit of history first:

The first driving school in the Czech Land was founded in 1907 at Mladá Boleslav, and connected to the Laurin & Clement motor works, where SKODA cars are now produced. It may be interesting to note that one of the first specialised cars for training purposes was built in our country.

In 1945, after World War II, the private driving schools started up again, being nationalised in 1948. Since 1953 they changed to be a part of the Union for cooperation with the Army. In many towns a network of driving schools were developed. Since the early seventies, Multi-phase education and training has been introduced. These were based upon experimental research and practical experience in driving schools. A broader experiment was conducted in the late eighties in West Berlin, led by Professor A.E. Bongard, at the Technical University. The results were positive from an education, economical and ecological viewpoint.

After the Velvet revolution in 1989, the Czech driving school organisation changed considerably, private driving schools appeared again. More than 1.500 private driving schools exist now in Czech Republic.

And now a bit more in detail!

Fig. 1  
Czech driving schools 1950 – 1990

Czechoslovak republic was the land, where was the driving education centralised in one organisation. Introduction of driving simulators was here in the second part of the sixties. 87 driving schools operated in Czech republic in that time.

Fig. 2  
Typised driving schools buildings

Typised driving schools building in all district towns was started in sixties and continued two decades. Driving school buildings had his own simulator room and were equipped with driving simulators of Czech construction and manufacture.

Fig. 3  
Driving stands (mockups)

The base for the use of complex simulators were the succesfull experiences from the use of simple driving stands (mockups) from previous years. Research of possibilities of improving this stands, for example by slide projection use, was important for the acquiring of basic driving skills on this devices.

Fig. 4  
Slide projection with commentary from a taperecorder

The voice of the teacher was recorded for the picture display. The commentary described each basic operational skill. The slideshow with the commentary helped to unburden the teacher. He could attend each student more intensively and give him the individual help when needed.

Fig. 5

Complex simulator room ART 65

The use of slideshow for first two hours was applied in the learning program for complex simulators ART-65 also. Simulators ART-65 were manufactured as the five cabin simulator rooms in the AOZ Olomouc factory in Moravia.

Fig. 6

Scheme of the simulator room ART-65

Shadowgraph projection was used after two hours of training by the means of slideshow with commentary. Since all five cabins were centered to the projection screen by the slideshow, two cabins were turned to the special projection screens with the use of shadowgraph projection.

Fig. 7

Shadowgraph projection discs

Two different shadowgraph disc made from plexiglass were used. The simpler one for the third training lesson, the more complicated disc for the fourth one. The discs in the form of driving range allowed the solving of dangerous situations also.

Two lessons with shadowgraph projection were called contact projection training.

It means, that the student was able to chose the direction and speed of his driving.

The system of shadowgraph projection according the CZ patent was very simple and efficient.

Fig. 8

Film projection

The fifth (and last) lection of the simulator programme, used the 16 mm film projection. There were black and white films used first, than color and widescreen pictures were introduced. Film projection we called as „contactles“ projection, because the student was not able to influence the situation on the screen. The computer generated pictures were in that time not available for low cost simulators.

Fig. 9.

#### Realisation of the simulator films

Special camera stative was used for simulator films realisation. Camera was situated in the place of the driver head, but the driver was sitting in the rear seat when driving the camera vehicle. The complicated device enabled the real view of the traffic situation on the screen in simulator room.

Fig. 10

#### Training on the driving range

The average student after five hours of simulator training had no problem to manage the two hours program on the driving range. Three students were there trained by one instructor with the help of special radio device. Students were sitting alown in the training car.

Fig. 11

#### Radiocommand device

The instructor was able to give the aproprate comands to the students and stop the car in danger. Commands could be done to all three students at the same time also.

Fig. 12

#### Czechoslovak multi-phase educational system

Training on the simulators and on the driving ranges was the part of the multi-phase driving education, which was introduced by the learning programme of Ministry of transport since the beginning of the year 1974. Multi-phase driving education was the important part of the complete system of the whole life preparation of citizens for mobility. This preparation was beginning with traffic education in pre-school and school organisations, where ended by the non-compulsory subject „Driving education“. Schools and driving schools have had very near cooperation in the whole spectrum of this educational system. Some 30.000 students of secondary schools take part on this programm each school year.

Fig. 13

First phase – Theory

And now the Multi-phase education in detail:

The communicator MODIFICA was used for teaching theory in the first phase of multi-phase driving education.

Fig. 14

Second phase – Training in the simulator room

Simulator room was used for the second phase of the multi-phase driving education for 5 hours instruction.

Fig. 15

Third phase – Training on the range

Typised driving range was used for two hours training. Each driving school had their own properly equipped training space.

Fig. 16

Fourth phase – Driving in traffic

Driving on the street with the instructor in the dual-control car was the content of the fourth phase.

Fig. 17

Fifth phase – Maintenance of the car

The set of four special training devices ZJ-AKOV (some sort of simulators also) were used for the acquaintance of car systems which are most important for safe driving.

Brakes, lights and signaling systems for example.

Fig. 18

Experiments in the Institute of Psychology at Charles University in Prague

The Multi-phase driving education like described here, should not be the end of the drivers preparation for the whole life. It should continue after the initial driving education in the driving school by next steps. This were centred to managing the complicated and dangerous situations. The results of this research were recomanded by the OSJD document No. AUT R 98. It was the result of long cooperation of the

Psychological institute of Charles University, Prague, with driving school specialists.

The team of SVUMP specialists from Brno was engaged intensively with the simulator training for the need of army.

Fig. 19

Experiment - 1970

I will now present one of the experiments which took place in 1970. The work analysed the influence of the simulator training on a driver's readiness for risk situation management. Thirty nineteen year old students, prior to their driving tests, were divided into two equal groups. Two situations were used: Situation 1: In a simulator, film was shown with a sudden appearance of a pedestrian on the road in front of the car after ten-minutes of normal driving. Situation 2: Having driven on the track for ten minutes a dummy was thrown in front of the car.

Group 1 underwent the condition of the first situation five times and students were trained to react correctly. The following day they underwent the conditions of the second situation. The group 2 was exposed to the condition of the second situation only.

Fig. 20

Results of experiment in Prague

Out of the 15 drivers in group 1, 12 drivers solved the situation successfully, only 3 drivers ran over the dummy in the 2<sup>nd</sup> situation. Out of the 15 drivers in group 2 with no previous training in solving this situation, only 6 drivers solved the situation successfully and 9 ran over the dummy.

These results indicate that the simulator training significantly improved the drivers ability to deal with the 2<sup>nd</sup> situation.

Fig. 21

Puls frequency increase

The greatest increase in pulse rate was in the group that had no previous training on the simulator.

The graph clearly indicates that the group responded to a simulator scenario, although to a lesser degree, than that of a real situation.

It was recommended that simulators should be used to train people to react to dangerous situations.

Fig. 22  
Recommendations AUT-R-90 and AUT-R-98

The OSJD organisation recommended the use of simulators with recommendation AUT-R-90 since the year 1971 and with the recommendation AUT-R-98 the use of simulators and other technical devices in training to avoid dangerous situations in the year 1977.

Fig. 23  
Some works about driving education since the beginning of sixties:

Hoskovec J., Pour J., Štikar J., "Driver Training and Psychology" NADAS Praha 1966, second edition in 1972, 236 p., Warsaw 1969, second edition 1974

Hoskovec J., Štikar J., Pour J., "Training in Ranges" ÚSMD-BESIP Praha 1973, 76 p, Moscow

Hoskovec J., Stýblo R. Štikar J. "Measurement of Driver Behavior in the Car" USMD-BESIP Praha 1974, 82 p.

Štikar J., Hoskovec J., Pour J. "Psychology of Safe Driving" NADAS Praha 1981, 180 p.

Štikar J., Hoskovec J., Pour J. "The Way and Method of Training Drivers for Solving Critical Traffic Situations" Research Project No. 53/81-11-17-05-07, ÚSMD Praha 1983,

Hoskovec J., Pour J., Štikar J. "School of Safe Driving" BESIP Praha 1984-1986, 4 Volumes

A.-E. Bongard, J. Hoskovec, J. Pour, J. Stikar and K.M. Walk "On the Effectiveness of Driving Simulator Application in Training of Drivers, An Empirical Study with teenage students conducted at the Driving Research Centre at the Technical University of Berlin 1990

All titles are translated from Czech.

The research group 3J (Hoskovec, Pour, Štikar) conducted since the year 1962 to 1990 many research works and acquainted the interested public with the results. Here are some titles which are included in the printed version of the presentation.

Fig. 24  
Simulators manufactured in Czech Republic since the year 1965 to 1990

Five generations of driving simulators were built in Czechoslovak Republic since the year 1965 to 1990 in the AOZ factory in Olomouc. After 1990 the manufacture was moved to private enterprise.

Fig. 25

Czech simulators in foreign countries

Some 600 hundreds of simulator rooms of five generations were produced in Czech Republic till the end of eighties. Smaller part of this production were used in Czech and Slovak driving schools, larger part was exported. Czech simulators worked in 18 countries of four continents in 1990. In the countries, where the driving education was centralised, there were the Multi-phase system presented or implemented. This was the case in Poland, Bulgaria, Hungary, Germany, Norway, Romania, Yugoslavia, Russia, Egypt, Iraq, Cuba, India, Vietnam and China.

Fig. 26

VIDEO – AT 80

Part of the videofilm AT 80 will be projected

Fig. 27

Thanks for your attention