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Administration

Manual

Driver training in Norway

Foundations for the revisions of the regulations
and curricula 2005



Foreword

In Norway, all driver training is governed by Regulations concerning driver training and driving tests etc. From January 1st, 2005, new training requirements will be established for the existing 16 driving license categories. In addition to these regulations, the Directorate of Public Roads has established a new curriculum for the various driving license categories to go into effect on the same date.

This book contains the professional foundation for the revisions of the regulations and curricula. It focuses on the pedagogic platform that it is based on, and provides a justification for the choices made. It also shows the path towards the general and fundamental training model chosen as basis for training with all categories.

The book is an abbreviated version of a study on new driver training published by the Directorate of Public Roads in 2002. The text has in parts been modified relative to the study to be in accordance with subsequent decisions.

Norwegian Public Roads Administration

Directorate of Public Roads

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SUMMARY

Background

The National Transport Plan 2002-2011 identifies the need for comprehensive treatment of the entire driver training sector and a strengthened training for all license categories.

The work presented here represents the professional basis for the revision of directives and curricula implemented on January 1st, 2005. This material was first presented in a study by the Directorate of Public Roads in 2002.

In the revision of the driver training, emphasis has been put on a common pedagogic platform for all categories and having a general and fundamental training model to be applied towards the formation of a curriculum for all categories.

A Modular Training System

Previous training systems required that driving license candidates for more than one category frequently had to cover the same training material several times. To avoid such repetition, the revision has facilitated a modular training system that takes into consideration any relevant previous training. This is an underlying feature of the curriculum development.

Psychological Factors relevant to Driver Training

The development effort is to a large extent based on the GADGET matrix (the GDE matrix). This model separates what the driver must learn into the following four hierarchical levels listed from the lowest to the highest level:

1. Manoeuvring level (manoeuvring the vehicle)
2. Tactical level (acting in accordance with traffic conditions)
3. Strategic level (selecting journeys/trips and factors related to journeys/trips)
4. Highest level (goals for life and skills for living)

It is important that consideration is made to all levels of the model, including levels 3 and 4. The subjects pertaining to these levels are often neglected in today's training. Moreover, drivers' insight into own knowledge, skills as well as goals for life and skills for living are emphasized. These subjects can significantly affect the potential to influence drivers towards safer traffic behaviour.

Driving is considered a form of problem solving and a cognitive model is being presented showing how information is processed towards a solution of the problems. It also recognizes the importance of proper and adequate knowledge to react correctly. It also underscores the significance of actions while driving are being automatic to avoid overloading the cognitive apparatus.

Which goals the driver has in mind for his/her driving will greatly influence traffic behaviour. Ajzen's "Theory of planned behaviour" states that a person's action depends on the person's anticipated consequences of that action. Driver training must therefore emphasize giving the students a realistic perception of possible results from different actions chosen in traffic.

Pedagogic Measures applied in Driver Training

In education, the curricula are of vital significance for what must be learned and how. This also applies to driver training. The didactic categories that all educational situations are made up of, is the basis for the structure of a curriculum. Typically, it is operated with six categories: Educational goals, educational content, teaching methods, evaluation of goals attainment, framework conditions for training and students' learning abilities. There is a mutual interdependence between the categories necessitating a change within all categories whenever a change is made in one.

There can be significant difference between the formal curriculum and the educational practices. To reduce this difference requires adequate control and management of the teaching effort.

The driver training can be managed either by investigating whether training goals have been attained or by mandatory training.

A Model for Driver Training

Seven subjects have been defined as necessary parts of the driver training based on the GADGET matrix (the GDE matrix) and an evaluation of what is important for a driver to know:

- *Legislation and road traffic as a system*
- *Vehicle manoeuvring.*
- *Road traffic skills.* (handling of various traffic and driving conditions and interactions with other road users)
- *Economic and environmentally friendly driving.*
- *Planning and preparations for driving.*
- *Behavioural tendencies and judgement tendencies.*
- *Self-knowledge regarding own competence and own personal behaviour tendencies and judgement tendencies.*

To achieve a favourable learning progression, the various subjects must be emphasized at different times during training. Proper distribution of the various subjects throughout training suggests that training is divided into four parts. These parts are considered as steps where step 1 is a prerequisite for step 2, step 2 a prerequisite for step 3 etc.

Step 1. This step contains theoretical training and demonstrations that includes such subjects as insight into own capabilities, goals for life and skills for living, economic and environmentally friendly driving, traffic laws and rules as well as traffic systems operation. This step shall give the students specific knowledge that is useful in the continued training (laws and rules), but also influence students' attitudes towards driving and provide a backdrop for the overall training effort.

Step 2. Here training focuses on vehicle handling combined with emphasis on economic and environmentally friendly driving. Adequate driving skills are required to benefit from participating in the next step.

Step 3. The main subject in this step is to learn to operate a vehicle in traffic including training in economic and environmentally friendly driving. Operational skills are required in order to undertake the last step.

Step 4. The main purpose of the last step is to influence students' attitude by bringing up such subjects as self-knowledge, goals for life and skills for living as well as trip planning and preparations.

An important point is to have the students complete one step before starting on the next; i.e. that step 1 is completed before the student embarks on step 2

Training Management and Control

It is important that the educational goals set for each step are attained and that the steps are taken in the correct sequence. Where training objectives cannot be quantified, adequate competence will be ensured by mandatory attendance. Where training goals can be quantified, competence is ensured by evaluation. Evaluation in conjunction with the various stepwise objectives is undertaken by a system involving evaluation and guidance lessons at driving schools while the final evaluation is undertaken through the Public Roads Administration's driving test. The driving schools report to the Public Roads Administration about completed evaluation and guidance lessons.

The Public Roads Administration has established a register for electronically recording evaluation and guidance lessons attendance for each learner driver. The driving schools are also obliged to report completed mandatory training. The electronic card reporting system enables the Public Roads Administration to keep track of how far each individual learner driver has progressed in the overall training effort.

The Public Roads Administration supervises the mandatory training lessons.

1. INTRODUCTION

The Public Roads Administration has been awarded the responsibility of managing and developing the training of motor vehicle operators through laws and regulations. The training takes place at driving schools, at some few upper secondary schools and by lay instruction, while the Public Roads Administration is entrusted with the task of evaluating the candidates' competence relative to the privilege of receiving a driver's permit in a given driving license category. The organization is also in charge of developing a curriculum for all driving license categories.

In the National Transport Plan 2002 – 2011, driver training has been given a wide coverage. It covers individual categories separately at the same time as the need for comprehensive treatment of the sector is expressed. The main message suggests a strengthened training for all categories.

As a follow-up of the National Transport Plan and the National Road Traffic Safety Action Plan, from January 1st. 2005 new curricula for 16 driving license categories including subcategories is being introduced. The introduction takes place in the form of revision of regulations on driver training and driving tests etc.

Basis for the revisions is the study "Revised Driver Training System. A proposal" prepared by the Directorate of Public Roads in 2002. The study suggests a joint pedagogic platform and a training model intended to function as a basis for all driving license categories. The study also contains proposed modifications of the content, structure and evaluation for the various categories.

In the subsequent regulation and curriculum revision effort, the proposals for the various categories are to a large extent being followed up. During the detailed planning process, however, a need to adjust some of the proposals became evident for policy and legal reasons.

This document, being an abbreviated and modified version of the 2002 study, is intended to express the common professional basis that the regulations and the curricula rest on. Reference is made to current regulations and curricula regarding concrete content and structure of the training within the various driving license categories.

The driver training is a complex system where the various factors are closely related. Modification of one single regulation/curriculum triggers a number of subsequent tasks that must be undertaken separately: Revision of content, guidelines and practical test criteria, changes in theoretical tests as well as the evaluation of instructor and sensor competence, possibly resulting in the need for competence improvement measures. This is an effort the Directorate of Public Roads undertakes as part of the curriculum implementation not described in this document.

2. ARGUMENTS FOR AN IMPROVED DRIVER TRAINING

2.1. Road Traffic Safety

The purpose of driver training is to provide persons with sufficient competence to drive safely, considerately and at the same time efficiently. Accidents and injuries are significant negative effects of traffic. Young and inexperienced drivers are particularly prone. The accident risk for novice drivers falls sharply during the first few months of driving (ref. Figure 1). The experience gained during the first months of driving is a common explanation for this reduction. Candidates could potentially gain this experience during driver training, thereby commencing their driving career with a much lower accident risk. The challenge is to bring forth such training that can be implemented within a realistic framework.

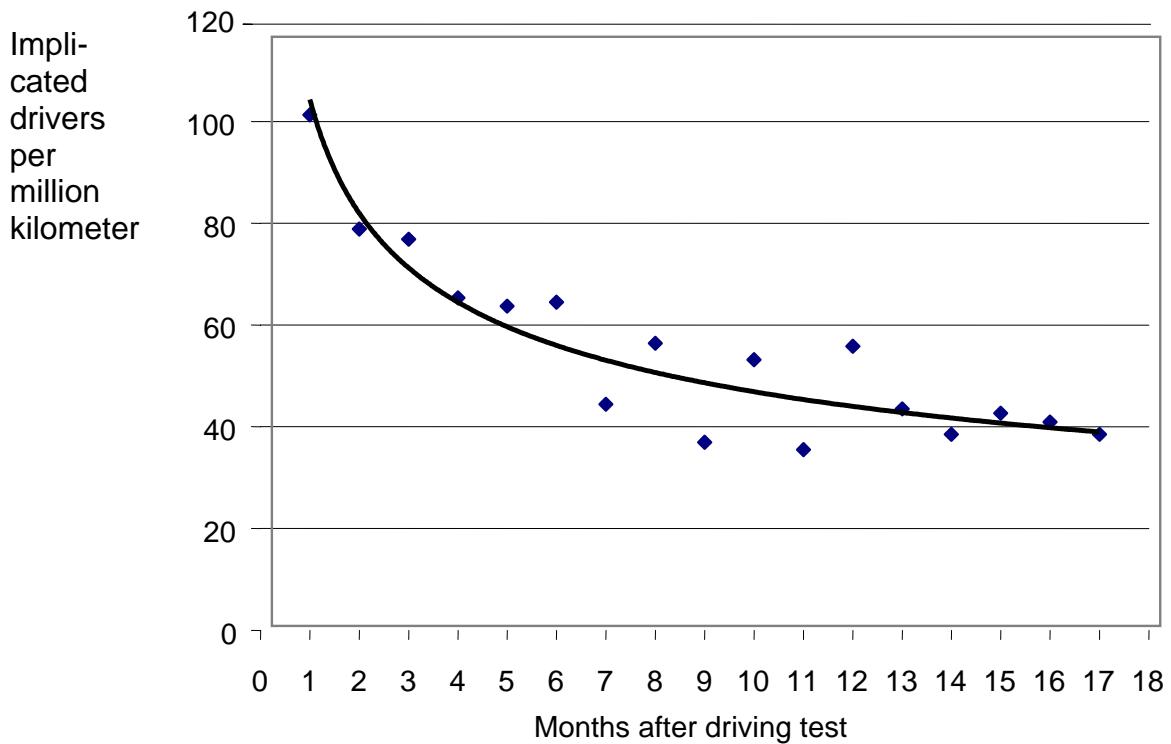


Figure 1 18-20 year old drivers' accident involvement against months with driving license. From Sagberg, 2000.

2.1.1. Young Drivers and Type Accidents

The type accidents novice drivers are involved in can tell what problems they encounter, thus contributing in identifying training needs. Figure 2 shows the distribution of Norwegian novice driver involvement by major type person injury accident. For automobile drivers, the distribution is based on 18-19 year-olds. To obtain an adequate sample for motorcycle operators, the data basis is expanded to include the 16-24 age group. For heavy vehicle operators, the 18-24 age group is being used. Both within the motorcycle and heavy vehicle operator groups, there can be individuals with several years driving experience. The term novice can therefore be misleading. The figure indicates nevertheless

what types accident young drivers are implicated in, providing a hint about which problems the driver training should aim at.

The figure shows that off-the-road accidents are the most prevalent accident type for as well young automobile drivers, young motorcyclists as young heavy vehicle drivers in Norway. They made up almost half of all automobile driver accidents, nearly that much for heavy vehicle drivers and over a third of all motorcycle operator accidents.

Running off the road indicates that the driver has had too high a speed relative to road and driving conditions and relative to own driving skills. It is therefore important to give the learner driver a realistic understanding of own skills and that they must adapt speeds to these skills. Moreover, the training must convey an understanding of the fact that speeds must be adapted to driving conditions.

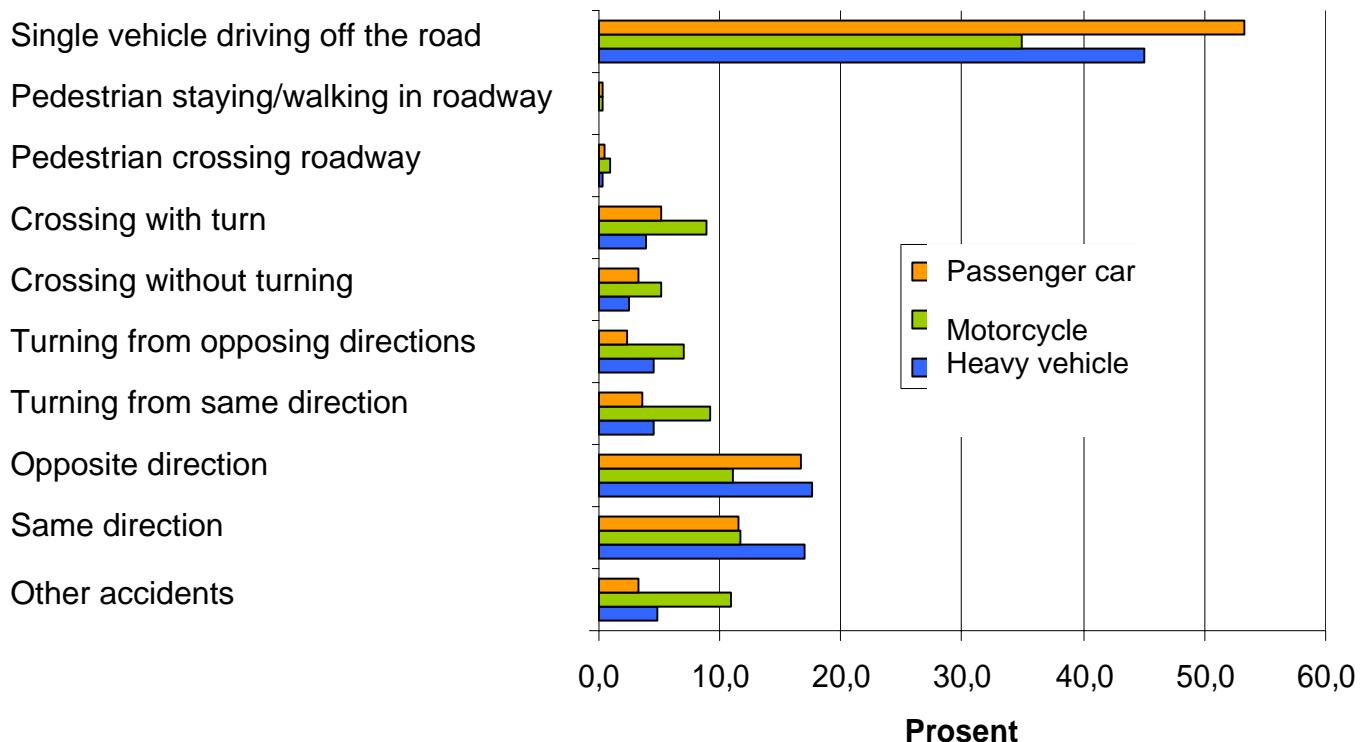


Figure 2 Percentage distribution of person injury involvement for automobile, motorcycle and heavy vehicle operators. Age 18-19 years for passenger car, 16-24 years for motorcycle and 18-24 years for heavy vehicles.

Motorcyclists are in a unique position. Motorcycle driving places great demand on technical driving skills. Inferior such skills can lead to off-the-road incidents even in the absence of a daring driving style. Motorcycle drivers can therefore benefit from improving their technical driving skills in order to avoid running off the road at normal speeds.

2.1.2. The Correlation between Driver Training and Driving Test

The driving test is an important directing element in the driver training. In principle it is desirable that the driving test contributes in ensuring that drivers have adequate competence. In practice this is difficult to attain. Firstly, there are subjects that are difficult to gage the competence being possessed. Secondly, the driving test is an inaccurate measuring gage. This leads to qualified candidates failing the test (false negative), as well as some unqualified candidates passing the test (false positive). The first mistake will normally be rectified on the candidate's second attempt. The second error will never be rectified. The candidate is let out into traffic with inadequate competence and remains there.

There is reason to believe that the candidates' competence level affects the evaluation during testing. When the candidate population is inferior e.g. from inadequate training, the percentage failing will increase. A high percentage failing will probably lead to a pressure to ease up on the evaluation criteria resulting in a reduction in the percentage failing. This will result in a larger proportion of drivers with inferior competence. This inherent weakness in the driving test and driver evaluation, results in a larger number of drivers being released onto the roads the poorer the candidate population competence is. This makes it especially important to make sure that the candidates are highly qualified when applying to undertake the driving test. It is therefore necessary to aim for a training effort independent of the driving test to ensure that drivers have the necessary competence. This has been an essential guideline in the driver training revision. In addition, it is of course important to develop driver training towards a better and more precise measuring tool.

2.2. Major Guidelines and Professional Development

The National Road Traffic Safety Action Plan 2002-2011 provides a number of leads towards improved driver training. These pertain both to driver training content, mandatory training to ensure adequate competence within important subjects, stimulating additional lay instruction with improved quality, curricula development for all vehicle classes and driver training system structure improvement.

Although the action plan to some extent points at suggested measures, the study of the new training has been obliged to identify current problem areas. This problem definition effort has also lead to other measures.

2.2.1. Areas with Improvement Potential

In the driver training development effort, the Directorate of Public Roads has therefore been cooperating with sector partners and other major professional organizations involved in driver training in order to identify problem areas within the current training system. A number of gatherings have been arranged for this purpose. Participants have in particular pointed at aspects with current training that the curriculum revision effort should be concerned with:

- The training provides inferior competence with regard to risk assessment and evaluation, traffic understanding and technical driving skills
- The students generally have had too little practice driving
- The training has sometimes had an unfavourable progression
- Training management has been lacking

The work defined two areas in need of improvement. One of these concerns the *structure* of the system and the other relates to the *quality* of the training.

2.2.2. The System Structure

What has been considered as inappropriate in the previous driver training system was the manner in which the various driving license categories were related to one another and the connection between them. Among others, several driving license categories share parts of the content. A person taking driving license in several categories having subjects and problem areas in common, must in principle repeat the content. This is the case between several light vehicle license categories and heavy vehicle license categories.

The curricula to be revised were developed at different times. This expresses itself by the various driving license categories having different formulations of objectives, methods and control of training. There therefore appears to be a need for a review of the plans to coordinate the pedagogic basis for the training with the various driving license categories.

In summary, the desired revision result was to improve the following structural characteristics:

- The main system structure
- Minimize repetition of content between driving license classes (less content overlap)
- Improve pedagogic conformity between driving license classes

2.2.3. Training Quality

Before the revision, it was with most categories largely up to the student to take responsibility for own learning. Little of the training was mandatory¹ and lay instruction was encouraged, in particular for category B. The curricula gave direction relative to the training progression, but experience showed that far from all learner driver possessed the competence they should have when for example signing up for skid pan driving. This is a problem as long as parts of the skid pan training was designed assuming that the learner driver had reached a certain competence level. Possible reasons for this can either be that the written curricula had not adequately made clear which competence level should be attained at which time, or that the student did not seriously enough take responsibility for own training.

The work also showed that it is necessary with a review of the training content as defined in the formal curricula. Some subjects were missing, others should have been reinforced or toned down. In particular, the need for a stronger focus on awareness and reflection is emphasized with the intention of influencing the candidate's attitudes.

In summary, the Directorate of Public Roads wanted the curriculum revision to strengthen the quality of the driver training by:

- Revise the content for each category
- More clearly define steps making up the training
- Ensure goals attainment at each step by milestones and stronger control
- Greater emphasis on awareness and reflection

¹ Does not apply to category A/A1. In category B 9, 5 mandatory lessons (from 1995), in heavy vehicle categories only skid pan course.

2.3. Research and International Development

The work to develop a common basis for the new curricula is also based on research and international development. The objective of this development effort has been to base the new curricula as much as possible on research supported knowledge. In a previous study, an overview ("Overall evaluation of the driver training") of international research on driver training, test driving and training support measures were prepared (Spurkeland, 1998).

During the study overview was supplemented with later research and development results in the field, not the least signals emanating through international research projects under EU auspices. Latest driver training development within several European countries has also been evaluated and considered.

3. A MODULAR BASED TRAINING SYSTEM

Drivers with driving licenses of different categories will to a large extent operate vehicles in the same traffic system. There will therefore be an overlap between driving license categories as far as competence requirements are concerned. With regards to training, this means that some of the subject matter to be covered in one category also is included in the training for another category. Training of learner drivers taking driving license in several categories was previously arranged such that they had to go through the same subject matter several times.

This is very impractical. In the revision, an attempt has therefore been made to undertake an administrative clearing-up by introducing a modular based training system principle where a person's previously acquired competence is taken into consideration. Whenever a person possessing driving license in one category wishes to obtain driving license in another category, it is desirable that he/she as a rule only has to cover the subject matter required for the other category that has not already been covered in connection with obtaining driving license in the first category. Training for the other categories will thus build upon the relevant competence the person has attained during previous driver training.

It should be emphasized that the modules are defined based on what the subject matter contains. This is attempted taken care of in the curriculum development work, but not implemented consistently. The modular based way of thinking will regardless be of help when the regulation and curricula shall form basis for establishing different training offerings. This way of thinking can lead to the enrollment of students from several driving license categories to one and the same course.

In the description of the modular system, it is appropriate to distinguish between driving license for light vehicles, for heavy vehicles and for trailers.

3.1. Light Vehicles

The various modules for the light vehicles are illustrated in Figure 3.

All those taking their driving license for the first time are obliged to be educated about the traffic system, about current laws and rules and about drivers' responsibility within the system. Such knowledge is necessary regardless of which of the light vehicle category driving licenses a person is taking. Training within these subjects can therefore be detached as a separate module. This module has been designated the "course in basic road traffic knowledge" and is the foundation that all light vehicle driving license training start out with. The module will consist of a subject previously found in all curricula for light vehicles (e.g. traffic as a system, general sign understanding and general traffic rules). In addition it will consist of subjects that have not previously been emphasized for all categories, but which should have been, such as first aid, the significance of attitudes and insight into own attitudes and valuations. In the new system, a completed basic traffic course will be a prerequisite for being allowed to engage in practice driving, both privately and at a driving school.

Following the "course in basic road traffic knowledge, the candidate must receive the training required within the specified category module. Each of these modules will be concluded with a theoretical and/or practical test. Training is concluded when the test is passed, giving the candidate the right to operate within the driving license category in question.

Some of the theoretical subject matter will reappear in the various categories, but the way the material is presented will be different. Even though drivers of different vehicle groups relate to the same traffic rules, they will still experience different traffic challenges precisely because vehicles have different characteristics. It is therefore important to get hold of what is specific for the category within each driver license category in the *voluntary* theoretical training and it will also appear in the various theoretical driving tests.

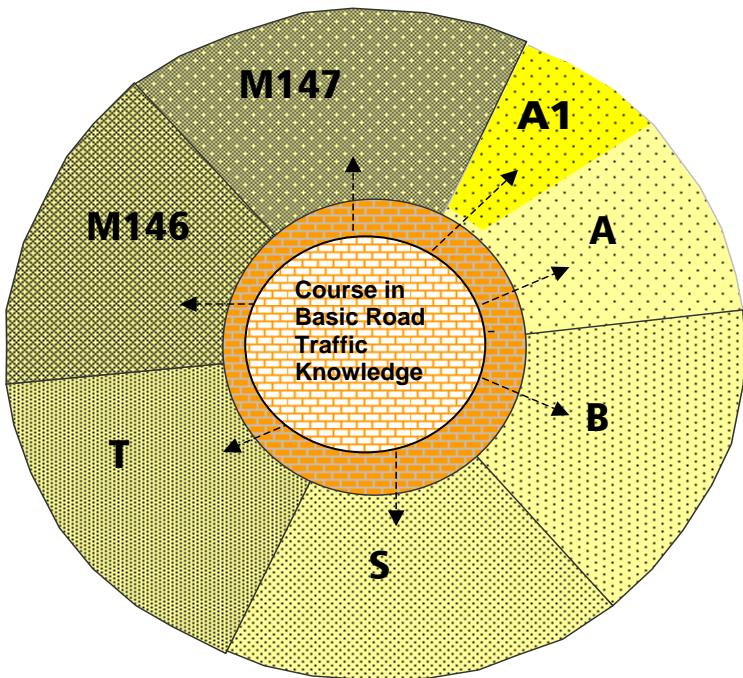


Figure 3 Light vehicle category modules

A person for example possessing driving license for automobile wanting driving license for motorcycle, can start motorcycle training with the category specific part. This person has already acquired basic traffic knowledge when attending the course in basic traffic knowledge she/he took in connection with the automobile training. (This is illustrated in Figure 3).

The independence between the category specific parts does not apply to category A and sub-category A1, as these have a common basis. The overlap between A1 and A subject matter entails that anyone having received category A driving license also has category A1 privileges.

The light vehicle class driving license subject matter is sorted into eight modules:

- Course in basic traffic knowledge
- A1 (light motorcycle)
- A (in addition to A1 to receive A driving license)
- B (automobile)
- S (snow mobile, national category)
- T (tractor)
- M146 (two-wheeled moped, national category)
- M147 (three/four-wheeled moped, national category)

For more precise driving license definitions, reference is made to the EU driving license regulations.

3.2. Heavy Vehicles

To receive driving license for heavy vehicle, the person must have acquired class B driving license. The training for the heavy vehicle categories also builds on the competence the person has gained through category B training. For heavy vehicles it is distinguished between two main categories, C (truck) and D (bus). Each of these has a sub-category, C1 (light truck) and D1 (minibus).

Between the subject matter for these four categories there will be different degrees of overlap, something that will become evident when comparing the curricula. This principle is illustrated in Figure 4. Some subject material apply only to truck (C in the figure) or only to bus (D in the figure). A portion of the subject matter will be common to category C and D but not included in the subject matter for any other category (C/D in the figure). For C and C1 there will be some common subject matter (C1 in the figure) that is not be included in the subject matter for either D or D1. Similarly, there will be some subject matter that is common to both D and D1 but which is not included with C and C1 (D1 in the figure). Finally, there will be some subject matter that is common to all four categories (C1/D1 in Figure 4).

The overall subject matter in the heavy vehicle curricula can be thus be divided into six parts. Each of these will represent a module. To receive a driving license for a certain category, the subject matter in one set of modules is reviewed to ensure that it covers what is required for that category. A person for example having a category B driving license wanting to obtain a category C driving license, must go through the subject matter in the following modules: C, C/D, C1 and C1/D1. When a person having a C1 driving license wants a C driving license, the person has to take modules C and C/D.

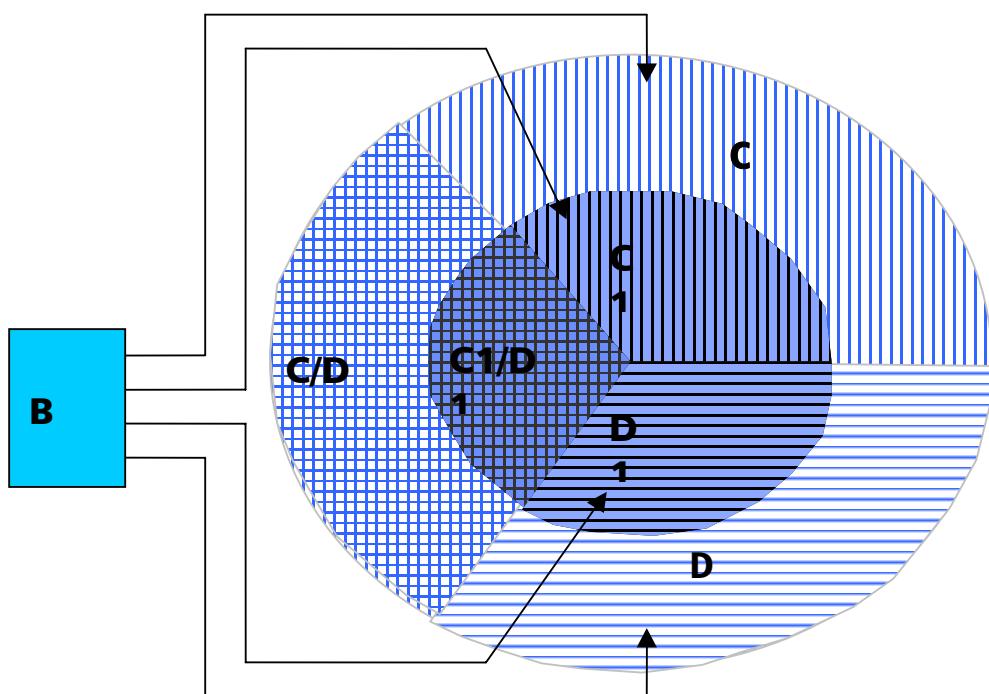


Figure 4 Illustration in principle of subject matter for the heavy vehicle driving license categories. The arrows show which modules a student can start with when he/she has a category B driving license.

3.3. Trailers

For trailer there is distinguished between five categories according to type vehicle hauling. These are BE (automobile), CE (truck), DE (bus), C1E (light truck) and D1E (minibus). Separate curricula have been prepared for all categories.

For C1E and D1E the subject matter is the same. Otherwise, the extent of the subject matter varies for the different categories. Category CE includes all subject matter for trailers and thus also the subject matter for the other categories, but some of the subject matter applies only to this category (CE in Figure 5). The DE subject matter comprises some that is common with CE, but which is not found in the other categories (DE in the figure). For C1E and D1E (common subject matter for these categories), some subject matter is common with DE and CE, but which does not exist for BE (C1E/D1E in the figure). The BE subject matter makes up only a limited part of the subject matter for other categories (BE in the figure). The total subject matter for trailers can also be divided into four parts where each part will be a module (CE, DE, C1E/D1E and BE).

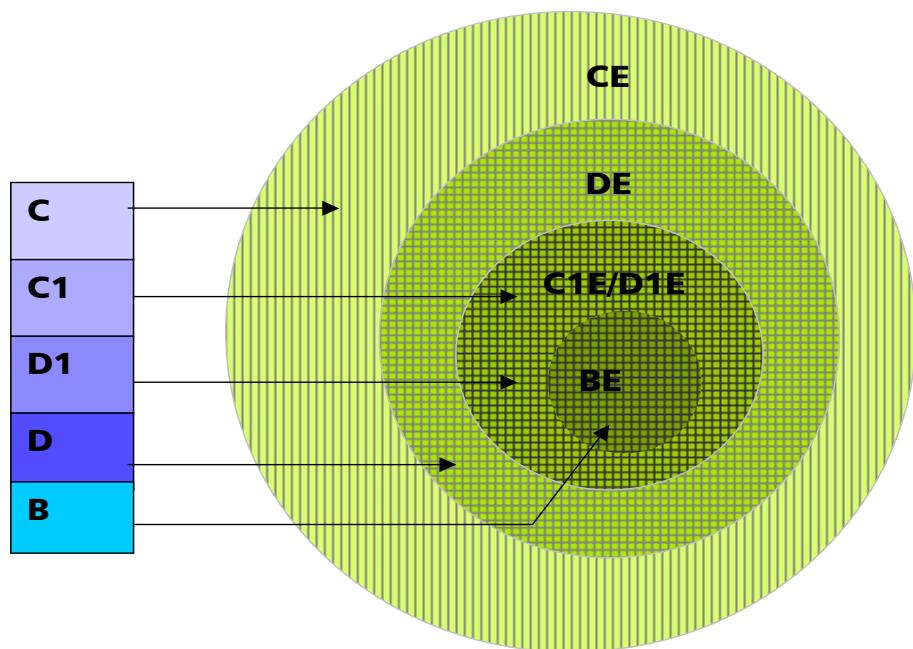


Figure 5 Illustration of trailer modules. The arrows show which category towing vehicle is required to commence training for the various trailer modules.

To commence training to receive a trailer category driving license, a person must have driving license for corresponding towing vehicle. The person must also have a C or D category driving license to start training for CE and DE modules respectively. Having C1 or D1, the person can start on the C1E/D1E module, but will only receive driving license for the trailer category she/he has towing vehicle driving license for. With for example a C1 driving license, persons completing the C1E/D1E module will only receive a C1E driving license. If a person later takes a D1 driving license, she/he will automatically receive a D1E driving license.

3.4. Modules in the Overall Training System

When following the module principle, there will be a total of eighteen modules in the training system. These modules are also linked to the subject matter ("curriculum") that exists for the various driving license categories found described in the curriculum. Figure 6 shows an overview of all modules that the curriculum is based on.

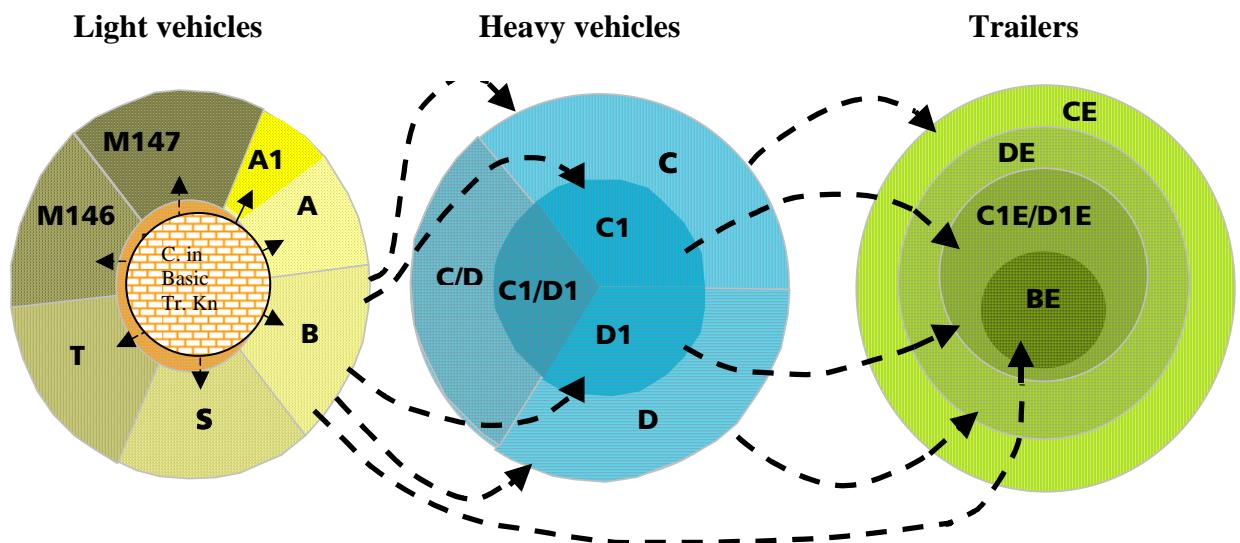


Figure 6 The modules in the overall training system

The proposals presented here are typical and idealized solutions based on the subdivided subject matter. For practical reasons it has proven advantageous to undertake the development of regulations and curricula with fewer modules than suggested here.

4. PSYCHOLOGICAL FACTORS RELEVANT TO DRIVER TRAINING

4.1. Driving Tasks Arranged in Levels

Driving can be considered to be a process where the driver continuously encounters tasks in need of solutions. The ability to master these tasks will depend on the knowledge and the skills the person possesses and the person's intellectual abilities. The objective of driver training is to remove the difference between knowledge and the skills required to drive safely, considerately and efficiently and the knowledge and the skills the person possesses when commencing training. For the training to be appropriate, the knowledge and skills that the driver needs to have must be known.

Driving is a complex activity involving solutions to a wide spectre of tasks. In a driving analysis McKnight and Adams (1970) arrived at 45 main tasks that could be identified and each of these could be divided further into a total of 1700 sub-tasks. In order to produce an overview in this multiplicity, an attempt has been made to arrange the tasks in various ways. A common way has been to split the driving tasks and the driving behaviour into three hierachic levels (Michon 1985; van der Molen and Bötticher, 1988):

- Strategic level. Tasks and behaviour at the top level is linked to for example planning and trip preparation, which route and departure time to be selected.
- Manoeuvring level or tactical level (hereafter called tactical level). At this intermediate level, the tasks and behaviour are linked to situations connected to the driving itself such as what speed level to select, deciding to pass the vehicle in front or not.
- Control or operational level (hereafter called the manoeuvring level). At this highest level, the tasks and behaviour is connected with situations at the moment such as positioning the vehicle properly and react correctly to incidents occurring that require immediate corrective action.

When operating with tasks at different levels, decisions made at one level can affect tasks at lower levels. When a driver at the strategic level chooses a delayed departure, he/she might wind up running late. The consequence can be that the driver at the manoeuvring level must select a higher speed and utilize smaller gaps to arrive in time. This will have influence on the requirements on how to solve the tasks at the control level. This places greater demand on correct and prompt handling of the vehicle. How the driving actually comes out, can therefore depend on how tasks at other levels are solved.

4.2. The GADGET-Model

4.2.1. Four Levels

In a larger European research project (GADGET²) on subjects such as driver training, a model was developed based on the hierachic models previously described (Hatakka et al 1999). In the GADGET matrix (later also referred to as the GDE matrix), however, a fourth level was added above the other three. This upper level became known as "Goals for life and skills for living" (hereafter denoted the "highest level"). This level does not actually contain driving tasks and driving behaviour, but is concerned with the more lasting driver characteristics such as personality, group identification, age and similar. The reason why this level is included is that these driver characteristics can have an influence on how the driver solves the tasks and on driver behaviour at lower levels. How a driver functions as a person can have an influence on how he/she solves tasks at the strategic level, such as how well trips are being planned. Poor planning can thus have an influence on tasks and behaviour at lower levels.

4.2.2. What needs to be Learned

A driver needs knowledge and skills within each of the four levels. At the superior level, this means knowledge of personality traits that can have an influence on decisions at lower levels. As far as the other levels are concerned, this implies knowledge and skills relevant to the ability to deal with the tasks at each level. The GADGET matrix (see Figure 7) also emphasizes that the driver must know how wrong and lacking information and/or skills can lead to increased risk. At the highest level, a risk seeking personality can be unfavourable from a traffic safety viewpoint. At the strategic level driving while drunk can result in increased risk, while choosing to drive too fast is an unfortunate choice at the tactical level and lack of technical driving skills being unfortunate at the manoeuvring level.

Driver insight into own tendencies and typical problem solving habits are considered important aspects of the GADGET matrix. A driver who knows that he/she enjoys thrills and therefore is apt to take chances, can attempt to modify such tendencies and choose a less risky behaviour. The same applies to drivers who know that they are lacking in knowledge and skills. Insight into own shortcomings can contribute in making their driving more considerate and careful.

In summary, the GADGET matrix operates with four hierachic levels that from the upper to the lower includes:

- Highest level
- Strategic level
- Tactical level
- Manoeuvring level

Each level requires:

- Knowledge about factors/conditions having influence on how tasks are being solved and knowledge and skills of significance in order to solve tasks
- Knowledge about factors/conditions that can increase the risk
- Insight into own reaction pattern and mentality and into lack of own knowledge and skills

² GADGET: Acronym for "Guarding Automobile Drivers through Guidance, Education and Technology".

What needs to be learned			
	Factors affecting the driving	When factors have a negative effect	Insight into own conduct or standing relative to the factors
Level			
Highest level Goals for life and skills for	Connection between driving behavior and personality, lifestyle, age, behavioral dispositions, group norms	Effect of 'sensation seeking', self-assertion, yield to group pressure, use of intoxicants	Knowledge of own general tendencies to evaluate and act in a given manner
Strategic level Choices on journeys/trips and journey/trip related factors	Choosing means of travel, planning departure time and travel time, consumption of intoxicants	Intoxication, short of time, unfavorable conditions because of bad departure timing	Own abilities to make and follow plans
Tactical level Choices made relative to traffic situations	Rules and regulations, traffic skills, safety margins	Inadequate knowledge of rules, lacking in traffic skills	Recognition of own deficiencies regarding knowledge and skills
Maneuvering level Maneuvering the vehicle	Technical driving skills, vehicle characteristics, physical laws	Inadequate automation of technical driving skills, vehicle deficiencies, poor driving conditions	Recognition of own inadequate technical driving skills and knowledge about vehicle, physical laws etc

Figure 7 Modified version of the GADGET matrix (GDI matrix). Modifications made by Alf Glad.

4.2.3. Training based on the GADGET Matrix versus Traditional Training

It has been claimed that driver training normally has been aimed solely at the two lower levels and neither has the creation of insight into any lack of own knowledge and skills been emphasized. The driving instructor might in some cases have touched on the higher levels and some have possibly also brought up the significance of self-knowledge. Among others, this was the case in Norway from 1989 to 1995 when the driving education contained the so-called "Traffic Safety Package" (10 lessons advanced driving, 8 theory lessons). The package was erased by the politicians in 1995). However, it should be assumed that driver training seldom has been based on a consciously planned training effort comprising all four levels and in addition emphasized self-knowledge relative to factors associated with each of the levels.

A driver training solely aimed at the two lower levels and not bringing up self-knowledge regarding learning and skills, can easily become a pure proficiency training. This can lead to excessive confidence in own skills and that the skills a driver means to possess are used to achieve goals entailing risky driving. An understanding of the effect of factors at the highest level together with self-knowledge regarding own weaknesses and strengths, can be important towards counteracting such tendencies. The GADGET matrix aims at a training that makes drivers reflect before choosing driving style and driving behaviour.

4.3. How Drivers Solve Tasks

A driver's decision is mainly based on information received through his/her senses (first and foremost the eyesight) and the knowledge and skills the driver possesses. It is therefore a matter of information gathering and information processing. It has been normal to refer to what takes place inside the driver's head as the "driving process". This is a process which goes through the following stages: sensing – perception – evaluation – decision – action. The driving process is a cognitive model. It can, however, be developed further based on what is known at present on cognitive processes to achieve a better insight into what takes place during driving.

4.3.1. A Model for Information Processing

In the model (see Figure 8) there are three central elements:

A sensory register that contains sensory impulses. This register probably has the capacity to keep a large quantity of impulses, but only for a brief period of time (less than one second for visual impulses).

The working memory where information is being processed. It is only the working memory that we are consciously aware of. The working memory has a limited capacity both as far as how much information it can contain (7 +/- 2 information units) and how long the information can be retained (a few seconds).

The knowledge storeroom where the person's experiences and skills are stored. The storeroom has a very large capacity and can store information for a long period of time. This storeroom is probably made up of several parts. Two of these are significant in this connection. One is the semantic knowledge storeroom that handles aspects such as knowledge of relationships and lexical knowledge. The other is the storage of action schedules. An action schedule is a form of a plan of action. When such schedule is activated it will trigger a certain action. An action schedule can simply control one single movement, but can also be composed of a chain of lesser action schedules controlling a longer action sequence.

The driver receives sensory impulses from the surroundings and his own vehicle and these are stored momentarily in the sensory register. Sensory registers contain at all times more impulses than can be processed. A selection takes place where some impulses are passed on to the working memory to be processed. The impulses have then become information the driver can consciously process. The driver will also collect information from own semantic knowledge storeroom and link this information with information from the surroundings and the vehicle to arrive at a decision on how to act. This decision will activate one or more action schedules leading to action.

Drivers who repeatedly have chosen same actions in a typical situation, will in time acquire a direct linkage between information selected from the sensory register and action schedules. This means that the driver does not consciously have to think about what has to be done. Action has been automated and does not burden the capacity of the working memory. The working memory can then be used to process other information

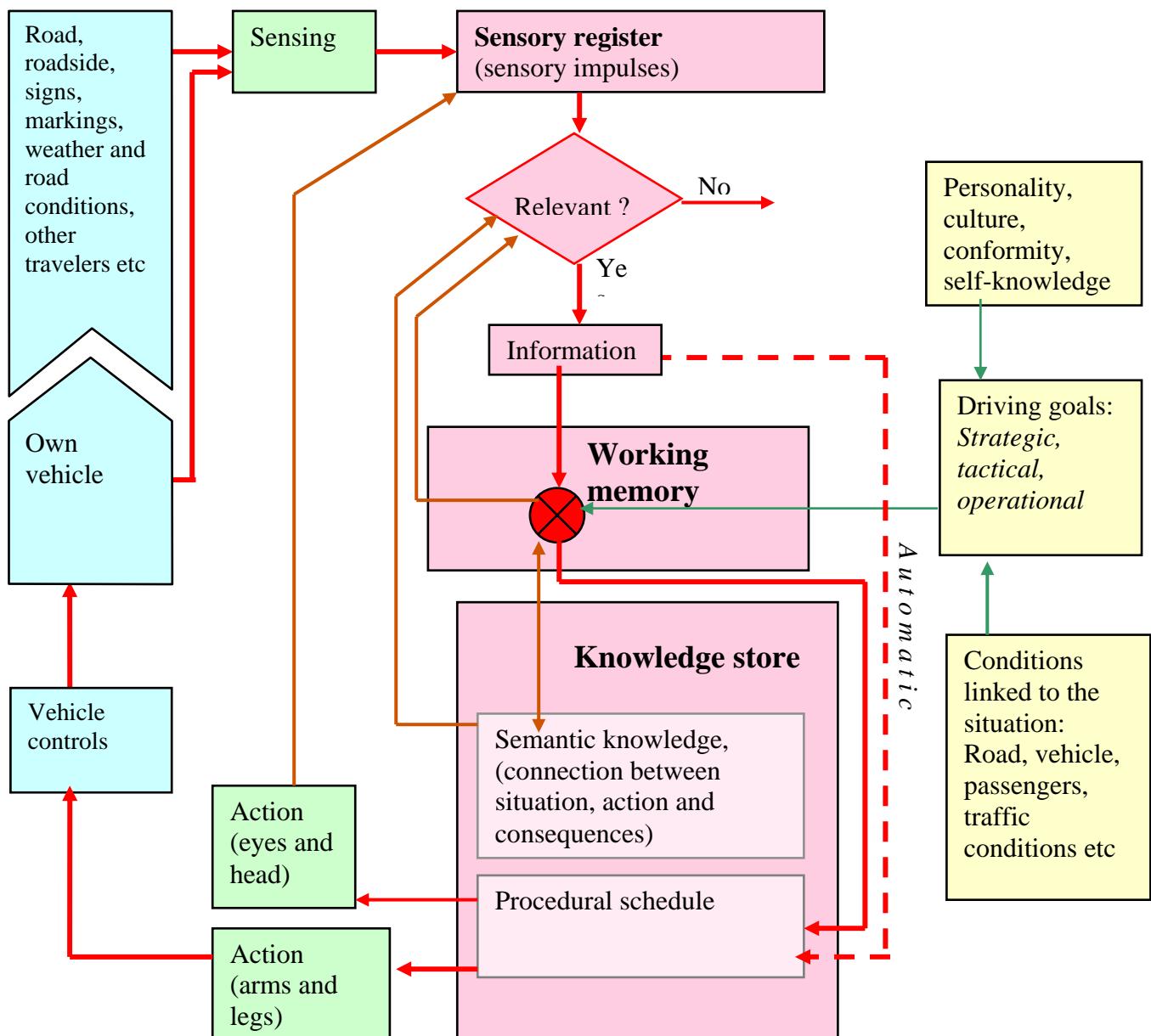


Figure 8 Model for Driver Information Processing

and solve other tasks. The driver can also handle two tasks simultaneously. With beginners, shifting gears can require conscious information processing within the working memory. This task might demand the entire working memory capacity precluding the processing of other information as long as the person is engaged in shifting gear. With an experienced person, gearing will be automated. Such driver can then use the working memory for other purposes such as paying attention to traffic.

Simple repetitive tasks (e.g. manoeuvring the vehicle) will easily become automated, but more complex tasks can also be automated (Svartdal and Overskeid, 1997). A driver who continually drives the same road section, will in time automatically select a certain speed level on that section.

Which impulse in the sensory register is selected, will depend on the driver's knowledge. Such selection will be made unconsciously. The semantic knowledge supply, being a result of experience and learning, will have an influence on what is retrieved from the sensory register for further processing or for the direct activation of an action schedule (automatic action). Such unconscious selection occurs when the situation is known or has many known elements. In more unfamiliar situations, the selection will to a greater extent be governed by conscious choices, i.e. activity in the working memory. The driver will attempt to consciously look for information in the surroundings that together with information from the semantic knowledge storeroom can tell what needs to be done.

The quality of decisions made and thus which action schedules are activated, is to a large extent dependent on which information is selected from the sensory register and of the knowledge within the semantic storeroom. The content of the semantic storeroom is therefore of an altogether decisive significance as far as how good solutions the driver arrives at on tasks faced as a driver. The GADGET matrix shows what knowledge and skills the driver needs and which should therefore be found in the knowledge storeroom.

Overloading the working memory is an essential cause of failure in the information processing. It has as previously mentioned limited capacity. When information is solely kept in the working memory, it is assumed that it has the capacity of 7 +/- 2 information units. If the information units need processing (such as seeing their interconnections) such operations demand some of the capacity. It is therefore anticipated that in driving situations, a driver will not have the capacity to handle more than 2-3 information units at a time. With a beginner who to a large extent must rely on conscious information processing (i.e. use of the working memory), many situations can demand processing of more information than the driver has capacity to handle. This can result in the driver disregarding essential information and therefore act incorrectly, or that the information processing is lacking, resulting in wrong decisions being made. In order for the driving to be safe and efficient, it is therefore important that much of the conduct is automated, and this can only be achieved through training.

4.3.2. Knowledge based, Rules based and Proficiency based Conduct

Reason (1990) divides the problem solving conduct into three types according to what the solution conduct is based on.

- **Knowledge based conduct** when the player faces an unfamiliar problem and must think through large parts of the entire problem solving phase. This entails the use of the working memory.
- **Rules based** conduct means that the player uses established rules to control the conduct. Conduct linked to the rule will be largely automated, but there is a need for conscious information processing (and thus the use of the working memory) when the player selects which rules to follow.
- **Proficiency based conduct** is mostly automated conduct. Environmental stimuli trigger action schedules directly without the person being conscious of it.

A person learning to drive will start with knowledge based conduct. Using the vehicle controls and adapting to road and traffic represent conscious reasoning and use of the working memory. The working memory will quickly be overloaded and the driver will make mistakes. With increasing experience, rules will be established for conduct in various situations. When the driver notices that the engine labours, he/she employs the gearshift rule. Rules will be chosen consciously, but undertaking the gearing itself can be automated. The driver has now freed some of the working memory capacity and can use this for other purposes requiring conscious processing. With additional experience, gearing will be automatic. Stimuli (such as engine noise) will automatically activate the gearing schedule without the driver having to think about it at all. This results in even more working memory capacity being freed.

With increasing experience, there is also a shift from knowledge based conduct towards rules based and proficiency based conduct. For a driver with extensive experience, most of the conduct will be rules based or proficiency based.

Reason (1990) claimed that the frequency of mistakes is clearly highest when the conduct is knowledge based and lowest when proficiency based. For the driver, this means that the potential for mistakes and thus accidents is greatest when the driving is mainly knowledge based, i.e. for drivers with limited driver training.

4.4. What affects Decisions and How are they Made

The cognitive model provides a crude explanation of how conduct is controlled. That it tells little or nothing about what is the basis for the decisions made in the working memory, is a significant deficiency. Why does a driver decide to drive fast on a road section while another decides to keep a low speed on the same section? A likely explanation is that the two drivers have different goals with their driving. The first one may need to reach the destination within a given hour and is running late, while the other one is driving just to look around. Both drivers make decisions leading to a conduct resulting in the attainment of goals or the probability thereof.

The purpose of the working memory is to make decisions and thus the conduct that results in favourable consequences relative to the goals the person has in mind. This point of view is in line with common behaviour theory. The opinion regarding which behaviour results in the most favourable consequences is mainly based on experience, i.e. the semantic knowledge storage.

Which goals a driver has in mind and which decision a driver takes, is an important driver training subject. The high beginner accident risk is probably in large part caused by lack of experience, but unfavourable driving goals creating hazardous behaviour, also appears to be a significant reason why beginning drivers are particularly vulnerable to accidents.

Which conditions or factors is it that the person is considering when making decisions? Ajzen's (1991) "Theory of Planned Behaviour" can provide some answers and at least be of help in thinking around the problem.

The main point in this theory is that a person will evaluate different consequences of various actions taken. A driver desiring to exceed posted speed limits can assess consequences such as becoming involved in an accident, being stopped by the police or be more focused while driving. It is also possible that the driver will evaluate so-called social consequences. How will passengers, other travellers and residents near the road react if she/he exceeds the speed limit. Getting the driver to evaluate new consequences or known consequences in a different manner can facilitate different actions.

This evaluation involves two components. One contains an evaluation of the probability that the consequence will occur if the action is executed and the other contains an evaluation of what will be the consequences for the driver. Between these two components there is a multiplicative relationship (probability x importance). An anticipated consequence that very likely will occur and which is expected to be of great significance will have major influence on action taken. When the driver considers the probability of the consequence occurring to be practically zero, this consequence will not have any influence on the action taken even if the consequence would have a major impact in the event it did occur. Similarly, a consequence of no importance to the driver will have no influence on the action taken even if the probability of occurring is considered high.

How a driver assesses the various consequences of an action and how he/she evaluates other persons' understanding of the action, depends on basic personal traits such as personality, cultural background, group identification and past experience. A person who likes to take chances, will probably judge possible negative consequences of an action differently from a more cautious person. A person who has just received a ticket for speeding will assess this consequence differently from one that has driven for years without encountering enforcement of speed limits.

Lasting personal characteristics will also influence behaviour by influencing consequence assessment of certain actions. This is in line with GADGET matrix viewpoints. The upper model level comprises driver characteristics and it is anticipated that these affect task solution and behaviour at lower levels. The GADGET matrix emphasizes the need for the driver to have insight into how own personality traits and how reaction patterns will affect behaviour. With self-knowledge this influence can be modified. In the Ajzen model, this means that the influence personality, group identification etc have on the consequence assessment of various actions, can be modified. A driver who is aware of being a risk taker, can show consideration when assessing the consequences of speeding and thus arrive at a different result than would otherwise be the case.

4.5. Summary of Chapter 4

This chapter explains about the cognitive apparatus and the functions a driver has available to manage the driving task. It is called attention to the fact that safe and appropriate driving is dependent on a "well stocked" knowledge storage. This storage is filled both by reading of theoretical material, knowledge transfer from others, but above all by experience. With automated behaviour mistakes are made less frequently. Automation is established through practice. To avoid accidents due to mistakes, it is therefore important that candidates have lots of driving experience before being let out onto the road on their own.

The GADGET matrix gives an overview of areas that are relevant and that the driver should have competence in. This spans from technical manoeuvring skills to the effect of goals for life and skills for living inherent in the driver. In addition, the driver must have insight into own competence level in various relevant areas and own goals for life and skills for living. This is in line with Ajzen's theory which states that actions are determined by how the person assesses consequences of the action and that the way in which the consequences are being assessed is determined by the person's characteristics. A driver having insight into his/her way of assessing different consequences, has a greater potential of counteracting any unfavourable consequences, then if such insight is lacking.

The content and structure of the curricula implemented on January 1st, 2005 are based on this theoretical knowledge.

5. PEDAGOGIC MEASURES APPLIED IN THE DRIVER TRAINING

Preparing for organized pedagogic activity (developing a pedagogic offering) requires insight into and understanding of which measures, premises and framework conditions are available to play with and their interrelationships. This applies regardless of which field and at which level training is being practiced. This chapter describes the various elements and shows how they are considered used in the training. The presentation is not based on an expressed didactic³ direction, but various approaches were chosen in regard to what is appropriate in the given situation.

5.1. Curricula

Most organized pedagogic activities are based on documented plans. These plans state something about what the activities are expected to achieve. For the school system, the formal curriculum provides the strongest signals on what society wants the school to do for and with the students.

A curriculum must fulfill several functions. It must be informative and communicative, and thus provide expression for which knowledge and values are represented in society and how these are desired prioritized at the various school levels. The curriculum will, moreover, have a steering function. The curriculum shall govern and partly be a supervising authority for what is going on in the classroom. The curriculum shall contribute in ensuring that the training within an educational level builds on the same goals. But similarly to the fact that the content of the curriculum provides guidance to student development, subjects/topics/knowledge not presented by the plan may also affect the development. Nonexistent knowledge will affect choices made precisely because the assessment basis will be narrower.

Different groups in society will have different preferences regarding which values and subjects shall be included in the curriculum. The contentious issue between politicians, authorities and the academic profession is often linked to the content of the curriculum and how detailed and thus how controlling the curriculum shall be. The different preferences make it impossible to satisfy all wishes and demands that exist in conjunction with curriculum development.

The Norwegian Road Traffic Act §28 on traffic education provides the legal basis for establishing educational curricula. In conjunction with the curricula coming into force on January 1st, 2005, the Directorate of Public Roads has chosen to enter the main objectives from the curricula into the “Regulations concerning driver training and driving test”. This was done for formal reasons to be able to supervise the training in the private driving schools. The curricula themselves are formally considered not to be regulations according to the Public Administration Act, but are supposed to be an instructor’s guide.

³ Didactic (from gr. Didaskein, teaching) educational theory, art of teaching.

5.1.1. Curricular Levels

The curriculum can be viewed from various levels. The American John Goodlad (1979) outlined five different curricular levels:

- The **ideal** curriculum is a hypothetical construction based on an idealized conception of what the curriculum and the education shall promote.
- The **formal** curriculum is the actual written curriculum formalized in the form of a regulation.
- The **perceived** curriculum is the way the formal curriculum is being perceived by the various players (instructors, examiners).
- The **operationalized** curriculum is the curriculum employed in education
- The **experienced** curriculum is the curriculum the student is left with after concluded education. This does not have to be in accordance with the perceived or operationalized curriculum because the student's perception of messages and incidents can deviate from the instructor's intentions with the messages and incidents.

In addition to Goodlad's five levels, the curriculum can be considered to be:

- **Guidance**, i.e. that it provides guidelines for instructors on how to instruct and in what
- **Course description**, i.e. that the curriculum informs students about what can be learned from the course

5.1.2. The Hidden Curriculum

The discrepancy between the formal plan and the student's learning (or experienced curriculum) is called the **hidden** curriculum. As this designation suggests, there are a number of factors at school that are learned unintentionally. Whether the "content" of the hidden curriculum reinforces the formal plan or not varies, and it may have been developed consciously or unconsciously. However, when the school's goals and its actual function deviate strongly, the formal curriculum does not function as a steering instrument in practice.

During driver training the student has a strong desire to pass the driving test. Driving schools can in the present competitive situation feel pressured to accommodate such desires. This can result in subjects of particular relevance to the driving test are being emphasized more than other subject matter. Thus a serious discrepancy can occur between the intention of the formal curriculum and the one the students actually are instructed from. This indicates a need for steered training. This is covered in a subsequent chapter.

5.2. Didactic Categories and Relationships

Any curriculum should be constructed based on the didactic categories that all educational situations are made up of. Nevertheless, the curricula can be expressed dissimilarly since curriculum developers emphasize the didactic categories differently and prioritize diversely within each category.

It is normal to operate with six didactic categories; goal, content, method, evaluation, framework conditions and teaching premises. The categories are interrelated in that a choice made with one category will influence other categories (see Figure 9). Curriculum development and the subsequent teacher's instruction program require comprehensive thinking. This means that final choices cannot be made for one category alone. That would in case suppress the dynamics between the didactic categories. The variation in the student group's learning abilities will for example require adaptation of content and instruction methods employed. Changes in goals formulation suggest that evaluation

forms and content must be adjusted, and a new evaluation form will possibly warrant new and expanded framework factors.

Below, the didactic categories are explained and the relationship between them and how they are expressed in the current driver training curriculum accounted for. Also, the choices made for each relevant category in the driver training development are reviewed. These choices have an influence on the development of the new curricula.

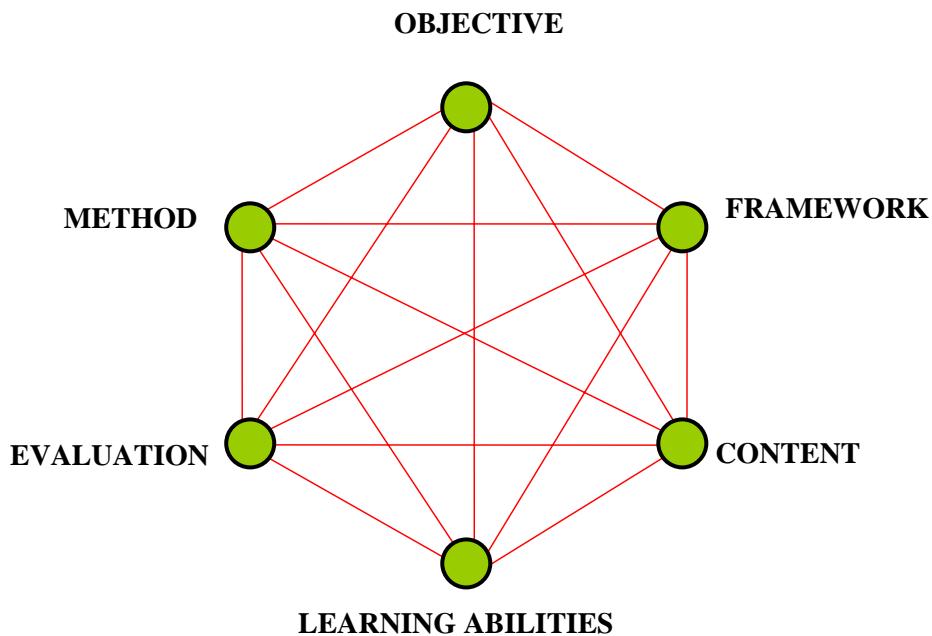


Figure 9 Didactic relationship model. Categories and connections

5.2.1. Objectives

The objectives indicate which direction the students are expected to develop. How the objectives are formulated lays down a framework for the training and the students learning. The choice of open or closed objectives and educational vs attitude objectives gives different guidance regarding choice of content, method and evaluation form. Closed objectives are detailed and describe precisely what the student shall achieve. Open objectives are to a lesser extent defined, giving the players a greater possibility of choosing how to attain the objective. With open objectives formulation, the process is in many cases more important than the product.

In the "formal" driver training curriculum there is formulated a primary educational objective. The objectives in previous curricula are formulated somewhat dissimilarly. In some curricula it is only stated what the learner driver shall know after completed training. In other curricula, the training progression is indicated through a number of secondary goals in addition to the main objective. What the learner driver shall practice on and where, is established by fixed detailed objectives related to the different parts of the training.

The purpose of driver training is to ensure that students have the necessary competence to drive safely, considerately and efficiently when getting their driving licenses. It is what the student can after completed training that counts. This suggests the use of secondary objectives in the training. In addition, EU directives will indicate which objectives must be attained within each category to acquire a driving license. At the same time it is natural to look at driver training from a progression viewpoint that suggests a stepwise training where training at one level requires competence acquired at previous steps. This leads to a situation where objectives must be formulated at each step in addition to a main objective for the overall training.

Each step can be rather extensive. How detailed the objectives for the various steps are broken down into underlying secondary objectives, will among others depend on what is intended for the student to achieve at that step. To learn specific skills, it will be more appropriate with definite objectives than if just reflection and consciousness-raising is desired.

Attempts should initially be made to obtain best possible agreement in the formulation of the objectives for all categories. At the same time, regard should be given to peculiarities within individual driving license categories.

5.2.2. Method

It can for example be distinguished between classroom education and project work, or more prominently, between deductive and inductive approach to education and learning. Methodical choices can be made based on knowledge about the student(s), own view of education and knowledge, objectives and educational content. Choice of method must be made in accordance with such factors as objectives, content and evaluation form.

The initial Norwegian driver training curricula gave rather precise instructions regarding training methods. Indications were given on what had to be instructed, when it had to be instructed and how the training should be undertaken.

Later curricula emphasize freedom of method and instructor's responsibility in use of varied methods to meet the students' different needs and competence. Today's Norwegian youngsters are used to different forms of learning including the project oriented one. This type education represents a radical break with the traditional dissemination pedagogic. Many students are used to learn themselves by solving concrete problems by thinking through and reflecting, and by planning what needs to be done. Driving instructors have also picked up this method. The instructor's duty will then be to prepare concrete work tasks with the learner driver. The task must contain a problem the learner driver shall work through. Instead of telling the learner driver where and when to give sign, the student must find out by herself/himself how best to inform others about one's intentions.

Youngsters engaged in driver training have rather dissimilar competence. They can have more or less traffic experience, good or poor learning abilities and variable attitudes towards driving. This suggests a "student adapted training", which will be in conflict with a strong and detailed methods directive in the curriculum. The 1994/95 minimum age lowering for practice driving to 16 years has given younger learner drivers then previously and reinforced the need for "student adapted training".

5.2.3. Evaluation

The purpose of evaluation is to ensure that the formal curricula objectives are attained. Evaluation can be done intermittently (formatively) or at the end (summatively). The choice of evaluation form must be made in relation to chosen objectives and content as well as the educational framework and teaching and working methods being used.

Besides evaluation, a curriculum developer can also use mandatory training to ensure that training goals are attained. Both evaluation and mandatory training can be considered as steering elements in the education effort. This function is covered later in this report.

According to the EU directive on driving licences, we are obliged to have a final driving test. Such summative evaluation shall in theory assure the quality of the candidate's competence. In practice the driver training contains many objectives that are difficult to evaluate summatively. The driving test is therefore not sufficient to quality assure the training.

In the new curricula /the new regulations, the objectives are formulated for each step in the driver training. This creates a need to ensure that the objectives are met at each step. This can in principle be done both by summative and formative evaluation. In cases where an instructor follows a student throughout the training, a professional instructor will understand when the objectives have been reached without letting the student be subject to a special evaluation. This will be discussed later in the text.

5.2.4. Content

The curriculum content is actually indicating the subjects that should be covered by the training. The actual educational content is affected by the curriculum and its formulations of the objectives. The recognition of which content should be emphasized, will at the same time provide guidance on how to formulate the goals and which evaluation form to employ.

The biggest problem associated with beginning drivers is their high accident risk. A major driver training objective should therefore be to reduce that risk. This is reflected in the content of future training. The content is largely based on the GADGET matrix (see previous chapter). Relative to past curricula, the GADGET matrix emphasizes more so the need for the learner driver to gain a deeper understanding of traffic, to understand how other drivers' personalities affect the driving and to gain insight into own personality traits. All this aims at influencing the student towards making safer decisions as driver.

5.2.5. Framework

The educational framework conditions are partly politically determined, such as the volume of mandatory training and which freedom the learner driver shall have to make own decisions on scope and training progression. The instructors'/examiners' competence also provides a framework for the activity together with natural conditions (light/darkness, driving conditions).

A significant framework condition are the costs. For category B (the category with decidedly most learner drivers), the average youngster had in 2002 between 25 and 30 driving lessons of which 9.5 were mandatory. Some of them had in addition voluntary theoretical training (training for the theory test is not mandatory in Norway). This involves a total driver training cost of 1800 – 2400 €(2003). The freedom learner drivers have had after 1995 to choose category B training scope and progression,

may appear to have had unfortunate consequences. The training has for many become somewhat lacking and unsystematic, and they made several attempts in passing the test instead. It is desired to steer the training through the new curricula / the new regulations without this leading to significant cost increases for students that already have had proper training.

5.2.6. Learning Abilities

Knowing the learner driver's standing and previous knowledge must be a prerequisite for choices to be made with regard to method, progression, presentation of subject matter etc. It is well known that educational methods have evolved and that today's youth are used to acquiring knowledge differently from what was done 20 years ago. It is therefore emphasized that it is the instructor's knowledge about each individual learner driver that shall provide direction for choice of method. The choice must of course be founded on the content of what the learner driver has to learn. Individualizing the training is very important both to motivate those that shall learn and to provide a favourable approach to the training.

There is a large age span among the driving license candidates. This reflects that the minimum age for practice driving has sunk (1995) and that the driving license age, especially in urban areas has risen. This fact has been considered when forming the new curricula.

5.3. General Educational Steering Elements

5.3.1. The Curriculum

Previously it has been emphasized that the "formal", e.i. the written curriculum shall among others be steering and thus being normative for what education within each individual discipline and type school shall cover. Unfortunately, experience has proven that it is not sufficient that the curriculum is intended as a steering function. There is a need for other steering instruments to ensure that all students achieve the desired goals in each discipline.

The use of steering tools has varied under past curricula. Some driving license categories, e.g. motorcycle, have had strong steering. The plan is based on mandatory objectives attainment for the learner driver at the driving school. At the other extreme are past Norwegian plans for heavy vehicles where only a nine hour slippery surface driving course was mandatory. It is again reasonable to assume that the forming of the curricula was influenced by the times.

5.3.2. Evaluation form

Dissimilar evaluation forms can identify different aspects with a student's competence⁴. Before evaluation form is selected, it is necessary to clarify what is the purpose of the evaluation. Choice of evaluation form must therefore be made based on what one wants measured. This suggests that the intentions of the formal curriculum and the chosen evaluation form are in agreement.

A curriculum contains normally so many objectives that it is not feasible to evaluate all. Therefore a selection must be made. Objectives emphasized through evaluation will establish guidance for what the players (instructors/learner drivers) consider important with the curriculum and thus contribute towards a distortion or prioritization of the subject matter. In this respect, the evaluation form can be a contributing factor in that the totality of the curriculum loses its impact.

⁴ Competence is here meant to represent the student's overall knowledge, skills and attitudes.

It can roughly be distinguished between two types individual related evaluation; formative and summative evaluation.

Formative evaluation, also called process evaluation, takes place during the training process and is often of an informal character. The attention is aimed at the student's learning process. The evaluation result is often used as a guide for adjusting the training arrangement. Formative evaluation does not significantly emphasize specific objectives attainment and can be considered as more of an inclusive evaluation form. This because more aspects of the student's competence can be captured.

Summative evaluation, product evaluation, takes place towards the end of the training process. This evaluation form is more formal. It is the product of the student's learning that is made subject to evaluation, and the purpose is to survey which level the student is at after completed training.

In addition, it can be differentiated between objective and subjective evaluation depending on what shall be evaluated, which criteria are available to evaluate against and which evaluation form is used. With objective evaluation, any qualified evaluators shall arrive at identical results, while with the more subjective evaluation forms, each individual evaluator's professional judgment will contribute towards results that may be different.

During driver training it is desirable that all candidates are treated equally. This means that a most objective evaluation possible should be used. In the evaluation of theoretical knowledge, this wish is to a large extent achieved through standardized theory tests. The evaluation of driving skills takes place under such varied conditions that a certain subjective judgment cannot be avoided in spite of nationwide evaluation criteria and coordination of the examiners. The aim, however, must be to make these evaluations as objective as possible.

5.3.3. Mandatory Training

In addition to evaluation, mandatory training can function as a tool for steering the learning. It can be distinguished between mandatory attendance and mandatory objectives attainment.

With *mandatory attendance*, a certain number (or minimum number) of hours of attendance will be required to gain approval for the discipline/course/training. When this form is chosen, there will in reality be no guaranty of the learning effect for the individual student. Ideally, it could therefore be appropriate / desirable to combine the requirement of mandatory attendance with a final test to ensure that the student has attained a satisfactory knowledge level. Such "partial tests" have not, however, been included in the driver training that will be introduced in 2005.

When *mandatory objective attainment* is indicated, no fixed number of hours of student attendance has been determined. The student's object attainment is tied to definite objectives in the curriculum as a whole or by elements of it. This approach requires a form of evaluation, and it is most often a formative evaluation that is utilized. The number of lessons are not predetermined since the students have different personal learning abilities and different needs during training. The instructor is normally in charge of evaluation during training and of determining if the student has achieved the level of knowledge, skills and understanding that the curriculum requires. Future driver training is being prepared for a system with counseling to cover such types evaluation.

5.3.4. Steering Future Driver Training

When a training course planning process requires a choice between mandatory training or summative evaluation as a steering factor, it is important to be aware of the fact that different goals are best quality assured by various means.

It can for example be less complicated to evaluate whether a student has achieved attitude objectives through mandatory training (formative evaluation) than through a final examination (summative evaluation). It is difficult to prepare a final test with the intent of evaluating if attitude objectives have been achieved. The result can be a discrepancy between the intention of the objective and the evaluation, and that the focus of the learning process as a consequence is being diverted away from the objectives wished evaluated towards other curriculum objectives. On the other hand, it can be simpler to ensure that the student has acquired factual subject matters through a final examination than through mandatory training. In other words, it is the desired learning effect and training purpose that should be the decisive factors when it comes to steering tools to be used.

A conclusion of the driver training for category B after the 1995 curriculum revision has been that the candidates lack basic knowledge and skills at the approach to the driving test, that the training deviates from the curriculum and that the curriculum lacks structure. This suggested that a better steering of the training should be achieved through the new January 1st, 2005 curriculum.

It also appears that the training for the heavy vehicle categories was previously steered by the driving test and the formal curriculum. Mandatory training and concurrent evaluation are in other words not being used to any large extent as steering instruments for these categories.

6. A MODEL FOR DRIVER TRAINING

It is possible to form a picture in principle of how driver training should be carried out from the psychological and pedagogic knowledge and experience that the various driver training participants possess. This chapter presents such a picture – a model for driver training. Such model must in principle indicate:

- What needs to be learned, i.e. training subjects.
- Training progression, i.e. in what sequence shall subjects be introduced into the training.
- Which objectives are relevant for individual subjects, i.e. which competence the students shall have within the various subjects.
- How training can be managed and controlled, i.e. how training can be ensured to have the right progression and that the learner drivers will attain their goals.

The new regulation / the new curricula are largely built up around this common model.

6.1. Training Subjects

The GADGET matrix (the GDE matrix) as presented in Chapter 3, shows what the driver training should contain. The five model levels can be considered as four different training subjects.

The GADGET matrix emphasizes that the training shall give the student *self-knowledge*. This will therefore be a subject in the training. *Laws and rules* enter into the GADGET matrix as part of the interaction skills at the tactical level. Knowledge about laws and rules to manage traffic is so basic that in order to provide an overview, it will be appropriate to address this as a separate subject. With this subject, it would be natural to include traffic systems knowledge, driver responsibilities and characteristics of the various types traveller that are users of the system.

A subject that has not been picked up by the GADGET matrix is *economic and environmentally friendly driving*. This subject has been added to some earlier curricula and will probably become more and more important in the future. Economic and environmentally friendly driving will therefore be included as a separate subject throughout the new curricula.

This results in seven subjects to be included in the driver training:

- *Legislation and road traffic as a system*
- *Vehicle manoeuvring*. The learner driver must learn to handle the vehicle safely and efficiently.
- *Road traffic skills*. The learner driver must learn to interact with other travellers and master different traffic situations and conditions.
- *Economic and environmentally friendly driving*. The learner driver shall learn about and get used to an economic and environmentally friendly manner of driving.
- *Planning and preparations for driving*. The learner driver shall learn to prepare for driving and make sensible plans before and during driving
- *Behavioural tendencies and judgement tendencies*. The learner driver shall learn how personality, social influence, lifestyle and similar factors affect personal choices.
- *Self-knowledge* regarding own competence and own personal behaviour tendencies and judgement tendencies. The learner driver shall be schooled in realistic evaluation of own competence, to understand personal tendencies and how these tendencies affect reactions.

Previous driver training curricula had a content and objective formulation somewhat in agreement with what is found in the GADGET matrix. The learner driver shall learn about laws, rules and the traffic system, they shall have technical driving skills and traffic skills.

Even the subjects of self-knowledge, planning and preparations for driving, and behavioural tendencies and judgement tendencies are mentioned in the curricula, although rather sporadically. Simply stated it can be said that earlier training emphasized the four lower left boxes of the model (see Figure 7). These boxes "contain" the competence needed to make one's way in traffic, i.e. to move along at a reasonable pace.

How this competence is used depends, however, on the driver's motives, attitudes and personality. The competence at the highest level of the GADGET matrix and in the self-knowledge requirements aims at modifying the influence of unfavourable motives, attitudes and personality. From a safety-viewpoint, it is therefore important that these areas are emphasized in the driver training.

There is consequently a need for certain modifications in or additions to previous curricula:

- The subject *planning and preparations for driving* will now be included in the curricula. Sensible planning and preparation are important to drivers of all vehicle types in certain situations and probably particularly important to professional heavy vehicle operators.
- The subjects *behaviour tendencies and judgement tendencies* and *self-knowledge* will appear more clearly in the curricula and be given more weight in the training. Insight into own competence and own personal tendencies can be an important tool towards safer driving, in particular among young beginning drivers.

6.2. Training Progression

The various training subjects are independent. For pedagogic and safety reasons it is desirable that the student has a certain knowledge and skill within some subjects before training commences on other subjects.

6.2.1. Legislation and Road Traffic as a System

Before the student begins driving in traffic, it is advantageous that she/he has a certain knowledge on laws and rules that govern interaction, on traffic as a system and the driver's role in this system. This knowledge will give the student a cognitive structure that she/he can use to arrange the impressions received during practical training. This will easier facilitate interpretation of impressions and learning from experience. Knowledge will also make practice driving safer.

In addition, it would be advantageous from the start of training if it was required to reflect over the fact that traffic is a system where drivers have a large responsibility and where laws and rules show the complexity of the system and drivers' responsibility. This can provide a backdrop that the entire training can be viewed against and that can provide a different perspective on driver training and of being a driver. On the basis of these evaluations, these subjects should constitute the beginning of driver training.

6.2.2. Vehicle manoeuvring

That the learner driver has relatively good technical driving skills is another precondition for efficient learning during driving in traffic. When the student must concentrate on gearing, braking and steering during traffic training, she/he will perceive little of fellow travellers' behaviour. This produces conditions that do not favour learning from traffic situations being encountered. It is therefore important that the learner driver has had sufficient technical driving practice before commencing traffic training to facilitate a large degree of automated vehicle operation. During traffic training the student can then use the cognitive resources on occurrences around the vehicle.

6.2.3. Road Traffic Skills

Normally, road traffic skill training represents the most comprehensive part of the training. As previously mentioned, the training efficiency of each subject depends on reasonable technical driving skills and knowledge of laws and rules. The traffic training will at the same time provide experience that is important in order to understand the significance of insight into own behaviour tendencies and judgement tendencies which should be emphasized towards the end of training. Consequently, traffic skill training will occupy a central position in the middle of the training period.

6.2.4. Economic and Environmentally friendly Driving

To drive economically and environmentally friendly, the learner driver must know what distinguishes such driving. She/he must have the skills to drive in that manner and to have the will to practice an economic and environmentally friendly driving style. Training-wise, this means that the learner driver must be provided with knowledge, skills and appropriate attitudes. Understanding of the significance of economic and environmentally friendly driving (appropriate attitudes) should be established early in the training process. Necessary knowledge and skills must be linked to actual driving and in particular in connection with technical driving practice and traffic training. The subject economic and environmentally friendly driving will therefore be relevant throughout the greater part of the training.

6.2.5. Behaviour tendencies and judgement tendencies

Knowledge about which behaviour tendencies and judgement tendencies can affect driver behaviour belong to the backdrop that the learner drivers should view driver training against. The learner drivers should therefore be provided information about this subject at the very beginning of the training. It can, however, be desirable that the subject also is emphasized towards the end of the training period. By such time, the training, in particular the traffic skill training, has provided the learner driver with a deeper understanding of what driving entails and thus a different basis for reflecting over the significance of behaviour tendencies and judgement tendencies. The subject should therefore be emphasized both at the start and at the end of training.

6.2.6. Self-knowledge

Self-knowledge can be considered a skill and this skill the learner driver needs during the entire training period. She/he needs at all times to understand what she/he can and cannot do. This subject should therefore be emphasized from the start and followed up throughout training.

Just as with behaviour tendencies and judgement tendencies, it can be appropriate to emphasize the subject especially towards the end of the training. The self-knowledge shall not only cover own knowledge and skills, but also own behaviour tendencies and judgement tendencies. Towards the end

of training when the learner driver has gained a more varied driving experience and a better understanding of the significance of behaviour tendencies and judgement tendencies, it can be fitting to reflect over own inclinations. This insight into own inclinations is an important ballast for the student to have when starting to drive by herself/himself.

6.2.7. Planning and Preparations for Driving

During traffic training and in the final part of the training when the learner driver shall be more on her/his own, there can be some possibilities of practicing parts of the subject (such as route selection). However, the subject fits better a more theoretical type teaching and discussion. The content of the subject can in many ways be considered a guide to future drivers and will as such best fit into the final part of training.

6.2.8. Overall view of Progression

The proposed training progression is illustrated in Figure 10. The blue areas show when training takes place within a given subject and the distribution of that training over the training period. Consideration is given to having the training within a subject extended over a major part of the training even if it is especially emphasized during a brief period. A learner driver can for example also get a rather intensive training in technical driving during a short period, but a continued training in for example traffic skills will also mean a certain training in and improvement of technical driving skills. Knowledge of legislation and traffic as a system will similarly be deepened throughout the entire training period in spite of the fact that the subject is emphasized especially at the start of training.

Figure 10 attempts to show this by having the blue areas extend over the entire or major parts of the training period. The height of each of the blue areas indicates how training is distributed within each subject. The higher the area is, the more comprehensive is the training within the subject.

6.2.9. Training Steps

From the distribution of training intensity within the various subjects over the training period, it can be seen from Figure 10 that the training can be divided into four steps. The main content of each subject will be:

- Step 1 Start-up training. Learn about legislation in general, about traffic as a system, about behaviour tendencies and judgement tendencies and about the significance of self-knowledge⁶.
- Step 2 Practicing technical driving skills (including economic and environmentally friendly driving)
- Step 3 Practicing traffic skills (including economic and environmentally friendly driving)
- Step 4 Final training. Training in complex traffic situations, further training on the significance of self-knowledge and behaviour tendencies and judgement tendencies and learning about planning and preparations for driving.

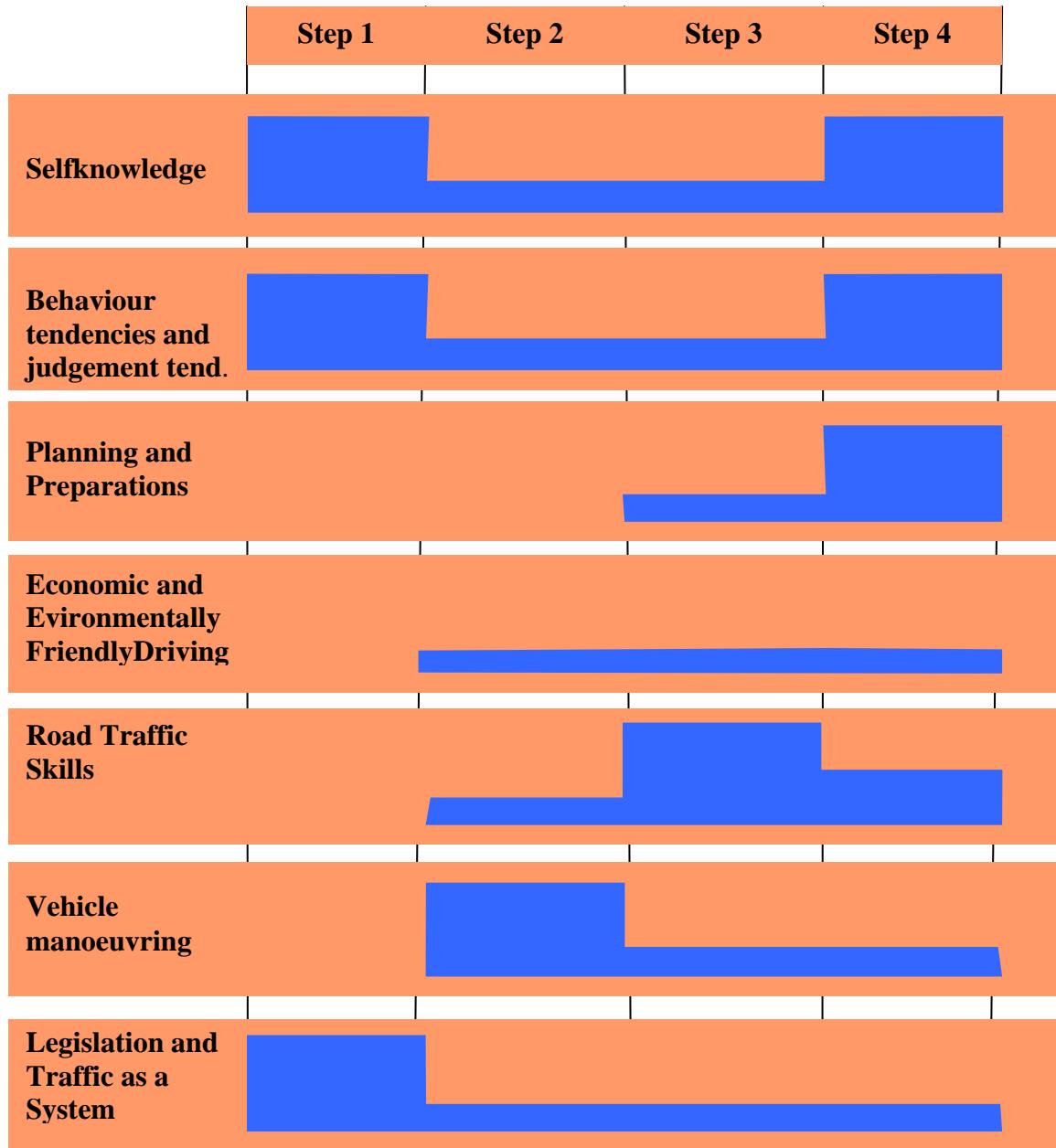


Figure 10 Relative scope of training within the various subjects and the division of the training in steps

The term step is used to indicate that the various parts (steps) shall be taken in a certain sequence and that training at one step requires certain acquired competence from an earlier step.

Step 1 gives a backdrop that the training shall be viewed against and which shall contribute in creating correct attitudes for driving a vehicle. In addition, the learner driver will acquire certain general knowledge on current laws and rules and as previously mentioned, this will give the learner driver "knobs" to hang the experiences from the latest traffic training on. Without such "knobs" the learner driver will be in a poor learning position. But it has to be underlined that the general knowledge of legislation gained from step 1 is not sufficient to pass the theory test.

The main thing in step 2 is training in technical vehicle handling where gradually also economic and environmentally friendly driving is emphasized. As previously mentioned, it is necessary with a reasonably good and automated technical driving skill before the learning of traffic skills starts in earnest.

Traffic skill learning (including economic and environmentally friendly driving) is the main consideration in the next step (step 3). The traffic experience the learner driver receives in step 3 is again a precondition for a favourable result from training step 4.

In this last step (step 4) the learner driver shall besides gaining driving experience during demanding conditions also prepare mentally for the role as driver. Subjects important during the first step (self-knowledge and behaviour tendencies and judgement tendencies) will also be important here, but here more connected to the driving. Training starts and ends with subjects intended to affect the drivers' choice of behaviour, i.e. how the driver chooses to use the knowledge and skills acquired through training.

6.3. Competence Objectives

In driver training, it is not enough to show what must be learned, it is also necessary to indicate how well the learner driver must know what has to be learned. This is done by formulating objectives that shall state which competence the learner driver shall have at the end of training. Such objectives are set by the regulations/curricula. The reference in this chapter is limited to a principal and principled view of the competence objectives.

Earlier in this document, the use of primary objectives and secondary objectives has been explained. The primary objectives show what the learner driver must know at the end of training, i.e. when the learner driver is ready for the driving test. Secondary objectives are linked to the training steps.

The regulations and curricula formulate objectives for learner driver competence for each main subject within a step. In step 1 there are, for example, for light vehicle categories defined objectives for the learner driver's knowledge of legislation and traffic as a system, about the significance of behaviour tendencies and judgement tendencies, and about the importance of self-knowledge and economic and environmentally friendly driving. Between the secondary objectives associated with the various steps and the primary objectives, there will of course be a difference even though both types objective are associated with the same subject.

The purpose of learning about legislation and traffic as a system in step 1 is to give the learner driver a basis to make it easier for them to understand and learn from situations encountered in traffic. The secondary objectives for step 1 reflect what is the necessary basis. Later during training, the learner driver must learn more about this subject, making the subject far more comprehensive than the secondary objective.

The same applies for steps 2 and 3. The secondary objectives define the competence that is considered necessary for the learner driver to benefit amply from the training in subsequent steps. The sum of the secondary objectives from step 1 to step 4 will constitute the primary objectives for the category in question.

The steering system chosen for the training requires precise formulations of the objectives. Through evaluation and guidance lessons towards the end of the steps, an evaluation shall be undertaken where the learner driver and the instructor together shall consider whether the objectives have been attained. To make this a valid and reliable evaluation, those undertaking the evaluation must know rather precisely what to look for. This requires quite precise and detailed formulations of the objectives.

At some steps and for some categories there will be mandatory training. Such mandatory training can be taken at any time within the step, also at the very beginning. Attainment of objectives at previous steps shall provide sufficient competence to take the mandatory training at the next step.

6.4. Steering the Training

A curriculum is as previously mentioned no guaranty for the training to occur in accordance with plan. Learner drivers and instructors can have motives and interests that result in some parts of the training being emphasized more than others. Many learner drivers are concerned with getting the driving license as inexpensively as possible. They therefore seek out training with the sole aim of obtaining a driving license. In the competitive situation driving schools find themselves, there will be a tendency for the driving schools to accommodate the students' wishes. Based on previous curricula, especially for category B, the learner drivers themselves have to a large extent determined both training progression and scope. This has in many cases lead to an inappropriate and poor training, which the high driving test failure rate seems to indicate. Instructors and examiners also claim that there has been a poor agreement between curriculum and teaching, that there has been poor steering of the training and that the learner drivers had inadequate knowledge and skills when entering the mandatory training towards the end of training. This underscores the need for better steering of the training than previously. Such steering must ensure both that the learner drivers have the competence needed within the various subjects and that there is an appropriate progression during training.

The document has previously reviewed the elements generally available to steer the training. A summative evaluation seems to be the most appropriate means of controlling student competence. A precondition for using such evaluation is that it must be based on rather precise competence measures. This will for example be the case for knowledge about laws, rules, technical driving skills and traffic skills. For other subjects such as self-knowledge, understanding of the significance of goals for life and skills for living and of preparation for driving, it will be difficult to undertake an evaluation that will give valid and reliable results. With such subjects it is most appropriate to ensure competence through mandatory training.

The driver training is considered to be constructed of steps where one step provides competence for the next step. This gives a sequential training where it should be demanded that a step has been completed and the competence required has been attained, before the student moves on to the next step. From the content of each step can be determined which steering method should be used to ensure the competence level.

Step 1. A significant part of the course is aimed at subjects where competence is difficult to verify through evaluation. Training at this step should therefore be mandatory.

Step 2. The main subject at this step is technical driving skill training. The competence within this subject is verified through evaluation.

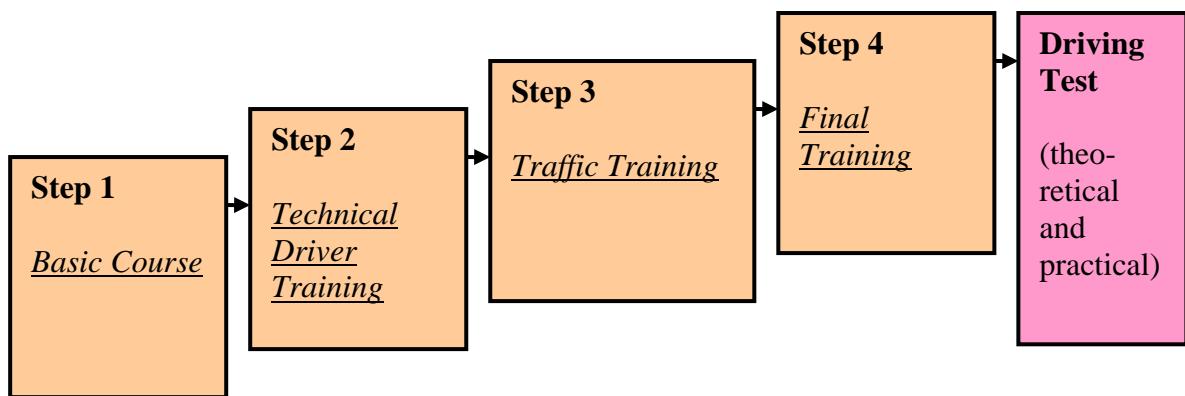
Step 3. This step focuses on traffic training. As with technical driving skills, the competence within this subject can be verified through evaluation.

Step 4. As with step 1, this step contains subjects that do not readily lend themselves to evaluation by verification. At this step there must therefore be a significant share of mandatory training.

It should be stressed that what is described above is a solution *in principle* to the steering problem. To the extent possible it has been attempted used as a basis when forming the new regulations / the new curricula. For some driving license categories, it has proven difficult to evaluate competence in a valid and reliable manner within given framework, making it necessary to resort to mandatory training for some subjects that with other categories can be steered through evaluation.

For evaluation and mandatory training to have the intended steering effect, there must in principle be possibilities of sanctions against students who do not satisfy the competence requirements or do not complete the mandatory training. The usual sanction is not letting the student receive a driving license. This will also be the situation for the training system coming into effect on January 1st, 2005. In addition, there is a need for mechanisms that ensure that the student takes the training step by step. The most obvious solution to this problem is to tie this to the training goals of the step. Or to ensure that the student has completed mandatory training associated with the step.

This means that the authorities must be able to follow the student through the entire training and obtain documentation on milestones reached. How this can be done in practice is being discussed in the next chapter.



7. ARRANGEMENT FOR STEERING AND CONTROL OF DRIVER TRAINING FROM 2005

7.1. Measures for Steering and control of Training

Last chapter pointed at the need for progression steering in the training and verification of competence. It was further referred to the need for sanctions that can be employed with violation of the guidelines given by the authorities. Past training systems have shown unfortunate consequences of deficient steering and verification.

The driver training is based on cooperation between three players; the learner driver, the driving schools and the authorities. The learner driver can buy services from driving schools rather freely since the system is based on the learner driver being in charge of own learning. Being private enterprises, the driving schools have to a large degree adapted to the market offering the services demanded. The authorities role in this interaction is to establish a framework for the driving schools' activities (in the form of regulations, curricula etc) and oversee that the activities are in accordance with the framework provided.

Experience so far shows that not all Norwegian learner drivers have been aware of their responsibilities and realized what it is that gives the training good quality. With the current form of finance, where each candidate is charged per lesson, they will look at driver training and driving license as an expense they wish to minimize. This has resulted in a culture where there is status connected with having the least amount of training and taking a gamble with passing the driving test. The culture has been supported by parts of the industry that offer "package deals", weekend courses and intensive courses largely aimed at passing the driving test.

In conjunction with the preparation of new regulations on driver training and the driving test etc. and the curriculum from January 1st, 2005, it has been natural to review this relationship. The new regulations will alter the basic distribution of responsibility that has been around for years, but requires a better clarification of its role than today.

The main challenge in the future driver training is to maintain as many degrees of freedom as possible for all players, at the same time as mobilizing adequate measures to prevent delusion and "misuse". An adjustment of the roles, a more clear structure and firmer follow-up from the authorities, is hoped to create better conditions for learning.

The indicated weakness of the past training system is just as much tied to the steering of the training as to the content itself. As a consequence, the new regulations and curricula have been made more precise both as far as the structure of the training as well as what is required especially with the mandatory lessons and the possibilities of rejection associated with the practice lessons.

7.1.1. Evaluation and Guidance Lessons and Mandatory Training

In the new training system, navigational points are being selected during the learner driver's training progress in the form of mandatory evaluation and guidance lessons and mandatory training. The learner drivers must relate to these at the same time as they function as check points for the authorities.

In step 2 and 3, all driving license categories following the stepwise model (with a preliminary exception for the national categories M147 and S) are supplemented with a mandatory evaluation and guidance lesson. Based on the learner drivers's achievement, the learner driver and the instructor shall together consider to what extent the objectives of the step have been attained. The instructor must give the learner driver advice on the question whether the learner driver has the competence necessary to get an adequate learning outcome in the next step. The evaluation and guidance lessons are of 45 minutes duration and contain both practical driving, an evaluation and counselling talk.

Completing the evaluation and guidance lessons is mandatory, but it is up to the student to follow the advice given by the instructor with regard to continuing on to the next step in the training progression when the objectives have not been attained. A "ban" to proceed will require a legal amendment by the Storting (Parliament) and has not been considered implemented in the January 1st, 2005 regulation revision. The problem is also related to a more fundamental an political question: Are we then giving the driving schools a mandate to conduct parts of the driving test, a task traditionally regarded as a responsibility for the Norwegian authorities.

The curricula prepare for mandatory training through mandatory attendance at various locations during training dependent on the need for certain driving license categories. For the learner drivers to benefit from the mandatory training (not Course in basic road traffic knowledge) they must possess certain competence. Such competence shall be secured through a natural progression in previous steps.

It can still happen that a school that implements mandatory training finds that a learner driver do not have the necessary competence to benefit from training. In such cases, the school will still have the right to refuse him/her, as has been possible also in the past, but not practiced to any large extent.

The learner driver must acquire the competence needed before enrolling for mandatory training. The school shall notify the Public Roads Administration about rejections. When the learner driver does not accept the rejection, questions can be put before the Public Roads Administration's regional roads office which makes a formal resolution. This can be appealed against.

7.1.2. Electronic Training Card

One precondition for the authorities to be allowed to supervise the driving schools as far as individual learner driver training is concerned, is that the authorities know where in the training progression the student finds herself/himself.

This is intended solved through the use of an electronic enrolment system for each learner driver tied to completed evaluation and guidance lessons and mandatory training. The enrolment system will be on a par with what is used for periodic vehicle control. The driving schools will be in charge of enrolment, the Public Roads Administration will run the computer database.

For learner drivers who do not have a driving license of any category, the enrolment into the system starts with completed Course in basic traffic knowledge. A "file" is prepared for each student, and maintained until the driving test is passed in a revised version of the Driving License Administrative system (Føniks). Each mandatory training completed is reported electronically by the school and recorded on the "file". The file will be deleted automatically when the learner driver

has obtained the driving licence and the key information is stored in our database of driving licences (Autosys).

For those learner drivers who already have a driving license and consequently have completed the basic course, enrolment takes place after step 2 of the training has been completed and the learner driver has been accepted by a driving school.

7.1.3. Supervision and Sanctions

The Public Roads Administration supervises that part of driver training that takes place against economic compensation. In connection with introduction of the new curricula from January 1st, 2005, the supervision of driving schools will be strengthened.

When it comes to mandatory training, the supervision shall ensure that the training takes place according to teaching plan that has been prepared. Where the Public Roads Administration through its presence discovers that the teaching is in conflict with regulations, the mandatory training can be terminated or disallowed.

When indicated mistakes and deficiencies are not being corrected within a given deadline, the Public Roads Administration's regional roads office can recall the approval of the driving school/course organizer for a given period of time. In special cases the approval can be revoked permanently.

7.1.4. Learning Progression over Time

It is desirable that the driver training extends over time to enable the learner drivers to absorb and reflect over what has been learned. Ideally, there should have been placed durational provisions for the entire training progression, but for practical reasons such has not been included in the regulations that will come into force on January 1st, 2005.

The Public Roads Administration has from 1995 recommended that training starts well before taking driving license, as much as two years, and after the candidate has driven a certain number of kilometre (2000 km +). Recommendations on amount of driving will still prevail. Combined with the navigational points put in the curricula, it is hoped that future training in practice will extend over a certain period of time at the same time as the quality of quantity training improves.

Previously, cases have been observed where entire or parts of the training have been squeezed into a rather short time span (intensive course). This is considered undesirable because the learner drivers are given inadequate possibilities of reaching a deeper understanding of the subjects raised during training. When preparing the curricula, it has been attempted to prevent entire or parts of the training to be offered as intensive courses, but there has not been placed any time limit on the training period.

7.1.5. “Mock examination”

In the National Transport Plan 2002-2011, the Ministry of Transport and Communications promotes a desire to ensure that candidates do not enrol to take the driving license without adequate knowledge and skills. The Ministry is of the opinion that this can be taken care of through a mandatory test or a “mock examination” before the candidate presents herself/himself to take the driving test. The new regulations/the new curricula solved this by introducing mandatory evaluation and guidance lessons both after technical driving (step 2) and traffic (step 3) training. In addition, the learner driver must complete mandatory training (steps 1 and 4) that gives the possibility of refusal.

7.1.6. The Driving Test

When introducing the new regulation which comes into force on January 1st, 2005, we have not altered our driving test concept (only small adjustments). For research in the future on effect we then changed only one parameter; the education. The Norwegian driving tests exceed the minimum time stated in the EU regulations. (For category B the driving test last 75 minutes, with minimum 55-60 minutes driving time.)

A primary principle in the new regulation and curricula states that what cannot for various reasons be tested through a driving test, shall be undertaken as mandatory training.

Driving tests of the past were, and those of the future will be prepared to provide a steering and controlling influence on training. For most categories (A1, A, B, C1, C, CE, D1, D, T) the regulations intend to let both theoretical and practical driver testing conclude the training. Some categories have either only practical (BE, C1E, D1E, DE, S) or theoretical testing (M146, M147). The theoretical test can be taken within six months of the established minimum age for the driving license category in question. The argument for having this completed early in training is to have the learner drivers motivated to gain theoretical knowledge early to provide a better basis for later learning.

7.1.7. Summary of Steering Measures

The use of steering measures is illustrated in Figure 11. Here applied to category B training.

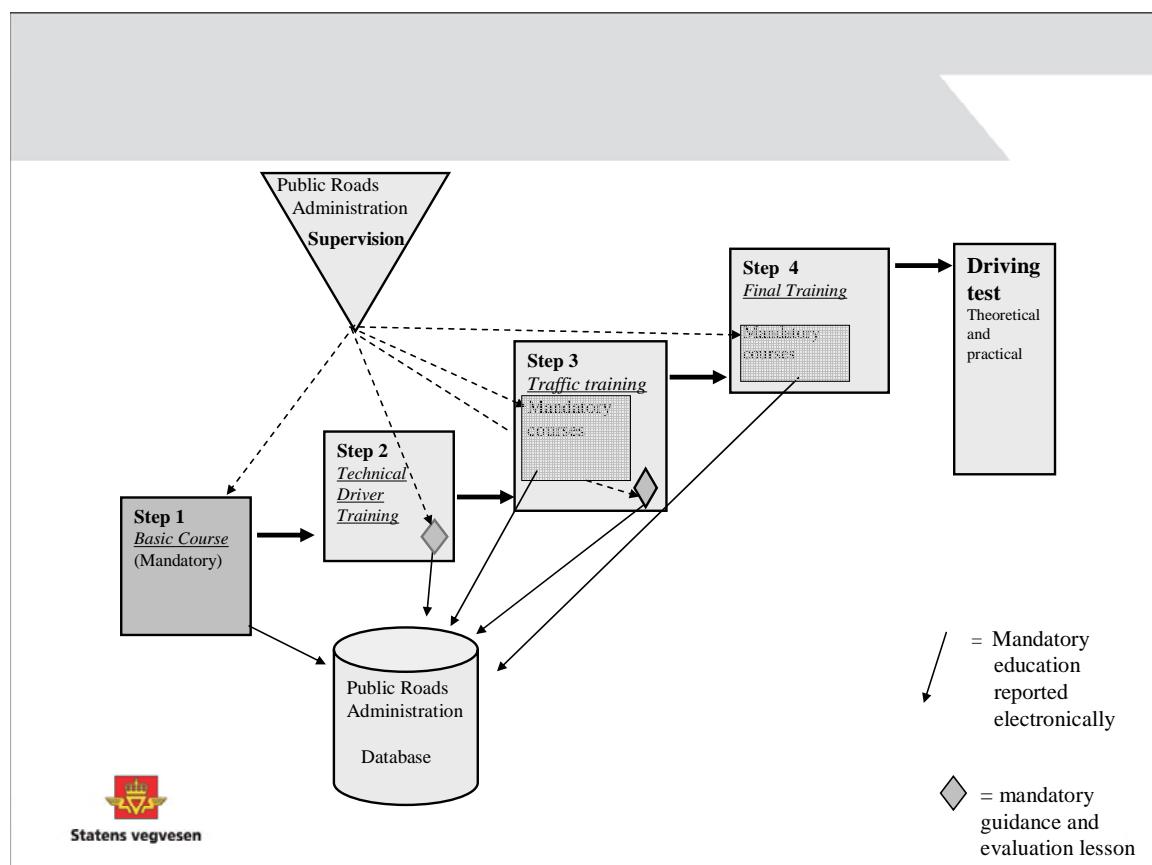


Figure 11 Use of steering measures with category B training.

8. LITTERATURE

- Ajzen, I. (1991)
The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, Vol 50, 1991
- DTLR (2002)
Introducing a More Structured Approach to Learning to Drive
Department for Transport, Local Government and the Regions, London, 2002
- Goodlad, J.I. (1979)
Curriculum Inquiry. New York, McGraw-Hill, 1979
- Hatakka, M., Keskinen, E., Gregersen, N.P. og Glad, A. (1999)
Theories and aims of education and training measures. In Siegrist, S.(ed): *Driver Training, Testing and Licensing – towards theory-based management of young drivers' injury risk in road traffic*. Results of EU-project GADGET, work package 3. bfu-report 40, Bern, 1999
- McKnight, A.J. og Adams, B.B. (1970)
Driver education task analysis. Volume I: Task description. Alexandria, VA: Human Resources Research Organization, 1970
- Michon, J.A.A. (1985)
A critical view of driver behavior models. What do we know, what should we do? In Evans, L. og Schwing, R. (eds): *Human behavior and traffic safety*. New York, Plenum Press, 1985
- Rismark, M., Folstad Norberg, P., Stenøien, J. and Sitter, S. (2002)
Kulturkollisjoner bak rattet. Innvandrere og føreropplæring
Voksenopplæringsinstituttet VOX, 2002
- Reason, J. (1990)
Human Error. Cambridge, UK, Cambridge University Press, 1990
- Sagberg, F. (2000)
Evaluering av 16-års grense for øvingskjøring med personbil. Ulykkesrisiko etter førerprøven.
TØI-rapport 498/2000, Oslo, Transportøkonomisk institutt, 2000
- Spurkeland, T. (1997)
Samla vurdering av føreropplæringa. Internasjonal forskning på føreropplæring, førarprøve og læringsstøttande tiltak i klasse B. Presentasjon, vurdering og tolking av resultata. Statens vegvesen, Telemark, 1997
- Statens vegvesen Vegdirektoratet, Trygg Trafikk og Politidirektoratet (2002)
"Nasjonal handlingsplan for trafikksikkerhet på veg 2002 – 2011"
- Svartdal, F. and Overskeid, G. (1997)
Automatisering, læring og emosjonell aktivering: Ubevisste prosesser i dagliglivet. In Overskeid, G. og Svartdal, F. (red.): *Det ubevisste og moderne vitenskap*. Oslo, Ad Notam Gyldendal, 1997

van der Molen, H.H. og Bötticher, A.M.T. (1988)
A hierarchical risk model for traffic participants. Ergonomics, vol 31, 1988

Vegdirektoratet (1998)
Samlet vurdering av føreropplæringen. Høringsutkast.
Statens vegvesen Vegdirektoratet

Vegdirektoratet/Glad, A., Isachsen, J.E., Lindheim, C., Lund, B.A., Sagevik, H., Aaneby, E (2002)
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