

ICT-INEX Project



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Guidelines for development of effective teaching comfort-driving with use of ICT and the multi-stage training process including mastering

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*** Deliverable type:** *PU = public, RE = limited to a group specified by the consortium, PP = limited to other participants of the programme (including to services of the Commission), CO = confidential, only for members of the consortium (including for services of the Commission)*

**** Nature of delivery:** *P = prototype, R = report, S = specification, T = tool, O = other*

Introduction:

The report contains guidelines for development of trainings intended for candidates for professional drivers taking into account language support of immigrants and integration of these trainings with other teaching methods. It also sets out the directions of development of teaching methods and takes into consideration development of available technologies which may improve quality of training and the degree of interest of its participant. Specified goals are oriented on target groups in an unfavourable situation, such as young unemployed people aged up to 30 and older long-term unemployed people over the age of 50.

It also analyses and assesses the process and methodology of teaching with use of comfort-driving in the context of maximisation of knowledge and skill transfer.

It also attempts to outline a desired profile of qualifications of an instructor giving trainings from the point of view of a trainee and a company offering trainings. Such a profile takes into account combination of various training tools and techniques.

We also point out limitations resulting from the wording of the applicable law in the EU countries and the need to amend it in view of the growing training market at the level of partner countries and at the level of the EU.

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Analysis of trainee's needs (analysis of the needs of people participating in driver training), 12

SURVEY (survey assessing the conditions in which the trainings were conducted), 13, 16, 17

surveys (description of surveys assessing the conditions in which the training took place), 9, 11, 12, 15, 18, 20, 22, 23, 25, 26

comfort-driving (vehicle components that reduce driver fatigue while increasing safety), 9, 10, 31

immigrants (persons who came to the country from abroad to live and take up the profession of driver), 9, 33

qualifications of instructor (qualifications of driving instructors), 24

training process (driver training process), 11, 27

lecturer (lecturer, driver training trainer), 24

6.Executive Summary

This report analyses presently taken actions in the area of training of drivers, and show directions which must be followed to use the modern training tools to increase effectiveness and attractiveness of training for drivers and candidates for drivers.

The report also indicates benefits which may be enjoyed by companies providing training to drivers. They are primarily financial benefits acquired due to the implementation of modern visual techniques based on the use of comfort driving.

For the purposes of the report, surveys were carried out in which persons participating in courses delivered in the training centre of CARGO took part. Groups of persons were selected in terms of achieved objectives of the project. Activities covered groups representing various age, with a particular emphasis on a group of persons aged up to 30 and persons who reached the age of 50. Immigrants were taken into account as well. In view of the limited availability of these persons, division by age was not made. Persons taking part constitute the main target groups of the project.

7.Introduction

The report contains the description of activities performed as part of ICT-INEX project which objective is enrichment of a training offer for professional driver courses. It sums up works carried out as part of task 6 of the project. Their final result are guidelines for the development of trainings including elements of comfort-driving. The guidelines show methods of integration of these trainings into other driver training methods. Such enriched package should constitute an offer tailored to current demand of the training market and at the same time be attractive for training participants.

The report contains an analysis of the course and results of trainings using comfort driving in trainings for drivers. It indicates possibilities causing an increase of training effectiveness and limitations embedded in the applicable laws concerning trainings for drivers. It specifies legal and organisational recommendations which may increase training quality at the same time reducing its costs.

This enriched package should constitute an offer tailored to current demand of the training market and at the same time be attractive for training participants and make it easier for them to gain knowledge and skills necessary for practising the profession of driver.

7.1 ICT-INEX project

The purpose of the project is increasing effectiveness and availability of trainings enabling access to the profession of driver. This is to be achieved through the use of information and communication technologies and new elements of equipment of vehicles facilitating driver's work. The final result is to be a cohesive model of holding trainings for drivers of the transport industry and recommendations for amendments to the national and EU legislation. The project includes persons being in an unfavourable situation in the labour market on account of presence in demographic groups of: young people up to the age of 30 and over the age of 50 who are long-term unemployed at the same time.

The project discusses the impact of training methods and describes conditions in which they are followed in terms of their impact on acquired results.

7.2 Description of work package

Actions performed for the purposes of the project included recruitment of participants meeting requirements of the project, their participation in individual stages of implementation, a summary and an analysis of obtained data and a

description of final conclusions. The purpose of conclusions obtained in the final stage is to work out a methodology improving effects of trainings and training conditions, creating a more friendly environment to trainees.

The assumptions being the basis of the task are an attempt to assess the impact of training conditions on the final outcome. Better training conditions should result in improved training outcomes. Conclusions were drawn on the basis of surveys filled in by participants containing questions concerning this project. Surveyed persons represented target groups covered by the project and participated in trainings held in various quality conditions.

Survey results will be used for working out a profile of qualifications of a teacher – instructor, and will show the path to optimisation of the conditions of holding a training for candidates for drivers.

7.3 Structure of the document

This document contains an analysis of the present training methods, description of actions carried out as part of the existing project and their effects, suggestions of changes and upgrades, taking into account ICT, which may be introduced. In the further part the document suggests methods of enriching the environment in which a training is held in terms of introducing elements increasing training effectiveness. We try to find differences or show the lack of them between individual groups of participants differing in age. We display the impact of trainee's age on the possibility of absorption of knowledge taught by a teacher – instructor, and the possibilities of selection of methods applied by a teacher to trainee's age.

In the next part we demonstrate the impact of selected training methods on costs generated by them.

The final part contains recommendations for:

- modification of training methods,
- training centres for course participants,
- amendments to the legislation regulating the training process.

8.Assumptions of the analysis of the methods of training candidates for professional drivers taking into account the term of comfort-driving

The phrase comfort-driving used for the purposes of this task specifies quality conditions in which training of drivers is held. This term covers the full scope of training including practical classes. Task 6 is to determine whether there is a relationship between acquired training outcomes and conditions in which a training is held. We take into account here:

- premises conditions of a training centre with a particular emphasis on external infrastructure,
- quality of training vehicles – vehicles taking part in trainings were changed for the purposes of the task so they represent different quality,
- the degree of adaptation of a schedule: from a friendly schedule meeting course participant's expectations to an imposed schedule not taking trainee's needs into consideration,
- the level of an instructor taking into account his or her character traits and quality of qualifications, and the degree of assertiveness in contacts with course participants.

Varied quality conditions faced by course participants were to provide an answer to the question whether there is a relationship between training conditions and results obtained by course participants.

The goal of carried out surveys was to specify a possibly occurring relationship between outcomes achieved in a training and conditions in which it was held, taking into account quality of infrastructure of a centre and vehicles which were at disposal. The survey also included questions about possible relationships between instructor's personality and an acquired training outcome.

Form of survey questionnaire 1

TRAINING ASSESSMENT SURVEY QUESTIONNAIRE

Dear Sir/Madam!

Information provided in this survey questionnaire will be used as suggestions for improvement of the level of the training in which you participate, and the level of effectiveness and attractiveness of next trainings. We kindly ask you to fill in all fields and enter any comments which could improve the level, quality of the training in which you participate.

GENDER

- ☐ Female
- ☐ Male

AGE

- ☐ up to 30 years
- ☐ from 30 to 50 years
- ☐ over 50 years

NATIONALITY

- ☐ Polish
- ☐ other

NOTE: *when responding to a question and marking your choice in the scale from 1 to 10, 1 means a negative grade and 10 means a positive grade.*

FIRST PART – EQUIPMENT OF THE CENTRE

1. Please specify on the scale from 1 to 10 conditions of holding the training.

1	2	3	4	5	6	7	8	9	10

2. Please specify on the scale from 1 to 10 the infrastructure of the centre.

1	2	3	4	5	6	7	8	9	10

3. Please specify on the scale from 1 to 10 quality of training vehicles.

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1	2	3	4	5	6	7	8	9	10

4. Please specify on the scale from 1 to 10 to a what degree it was possible to adjust basic settings of chair and steering wheel in vehicles.

1	2	3	4	5	6	7	8	9	10

5. Please specify on the scale from 1 to 10 the presence and efficiency of air-conditioning system in vehicles.

1	2	3	4	5	6	7	8	9	10

6. Please specify on the scale from 1 to 10 the general efficiency of vehicles in terms of functioning of basic elements of drive, braking and steering system.

1	2	3	4	5	6	7	8	9	10

7. Please specify on the scale from 1 to 10 to a what degree the completed training met your expectations.

1	2	3	4	5	6	7	8	9	10

SECOND PART – HOLDING THE TRAINING

1. Please specify on the scale from 1 to 10 whether classes were held on days and in time convenient to you.

1	2	3	4	5	6	7	8	9	10

2. Please specify on the scale from 1 to 10 whether the duration of individual classes was optimal.

1	2	3	4	5	6	7	8	9	10

3. Please specify on the scale from 1 to 10 whether the duration of all classes was optimal.

1	2	3	4	5	6	7	8	9	10

4. Please specify on the scale from 1 to 10 how do you assess intensity of the undertaken training?

1	2	3	4	5	6	7	8	9	10

5. Please specify on the scale from 1 to 10 how do you assess the subject of the undertaken training?

1	2	3	4	5	6	7	8	9	10

Thank you for filling in the survey questionnaire

We present below results obtained from it. Surveys were conducted in various age groups, whereas the division was applied at the boundary of 30 age of life and 50 age of life. To ensure reliability, three age groups were surveyed with a fixed number of 10 persons in every group. We are aware that a higher number of participants would allow for better optimisation of data, however, during the surveys the number of available participants was limited.

Results of the survey below:

Table 1 – results of the survey – course participants up to the age of 30

Survey results of assessment of training – course participants up to the age of 30											
Person/Question	1	2	3	4	5	6	7	8	9	10	Obtained average
First part - equipment of the centre											
conditions of holding the t	8	7	5	9	9	6	10	8	9	7	7,80
infrastructure	7	9	6	6	7	7	7	9	8	8	7,40
vehicles	5	8	9	4	5	4	3	9	8	8	6,30
adjustment of settings	10	9	8	9	8	8	9	7	8	10	8,60
air-conditioning	6	4	5	6	7	5	7	7	5	5	5,70
effectiveness of vehicles	5	8	5	5	4	6	5	3	2	3	4,60
meeting expectations	6	7	9	10	8	5	6	7	8	9	7,50
Second part - holding the training											
choice of days and hours	5	4	5	6	9	4	5	7	7	7	5,90
choice of length of classes	9	8	8	9	8	8	9	8	8	9	8,40
choice of the number of cl	10	10	9	10	10	8	8	9	9	9	9,20
intensity of classes	5	6	9	8	7	8	5	8	6	7	6,90
subject of classes	9	2	9	5	8	7	9	9	4	5	6,70

Table 2 – results of the survey – course participants from the age of 30 to 50

Survey results of assessment of training – course participants aged from 30 to 50											
Person/Question	1	2	3	4	5	6	7	8	9	10	Obtained average
First part - equipment of the centre											
conditions of holding the t	10	7	5	9	10	6	9	9	9	7	8,10
infrastructure	9	9	9	6	9	8	7	8	7	7	7,90
vehicles	8	8	9	8	8	4	5	7	8	7	7,20
adjustment of settings	7	9	8	9	9	9	9	9	8	7	8,40
air-conditioning	6	4	8	6	7	8	7	7	5	5	6,30
effectiveness of vehicles	8	8	7	5	7	6	7	7	8	7	7,00
meeting expectations	6	10	9	10	8	5	6	10	8	10	8,20
Second part - holding the training											
choice of days and hours	5	4	5	6	5	4	5	6	6	7	5,30
choice of length of classes	9	9	8	9	10	8	10	8	8	10	8,90
choice of the number of cl	10	10	9	10	10	8	10	9	9	10	9,50
intensity of classes	10	6	9	8	10	8	5	8	10	8	8,20
subject of classes	9	8	9	7	8	9	9	9	10	10	8,80

Table 3 – results of the survey – course participants above the age of 50

Survey results of assessment of training – course participants over the age of 50											
Person/Question	1	2	3	4	5	6	7	8	9	10	Obtained average
First part - equipment of the centre											
conditions of holding the t	10	9	9	9	9	6	10	8	9	7	8,60
infrastructure	10	10	9	8	9	8	7	9	7	6	8,30
vehicles	10	9	9	8	6	8	9	5	5	8	7,70
adjustment of settings	7	9	7	7	8	6	9	7	8	9	7,70
air-conditioning	9	9	9	8	7	7	5	10	10	5	7,90
effectiveness of vehicles	10	8	9	8	9	7	5	5	7	7	7,50
meeting expectations	5	9	8	10	8	5	9	10	10	10	8,40
Second part - holding the training											
choice of days and hours	10	9	8	8	7	8	5	6	7	6	7,40
choice of length of classes	7	8	8	9	7	8	5	5	4	5	6,60
choice of the number of cl	8	8	9	7	6	8	6	6	7	9	7,40
intensity of classes	4	3	5	5	4	3	5	8	5	8	5,00
subject of classes	9	9	8	8	8	9	8	9	10	10	8,80

The results of the survey indicate a concurrent assessment of conditions of holding a training independent from trainee's age, whereas in the age group up to the age of 30 higher expectations with respect to infrastructure of a centre and vehicles were observed. It is undeniably caused by the age of a surveyed person, hence, by contact only with vehicles of a newer generation in which certain elements of good equipment are natural for this group of persons.

Elderly persons, often having contact with considerably worse conditions, more appreciate quality of the modern vehicles and good infrastructure of a new centre.

Among assessments concerning quality of training among young people, there is lower satisfaction from the choice of training hours. It is caused by higher professional activity of this group and the resulting problem with finding time for a training.

All surveyed persons show a correlation between conditions and duration of a training, and achieved degree of fatigue. It is clearly higher when a training vehicle has very poor equipment in the field of driving comfort and when duration of a training reaches the maximum number of hours.

The surveys were also carried out among instructors. Here, due to a lower number of available persons the age division was specified at the boundary of the age of 50. The goal of the survey was to specify a possibly occurring relationship between outcomes achieved in a training and conditions in which it was held taking into account quality of infrastructure of a centre and vehicles which were at disposal. The survey also specified questions about possible relationships between course participant's personality and an acquired training outcome.

Form of survey questionnaire 2

INSTRUCTOR ASSESSMENT SURVEY QUESTIONNAIRE

Dear Sir/Madam!

Information provided in this survey questionnaire will be used as suggestions for improvement of the level of the training in which you participate and the level of effectiveness and attractiveness of next trainings. We kindly ask you to fill in all fields and enter any comments which could improve the level quality of the training in which you participate.

GENDER

- ☐ Female
- ☐ Male

AGE

- ☐ up to 50 years
- ☐ over 50 years

NOTE: *when responding to a question and marking your choice in the scale from 1 to 10, 1 means a negative grade and 10 means a positive grade.*

1. Please specify on the scale from 1 to 10 conditions of holding the training.

1	2	3	4	5	6	7	8	9	10

2. Please specify on the scale from 1 to 10 the infrastructure of the centre.

1	2	3	4	5	6	7	8	9	10

3. Please specify on the scale from 1 to 10 quality of training vehicles.

1	2	3	4	5	6	7	8	9	10

4. Please specify on the scale from 1 to 10 to a what degree it was possible to adjust basic settings of chair and steering wheel in vehicles.

1	2	3	4	5	6	7	8	9	10

5. Please specify on the scale from 1 to 10 the presence and efficiency of air-conditioning system in vehicles.

1	2	3	4	5	6	7	8	9	10

6. Please specify on the scale from 1 to 10 the general efficiency of vehicles in terms of functioning of basic elements of drive, braking and steering system.

1	2	3	4	5	6	7	8	9	10

7. Please specify on the scale from 1 to 10 whether results obtained during a training are linked to trainee's personality.

1	2	3	4	5	6	7	8	9	10

8. Please specify on the scale from 1 to 10 whether results obtained during a training are linked to trainee's age.

1	2	3	4	5	6	7	8	9	10

9. Please specify on the scale from 1 to 10 whether trainees after finishing classes show signs of fatigue.

1	2	3	4	5	6	7	8	9	10

10. Please specify on the scale from 1 to 10 whether total number of hours of a training should be increased?

1	2	3	4	5	6	7	8	9	10

Thank you for filling in the survey questionnaire

We present the results below:

Table 4 - results of the survey – instructors

Survey results of assessment of training – instructors								
Person/Question	1	2	3	4	5	6	7	Obtained average
Persons up to the age of 50								
conditions of holding the training	9	8	10	10	10	9	9	9,29
infrastructure	8	9	10	10	10	9	10	9,43
vehicles	9	9	8	8	9	8	8	8,43
adjustment of settings	6	9	10	9	9	8	9	8,57
air-conditioning	10	10	9	7	7	9	8	8,57
effectiveness of vehicles	8	8	9	8	8	7	8	8,00
results and course participant's p	9	9	7	8	8	9	9	8,43
results and course participant's a	9	10	5	8	9	9	8	8,29
assessment of course participant	8	5	6	7	8	8	8	7,14
duration of course	10	10	9	10	9	10	10	9,71
Persons over the age of 50								
conditions of holding the training	8	8	8	10	10	10	9	9,00
infrastructure	10	10	10	10	10	9	10	9,86
vehicles	9	10	10	8	9	8	8	8,86
adjustment of settings	8	9	10	5	9	8	9	8,29
air-conditioning	9	9	9	7	7	9	8	8,29
effectiveness of vehicles	8	8	9	8	10	9	9	8,71
results and course participant's p	9	9	10	8	10	10	9	9,29
results and course participant's a	9	7	5	8	7	7	8	7,29
assessment of course participant	10	5	6	7	4	3	4	5,57
duration of course	9	9	9	8	9	10	10	9,14

The results of the surveys presented above show similarities in both age groups concerning instructors. Irrespective of age, they point out a relationship between equipment and quality of a vehicle, and achieved training outcomes and the degree of fatigue of trainees.

The relationship is as follows: the higher age of a trainee, the higher susceptibility to conditions and duration of a training.

The result of the relationship indicated above should be making duration of classes conditional on trainee's predispositions. There are no legal obstacles here, therefore, the subject was not included in the group of legal and organisational recommendations. As set out in the applicable laws, we have specified maximum time of trainings, but there is no reason not to shorten this time in line with capabilities of a relevant person which may prevent fatigue and improve training outcomes.

In any case, the problem does not concern only transport trainings. As Ms Joanna Urbańska wrote in her doctoral thesis "FATIGUE WITH EVERYDAY LIFE": "Fatigue is one of the most important social problems of the 21st century. *Firstly, because the average life expectancy of people is growing, consequently, the number of persons suffering health disorders related to ageing is increasing (compare Hayward, Zhang 2001). One of the symptoms of many illnesses and a decrease of psychomotor fitness is feeling strong fatigue when performing everyday activities (Schwid and others 2002). Secondly, certain features of the modern life are favourable for the increase of felt fatigue... As an example, the development of science and technology frequently outdistances our capability to adapt (in particular of the elderly). The number of stimuli affecting us every day is growing.*" The fragment of the thesis directly referring to our subject of the organisation of classes argues that: "Usually, the following methods of preventing fatigue are deemed effective... proper work organisation (setting priorities, day schedule in which the most difficult tasks are fulfilled when a person is well rested, dividing tasks into smaller stages, finding time for rest, adding variety to activities, caring for proper body position)..."

9. Basic elements of ergonomics which may improve comfort-driving

If at the beginning of a training we ensure , e.g. in practical classes, that elements used for driving a vehicle are properly, ergonomically adjusted, taking into account physical conditions of a person, we will improve safety and quality of a training for the course participant. An instructor giving the training should specify these elements and point them out to a candidate for a driver.

They include:

- setting a comfortable and practical position of driver's seat. The following is of importance:
 - distance of the seat to steering wheel: feet should be comfortably positioned on pedals, knees slightly bended. The distance should guarantee easy operation of pedals without the necessity to reach out to them. Settings of the seat should guarantee the angle of 100÷110 degrees between hips and back, with arms behind hips. The optimal distance of chest to steering wheel is about 35 cm.
 - position of steering wheel is to enable easy visual access to dashboard of a vehicle and control elements located in the first, second and third access zone.
 - position of headrest is to ensure protection of head, that is the upper edge of headrest should be above the tip of head, while the lower below its lower edge.

A person holding the training should also ensure that information was provided on the impact of adjusting proper temperature inside a vehicle and ventilation of a vehicle on driving quality and safety.

The results of the surveys show that conditions in which training is held are important for the trainees. A relationship was proved between the said conditions and satisfaction from progress achieved by a course participant.

Persons who were able to compare infrastructure with other training centres stated that:

- better state of a centre allows to easier achieve the desired result,
- the technical condition of a vehicle also directly affects the time of reaching the desired result (changes of vehicles were made as for the purposes of the survey it was important that surveyed persons had contact with vehicles in various technical condition),

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- good condition of equipment for adjusting settings in terms of ergonomics and its correct functioning reduced the degree of fatigue of participants of the survey,
- no significance of air-conditioning in vehicles was proved – it is necessary to take into account the winter and early spring period in which the surveys were conducted.

10. Desired qualifications of instructor

Recommended qualifications of a lecturer – instructor:

- extensive knowledge exhausting issues discussed during classes,
- the ability to make students aware of didactic tasks and goals,
- the ability to transfer possessed knowledge, including analysis and synthesis of taught material,
- the ability to point out practical situations in which using gained theoretical knowledge is justified,
- the ability to assess predispositions of training participants in terms of learning discussed subjects,
- the ability to assess skills picked up by course participants and course participant's natural predispositions and indicate a correct next stage of a training,
- the ability to adapt training intensity to momentary fitness of a course participant,
- the ability to use tools utilised for training,
- the ability to assess the degree of learning material by training participants in terms of possible extension of a training with elective hours.

11. Driving technique ensuring comfort-driving

Driving vehicle does not involve only manual skills of a driver, but also proper reaction to dynamically changing surroundings. Driver's attitude to other users, correctly planning the route also ensure correct quality of driving. Trainings of candidates for drivers are to make them aware that quality of driving a vehicle is not only technical conditions characterising a vehicle, but also a driver and his or her personality determine whether we will reach a destination fatigued and exhausted.

An instructor holding a training may assess by observing a trainee:

- trainee's predispositions to driving vehicle,
- on what elements of a training it is necessary to focus to achieve optimum results,
- how to choose intensity of a training to avoid early or large fatigue of a trainee,
- point out driving errors to a course participant leading to early fatigue and distraction of attention,
- make aware of the necessity of taking breaks in driving and methods of spending free time which regenerate driver's body.

The carried out surveys which form was presented above shown the existence of the relationship between training intensity and the degree of fatigue and results achieved by a course participant.

Trainees prefer:

- if it does not collide with their other activities, e.g. professional work, they prefer to have a training in the morning hours,
- 1-hour duration of a training was deemed to short (due to a long travel to the centre),
- 2-hour duration of a training was often deemed optimal, it justified travel to the classes, did not cause too high fatigue,
- 3- and 4-hour duration of a training was deemed too long – causing fatigue of a course participant.

It is worth pointing out that instructors indicate that evening hours of a training are less effective because frequently trainees are already fatigued, e.g. by their professional work.

12. Quality of education and following the principles of comfort-driving

The current training methods do not include the principles of comfort-driving, apart from the necessary fundamentals. These principles take into account the ability to correctly drive vehicle by drivers, having in mind various degree of equipment of vehicles. For the purposes of the report course participants' ability to correctly carry out a training programme was assessed, taking into account conditions provided to them by a training centres. Circumstances in which a training is held include necessary requirements, not taking into account an increase in effectiveness when providing trainees with more favourable conditions of holding a training. Time spent in a simulator or a training facility should be time in which a planned programme is maximally carried out. It can be achieved by improvement of results, increasing comfort necessary for health and safety.

Good conditions of holding a training in terms of quality of infrastructure and vehicles allow to faster attain desired results. Conversations with instructors holding a training and surveys show a relationship between achieved results and training conditions.

12.1 Target group

Future drivers being the object of interest of the project are young unemployed persons up to the age of 30 and professionally inactive persons over the age of 50. The level of education is varied: from primary to higher. They are linked by the need of fulfilment in a profession, willingness to gain qualifications allowing to get a job, and in this way income. According to own experiences of CARGO, a problem in the moment of starting a training is the lack of knowledge of the scope of material which has to be learned, insufficient knowledge of time which has to be reserved for a training – it is considerable. For the so-called initial qualification it amounts to 140 hours, for driving licence courses several dozen hours depending on driving licence category. Sometimes it is compounded by fear of change, the lack of faith in own capabilities. In contract, a part of persons displays high energy to changes, possessed organisational skills, stress resistance, base in the form of supporting family may constitute potential as well. Nevertheless, we must remember that all qualities listed above are individualised and every person presents a mixture of the above elements.

Consequently, a training usually has an individual form which is a highly advantageous variant as it allows a path of education tailored to a specific person.

12.2 Analysis of trainees' needs

An analysis made for the purposes of the report shown the below needs which are important for trainees in the context of the use of the principles of comfort-driving:

- holding a training in conditions meeting the fundamental criteria of comfort standards,
- allowing to undergo a training in a place and time convenient to a trainee,
- contact with a centre for the purposes of adjustments in the training process (e.g. a change of a date of a training),
- contact with a person providing a training to obtain additional information clarifying training material,
- receiving feedback in real time concerning progress in a training.

13. Suggestions of desired development tendencies of driver training centres

In the result of the analysis, CARGO confirms that care for quality of infrastructure and vehicles, and selection of personnel putting heavy emphasis on trainer's personality and substantive knowledge, i.e. care for quality, and, thus, fulfilling the conditions of comfort-driving allows to achieve desired quality effects of a training.

To meet the principles of comfort-driving, centres holding trainings should place emphasis on gradual improvement of quality base, and employment of personnel at a suitably high level. It will ensure better educational results.

Every stage of a training should take into account the degree of learning material and should be used to assess a course participant. Passing to a next stage should be conditional on achieving certain minimum progress. The entire training should sum up in points knowledge and skills presented by a course participant.

14. Recommendations for fleet used in a training

Vehicles may display various level of technical advancement, yet they should present the newest technical solutions which a training participant may face also at the beginning of his or her professional career.

Taking into account all the rolling stock owned by the center, the vehicle equipment should take into account:

- basic vehicle control elements,
- air conditioning,
- engine brake,
- retarder, continuous operation brake.

Recommended elements of active safety:

- ABS (Antilock Brake System - anti-lock braking system),
- BAS (Brake Assist - electronic brake assist),
- TC (Traction Control - driving control by controlling engine torque),
- ESP (Electronic Stability Program - electronic driving control system also prevents side slip and prevents loss of control),
- EBD (Electronic Brake Distributor - a system controlling the distribution of braking force between the axles),
- FLS (Foreward Looking System).

Recommended driving assistance systems:

- ASG (Automatic Stop and Go - a system for automatically stopping the engine and starting it when starting off),
- ACC (Active Cruise Control - active control of speed and distance from the vehicle ahead),
- HDC (Hill Descent Control - ramp exit control system),
- TPMS.

The provisions in force in Poland, i.e. the Regulation of the Minister of Infrastructure on the training of drivers performing road transport and the Regulation of the Minister of Infrastructure on the technical conditions of vehicles and the scope of their necessary equipment regulate the requirements of equipping vehicles for driving lessons, specifying their mandatory elements. The continuous technological development caused that the current vehicle equipment is much richer than those mentioned in the above documents. Hence our recommendation to review the regulations in force in EU countries in terms of their adaptation to modern equipment of vehicles moving in Europe.

The driver participating in the training should be able to learn and practice the use of systems that he will meet in the company that will employ him in a moment. The learning process must include a way of reacting also to modern automatic driving assistance systems, so that their operation is not a surprise to the driver. The above recommendations are not a suggestion for a sudden replacement of rolling stock. They are an indication of the development path that should be followed by regulations determining the level of technological advancement of driving vehicles.

15. Legal and organisational recommendations

We recommend an analysis of the applicable training programmes to ensure modern elements of equipment of vehicles, which are frequently standard equipment, are included in them. A person who is to be a driver must not only know and be able to follow road traffic regulations, but also should be able to correctly operate a modern vehicle and diagnose simple failures of the vehicle.

Presently, the technical condition of a vehicle used for a training is specified by chapter 13 of the "Regulation of the Minister of Infrastructure on technical conditions of vehicles and the scope of their necessary equipment". Also "Regulation of the Minister of Infrastructure and Construction on training of drivers engaged in carriage by road" in Section 4 refers to technical conditions of vehicles used for a training. These regulations set out basic and additional equipment of vehicles. They were updated in the recent years, but do not reflect the actual condition in the field of development of modern transport. We recommended here a review of the currently applicable legal acts in terms of adapting them to equipment of modern vehicles used for professional transport. It does not suggest imposing an obligation to right away possess above-standard equipment, but it details a path in a certain time horizon of reaching an optimal level, taking into account the principles of comfort driving as well.

The training itself in the theoretical part should include familiarising with technical novelties present in modern vehicles, their impact on comfort and safety of driving, and the practical part should contain lessons in correctly using them, showing their impact on driver's fitness. The systems mentioned in this place were listed in chapter 8.

16. Laws regulating training of drivers in Austria

In Austria, the following legal acts regulate the training of professional drivers:

- "Regulation on initial and periodic training for professional drivers" (BGl. II Nr. 139/2008)
- "Regulation for Professional Driver Apprenticeship" (Berufskraftfahrer / Berufskraftfahrerin – Ausbildungsordnung)
- „Act on motor transport" (Bundesgesetz über das Kraftfahrwesen). BGBl. Nr. 267/1967
- Decree of the Federal Ministry of Traffic, Innovation and Technology (BMVIT-167.533/0025-II/ST5/2010)
- Act on commercial freight transport (Güterbeförderungsgesetz, BGl. Nr. 593/1995)
- Act on Occasional Traffic (Gelegenheitsverkehrs-Gesetz, BGBl. Nr. 112/1996)
- Act on driving lines (Kraftfahrliniengesetz, BGBl. I Nr. 203/1999)

In 2008, the "Bundesgesetzblatt BGBl. II Nr. 139/2008"¹ (Federal Law Gazette) legally anchored the Directive 2003/59/EC for the "Certificate of Professional Competence" (CPC) training of truck and bus drivers into Austrian Law. The BGBl. II Nr. 139/2008 regulates the CPC qualification (initial and periodic training) and since that time, professional drivers have to hold a CPC besides their driving license. The CPC is inscribed in the Austrian driving license with the Code 95 (C95). The EU Directive stresses the "differences between current systems in certain Member States" (article 8)² and therefore allows different options of how to acquire the CPC i.e. mandatory classes or only completing a test for the certificate. Austria voted for the test-only option of the CPC. In April 2018, an amendment of Directive 2003/59/EC was passed by the European Parliament that has to be implemented into Austrian law by 2020 at the latest.

The initial qualification exam consists of a theoretical and a practical test. The theoretical test takes 4.5 hours for the oral and written sections. In the first part, multiple-choice questions have to be answered (60 to 80 questions, differing from province to province). In the second part of the theoretical exam, the candidates discuss real life scenarios.

¹ <https://www.ris.bka.gv.at/eli/bgbl/II/2008/139/20080502> (05.08.2019).

² Verordnung des Bundesministers für Verkehr, Innovation und Technologie über die Grundqualifikation und Weiterbildung der Fahrer bestimmter Fahrzeuge für den Güter- oder Personenkraftverkehr (Grundqualifikations- und Weiterbildungsverordnung – Berufskraftfahrer - GWB). Online: <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:226:0004:0017:EN:PDF> (05.08.2019).

For the theoretical CPC exam, the following subject areas are tested:

- Improvement of rational driving behaviour
- Optimisation of fuel consumption
- Ensuring the safety and comfort of the passengers and cargo securing
- Labour and social law regulations
- Provisions applicable to the carriage of passengers
- Health, Transport and Environmental Safety (e.g. ergonomics, behaviour in emergencies, image of the profession)
- Economic environment of road haulage and market organisation

The practical test for the CPC exam has two options: If the CPC and the practical exam for the driver's license (C/D) are pursued together, the candidate completes a 45 minute practice test (driving a vehicle) for the driving licence and afterwards continues with another 45 minutes of driving to pass the CPC qualification. If the candidate is only performing the practical exam for the initial qualification, then a 90 minutes practice test (driving a vehicle) has to be completed.

Since 1987, a three-year professional driver apprenticeship training prepares for cargo transport as well as passenger transport in Austria. This profound vocational education and training does not play an important part in Austrian professional driver training because the majority of trainees choose the CPC exam since it only asks for a theory and practical test and the trainees do not have to study professional driving for three years, but instead can just book a preparation class at an accredited training provider or study for themselves.

The final apprenticeship examination for professional driving (freight/passenger transport) also consists of a theoretical (90 minutes) and a practical test (45 minutes). The theoretical test includes the subjects:

- Applied mathematics
- Professional knowledge (e.g. contracts, transport goods, passenger transport, traffic geography, tools, maintenance, motors etc.)
- Suitability of the kinematic chain for optimised use
- Technical characteristics and functionality of safety equipment for vehicle control, wear minimisation and malfunction prevention
- Optimisation of fuel consumption
- Cargo securing and safety regulations
- social law framework conditions and regulations for road traffic
- Requirements for freight/passenger transport
- Risks of road traffic and prevention of accidents at work
- Prevention of crime and smuggling of illegal immigrants

- health protection
- Physical and mental condition
- emergencies
- image-enhancing behaviour

16.1 Recommendations

In Austria, widespread integration of technology-based learning in professional driver training is still hindered by strong scepticism of involved actors and by legal regulations still applying an input orientation focussed on traditional training settings. Both barriers are based on missing trust in technology-based tools and their appropriate application within vocational education and training for professional drivers. The existing regulations on the integration of e-learning and simulator-based training (SBT) into the initial qualification and periodic training of professional drivers in the context of EC Directive 2003/59 (and its national implementation into Austrian law) are very limited.

The Austrian Ministry of Transport, Innovation and Technology issued a “clarification document” that specified that e-learning can only be used as a teaching method if the identity of the professional driver trainee can be determined and if it can be ensured that the trainee is doing the whole amount of training hours of a module. Furthermore, the document recommends a combination of e-learning with blended learning. In the apprenticeship training for professional drivers and in the CPC (Driver Certificate of Professional Competence), computer-based training (CBT) is not conducted. In article 7 of the amended Directive (EU) 2018/645 which is not implemented into Austrian law, yet, it is suggested that periodic training should be a combination of classroom teaching, practical training and training by using ICT tools or “top-of-the-range simulators”. At the same time, new CBT training formats like virtual reality (VR) trainings, augmented reality (AR) trainings and serious games are appearing on the Austrian training market which are not even mentioned in the current and amended EU directive. Therefore, a clearly defined integration of technology-supported and ICT-based learning into the Directive as an additional and complementary training option would be important. To facilitate a useful and high-quality application of ICT-supported driver training, it should be combined with the learning outcomes approach of the European Qualifications Framework (EQF). Technology-supported training needs very concrete quality considerations with regard to didactics so it can be integrated well.

Theoretical and instructional design principles should be part of any computer-based (CBT) or SBT intervention. CBT or SBT for professional drivers should build on the rich sources of educational theory and instructional design because it enhances content retention and facilitates the transfer of learning into practice. The

suitability of a theory and of an instructional design model depends on learning objectives and learning outcomes to be achieved. Since learning is a social process, CBT/SBT should allow student/tutor exchange. Interaction between learners and a tutor has a positive influence on the learner and the learning process. Some kind of exchange between learners (peer learning activity) during the training could be a positive impact. In SBT, peer-learning could be organised where learners observe one another during driving simulation and exchange feedback afterwards within a group session. The opportunity to exchange experience with other individuals (a tutor or other learners) during the learning process (e.g. online, via phone, or face-to-face) can provide a clear added value, so the provision of some form of tutoring is recommended when implementing ICT-based training. In CBT, online course elements, course elements with direct interaction between the learner and the tutor, and work-based learning elements should be combined to provide a suitable training environment. Therefore, a blended learning approach where computer-based training sessions are combined with classroom or online training sessions seems to be most promising for the development of effective ICT-based teaching. In SBT, training sessions should always be conducted by a tutor who explains the learning objectives and learning outcomes at the beginning of the session. Furthermore, the tutor should provide feedback to the trainees both during and after the SBT.

17. Laws regulating training of drivers in Finland

For Finland, the following main legal regulations are reported:

- Law of driving licenses
- Law of professional qualification
- Law of road transport
- Health and driving ability
- Law on adult education-, vocational education and training

The first two laws named above are introduced as being direct legal answers to the EU legislation, namely the law of driving licenses as contribution to EU-Directive 2006/126 and the law of professional qualification as contribution to EU-Directive 2003/59. The law of road transport gains relevance by regulating in detail the driving license classes for each vehicle type. Finally, the law on adult education-, vocational education and training gives the legal framework for PD training as a part of vocational education. The legislation of vocational training does not generally take a stand on the way teaching is organized, but rather on content and quality. Distance- and/or e-learning is therefore primarily the responsibility of the training provider.

Driver training in Finland

The Professional Qualifications Directive harmonizes the minimum level of training for road haulage and passenger transport operators in EU Member States. Basic level qualifications are always acquired through formal education.

Training usually lasts for 280 hours, but can also take place under accelerated conditions under certain conditions, with a duration of 140 hours. The training includes a theory test.

The National Board of Education decides on the basics of the curriculum and the degree examination leading to a vocational qualification, and in this context confirms the basics of the curriculum and the degree examinations to be followed in initial vocational education and training. A training provider approved as a training center for initial vocational training shall comply with the criteria of the curriculum and the degree examination approved by the National Board of Education in the initial vocational education and training.

A training provider approved as a training center for initial vocational training shall be responsible for providing the training in the application for approval of the training center and in addition to the information provided and the terms of approval. If there are any changes to the information provided in the application or other information provided by the Applicant that cause the terms and conditions of the approval as defined in the law on the professional qualifications of truck and

bus drivers no longer apply, the Training Center shall immediately inform the National Board of Education.

Development of driver training

Nowadays, the driver is required to act as a heavy duty driver:

- A C driving license is required for driving a truck. The driver of a combination vehicle (truck) must have a driving license and a card of the CE vehicle category.
- The EU regulation for freight transport from new truck drivers requires a initial vocational training and already in the profession further training from 10 September 2009.
- Drivers whose driving license has commenced before 10 September 2009 are exempted from initial vocational training but further training is also exempted from initial vocational training.
- The transport operator needs a joint permit for domestic and foreign goods transport, which must be covered by a freight transport course approved by the Ministry of Transport and Communications.

There will be no changes in these requirements in the near future. In the long run, the technological development of the industry will change and develop driver training.

17.1 Recommendations

Finnish legislation sets the minimum requirement to driving simulator for the training of professional drivers:

- Front and rear driver view (wide enough)
- Controls according to the vehicle (steering wheel, pedals, gears)

There are no legal restrictions to the exercises themselves, i.e. the driving simulator is legally allowed to use a studying comfort-driving exercises in a group (that is, all students present at the training event, receive the same number of hours of exercise, even if they do not drive a one meter). We believe that this point in the law should be corrected so that the driving hour must include a certain amount of driving in the simulator, as many proactive driving exercises, in particular, require controlling of vehicle behaviour. The simulator can also be used to train the active safety features of the vehicle (brake assist, lane departure warning, etc.) in the context of comfort-driving exercises, which requires the driver to be able to drive himself and know how the restraint system interferes with driving. However, the exercises are not recommended to be built solely on driving and safety equipment; In the form of on-board customers in the bus, freight on the truck and outside road users. On the basis of the exercises, the driver must learn to anticipate situations likely to lead to sudden braking and the overturning of passengers or the movement of cargo. Driving in varying weather conditions should

also be practiced with the additional requirements mentioned above, as sudden braking on icy roads can lead to derailment even when active safety devices are in operation.

There is no legal requirement for instructor expertise other than a traffic instructor qualification and at least one year of work experience as a heavy duty driver (provided that the instructor is training in basic professional skills in anticipation exercises). We recommend a minimum of 3 years of work experience in heavy equipment and simulation pedagogical training for the trainer (such training exists in Finland but is not standardized or defined in any quality measure). The instructor must be thoroughly familiar with the technicalities of the driving simulator, but must also be able to think in a central and effective way about the learning outcomes of the student to achieve the desired outcome (in this case, proactive driving).

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