PROCEEDINGS FROM THE CONFERENCE: THE GDE-MODEL AS A GUIDE IN DRIVER TRAINING AND TESTING

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PREFACE

The driver education systems in Norway, Finland and Sweden are all based on the GDE-matrix, which is a conceptual model of driver training and education. Due to the common basis of these driver education systems, these countries share an interest in how the levels of the GDE-matrix can be implemented in the driver education systems. Therefore, the main purpose of this conference was to share research findings, thoughts, and experiences in the area of driver training and testing in Finland, Norway and Sweden, primarily to analyse the use of the GDE-model in driver education systems. The focus of the conference was the assessment or testing aspect, i.e. how to measure the new areas of knowledge and skills that the GDE-matrix has contributed to in a relevant and reliable manner.

The papers in these conference proceedings offer a unique reflection of the driver education systems in Finland, Norway and Sweden. The conference was the second meeting in what is expected to be a continuing series of conferences devoted to the GDE-matrix as a guide in driver training and testing. The conference was organised by the Department of Educational Measurement, Umeå University, and held in Umeå, May 7-8, 2007.

The first meeting on this subject was held in Turku, Finland, in 2006 (the seminar, “Self-evaluation in driver education and driver testing”). Participants in that seminar were researchers from the Department of Educational Measurement, Umeå University and from the Traffic Psychology Group at the Department of Psychology, Turku University. Employees from the Swedish Road Administration, the Central organisation for Traffic Safety in Finland and the Finnish Vehicle Administration Centre (AKE) also attended. Over the last few years, driver education in Finland and Sweden has changed direction from only focusing on drivers’ performance regarding driving-related knowledge and skills to focus more on the drivers’ evaluation of their own competences. These countries base their driver education on the GDE-model, Goals for Driver Education, and self-evaluation is one of the new areas of knowledge and skills the GDE-model brings. The purpose of the seminar in Turku was to exchange experiences in the area of driving training and testing, with self-evaluation as main focus.
At the end of the seminar the possibility of continuing this knowledge exchange and extending it to also include Norway was discussed. As well as in Sweden and Finland, the GDE-model is used as a foundation in the Norwegian driver education system. The intention was to further advance our co-operation, with researchers and officials from Norway as new participants.

Therefore, when planning for the conference in Umeå, the Norwegian Public Roads Administration was contacted to find out if they were interested in such a co-operation and also to ask them for suggestions of appropriate Norwegian researchers in the area. As a result, members of the Norwegian Public Roads Administration, the Norwegian University of Science and Technology and the Nord-Trondelag University College participated in the conference (Appendix 2). Participants from Finland and Sweden were about the same as in the first meeting in Turku and a total of 15 persons attended the conference, five from each country.

The following thirteen presentations are organised with the schedule (Appendix 1) as the main structuring principle, i.e. the order of the described presentations is the same as the order of the presentations at the conference. Each presentation is mainly structured by the following three headings: Introduction/Background, Main results/Main findings and Conclusion/Reflections.

Acknowledgments

The authors are grateful to the Swedish Road Administration for sponsoring the conference dinner. We are also grateful to Umeå University for financial support of the conference.
What is GDE all about and what it is not

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Introduction: Purpose of theories and models

In scientific work theories and models play an important role. Their task is to simplify the reality to such a degree that understanding and predicting phenomena will be possible. To fulfil their task theories also have to describe the mechanisms which produce the phenomena. and not only describe the phenomena.. One basic goal of the theory is to give tools to understand (and manipulate) reality (Keskinen, Hatakka, Laapotti, Katila, & Peräaho, 2004) And especially for practical purposes, for applications, it is important that professionals who use the model or theory as their starting point in work are capable of understanding the content of the theory. Only understanding of the theory gives real possibilities to make applications.

There is however a danger in this process as in any process where persons task is to understand and apply something. Everybody understands new things using his or her old memory representations. When these representations differ, will also the understanding of the phenomena differ. In scientific work the solution for this problem is a strict use of original publications and system of using references. All new additions or new conclusions concerning a certain theory are informed. This system gives the possibility to see, what additions or what modifications somebody has done to the theory. However, when professionals in the field use the same theory, they use it in a more “liberal” way and new contents may be added without informing the reader about them.

It is of course an honour that a psychological model, in this case, model of driver behaviour and model of the contents of driver education, will be widely used in practical work. However, there is also a concern that the model may be used only as a stamp without to deeply understanding
the content of it or that the model will be changed by many users and
that it will finally lose its original character. My concern in this case is
the GDE-model and it’s life and changes.

How to define driving, what is driving?

As Ranney (1994, 746) has noted: “No comprehensive model of driving
behaviour has been developed, and, given the wide variety of driving
situations and associated combinations of component skills, it is unlikely
that one will soon emerge”. Defining the driving gives a lot of degrees of
freedom concerning the phenomena which will be taken as a core com-
ponent of driving. Driving could be defined as a tracking task where
important components are controlling speed, changing lane and avoiding
obstacles. Or driving could be defined as part of person’s life where mo-
tives for driving like enjoying sceneries and own skills or performing a
safe transport of persons and goods are the important components. It
seems to be self evident that it is both a tracking task as well a part of
ones life and it’s also interaction with other trafficants in different kind
of situations. Hierarchical models of human behaviour (Hacker,1978;
Leontjev, 1977; Miller, Galanter, & Pribram, 1960, and driver behav-
iour (Janssen, 1979; Michon,1976) have solved this problem.

The pioneer in the area of developing driver education based on a psy-
chological model of driver behaviour was McKnight already at the early
1970 (McNight & Adams,1970a; McKnight, & Adams, 1970b;
McKnight, & Hundt, 1971). His problem, however, was that he identi-
fied 45 major tasks and 1700 elementary tasks. This is, of course not a
good starting point for driver education curriculum. For long time it was
more common that driver training was not at all based on a theory of
driving.

At the beginning of 1980 the hierarchical models of driver behaviour
were started to be used as a starting point for planning the training. As
far as I know the first suggestion and trial was made in Finland by
Mikkonen, & Keskinen (1983). This first trial was followed by the pub-
lication in Finnish language Keskinen, 1998: The goals of driver training
from a psychological perspective) and the well known GADGET-report
(Siegrist, 1999) where the GADGET- matrix (Hatakka, Keskinen, Gre-
gersen, & Glad, 1999) was first presented in English language. It is interest-
ing to note that such famous theories of driver behavior as Näätänen &
Summala’s (1974) zero-risk theory or Fuller’s (1984) threat -avoidance
theory were never used as a starting point for planning a driver education.
What are the key features which should be taking into account when building a model of driving

There are some critical factors which should be taken into account when building a model of driving behaviour. It is necessary to define driving as a multitask and multilevel process, where the driver is in interaction with the environment and with the vehicle.

Driving can also be described as an interplay between skills and motives. Skills are always developed in a learning process and that’s why it is important to also have a model of learning of driving behaviour. One reason for this emphasis on learning is also that it is difficult to think such a model of driving behaviour which would be used in driver education and which would not say anything explicit of how learning takes place in driving. Consequences of learning for driving are of course important: how learning changes the mechanisms which control driving process.

As safety is one important goal in driver training also the model should describe how normal, non problematic driving takes place as well as how accidents and other conflicts develop in driving.

Hierarchical models: similarities and differences

Michon (1985) differentiates between functional models and taxonomic models. Taxonomic models are essentially inventories or lists of facts. One example of a taxonomic model is Rasmussen’s (1987) model of human behaviour. The model contains three different ways of controlling behaviour. Usually these are called levels and from the bottom up they are called skill based behaviour, rule based behaviour and knowledge based behaviour. The stimulus situation activates the suitable action model. Skill based behaviour is fastest and most rigid and it is controlled automatically. Next level is controlled by learned rules and driver’s task is to select the suitable rule for the situation. Control of the behaviour on the highest level is based on “problem solving”. There are no ready made rules for the situation but the behaviour is based on the use of learned knowledge in he memory. There are no specified dynamic relations between the three levels in Rasmussen’s model and that is what differentiates taxonomic models from functional models.

Reason (1985) has used Rasmussen’s taxonomy and he has created a model, Generic Error Modelling System (GEMS) that has been applied to the study of accidents and violations. The results have shown that the lowest levels of aberrant driving behaviour, self-reported slips and lapses
and errors do not predict accidents rates (Parker et a 1995a, 1995b) but violations, i.e. behaviours that involve deliberate deviations from safe driving practice, correlate with both past and future accident rates.

More or less functional models of driving behaviour are Janssen’s (1979), Michon’s (1971), Van der Molen and Bötticher’s (1988), Summala’s (1996), Mikkonen and Keskinen’s (1980, 1983), and Keskinen’s (1996) models. Here only Michon’s (1971) and Mikkonen and Keskinen’s and Keskinen’s models are presented.

A general way of dividing a driver’s task is to use three levels of behaviour and control: strategical (planning), tactical (manoeuvring), and operational (control) respectively (Michon, 1971, 1979, 1985, Janssen, 1979). In Michon’s (1971) and Janssen’s (1979) models the strategical level defines the general planning stage of a trip, including the determination of trip goals, route, and modal choice, plus an evaluation of the costs and risks involved. Plans derive further from general considerations about transport and mobility, and also from concomitant factors such as aesthetics and comfort. At the tactical level drivers exercise manoeuvre control allowing them to negotiate the directly prevailing circumstances. Although largely constrained by the exigencies of the actual situation, manoeuvres such as obstacle avoidance, gap acceptance, turning, and overtaking, must meet the criteria derived from the general goals set at the strategical level. Conversely these goals may occasionally be adapted to fit the outcome of certain manoeuvres. Michon (1985) also states that a comprehensive model of driver behaviour should not only take into account the various levels, but should also provide an information flow control structure that enables control to switch from one level to the other at the appropriate points in time (p.490). Michon (1985) is also supposing that in the course of a skill learning process, performance proceeds from general and flexible but slow, to specific and rigid but fast.

Already in 1980 Mikkonen and Keskinen published their Theory of internal models in driving behaviour but unfortunately only in Finnish. The model was based on four assumptions which form the basic statements of the theory: (Descriptions of the models from Mikkonen and Keskinen (1980) and from Keskinen (1996) are taken from Keskinen et al. (2004)).

The four assumptions in the theory of internal models in driving (Mikkonen and Keskinen,1980)
1. Internal models are used in the control of traffic behaviour. The models are used in the planning of actions, in the interpretation of sensory information, in guiding motor operations and in comparing feedback received from the activities.

2. Internal models develop with experience to represent typical characteristics of the traffic environment and of the flow of traffic events. Experience can be gained through personal participation in traffic e.g. as a driver, and through observing the behaviour of others, but also through verbal and pictorial description, and by imagining the course of traffic events.

3. Internal models are used interactively in two ways: some environmental key features and continuities in the flow of events arise internal models, and the anticipatory choice of model is verified by cues in the stimulus environment, and on the other hand, the choice of model is made in accordance with the motivational state.

In the theory of Mikkonen and Keskinen (1980; 1983) internal models are sub-ordinate to motives, as the switching of models is sensitive to changes in the goals of behaviour. In the theory internal models are regarded as purely cognitive states controlled by motivational and emotional factors. This creates an unstable element in the system; relevant models are not always in use even though they belong to the repertory of a driver.

4. Risk situations arise when the internal models in use differ from the demands of the objective situation.

Surprises and near accidents as well as accidents can be accounted for by differences between existing models (models in use) and the situational requirements. The seriousness of the consequences of risks is dependent on the magnitude and quality of the differences. The risks themselves have common roots, whether they appear as harmless surprises or as fatal accidents.

Description of the contents of a driver’s internal models is an important part of the theory. What are the aspects of a traffic environment that are represented by internal models? A system for evaluating and using information concerning the developmental level of models must also be hypothesised; otherwise the process will be controlled only by external cues or stimulus.
The other question is: How is knowledge in the models organised so that it can be used to ensure a fluent and anticipatory control of actions in driving. A hierarchical organisation seems to be necessary in which models are differentiated by their extensiveness. Theory divided the internal models into three levels. The model covering the largest range of a traffic performance was called the route model. It contains knowledge about roads and events between start and goal, and it is divided into several visual scenes each of which includes a sight model. On this level the model covers the range of road which can be tested by sensory information. Within each sight level, several handling models are needed. They include a map of the control equipment of the vehicle and knowledge about how it behaves when the controls are used. The route level makes possible to anticipate the type of sight models which again limit the handling models necessary for realising the performance. The model therefore assumed a control hierarchy as well as a hierarchy of representations.

It was also pointed out in the original theory that it is reasonable to assume that the internal models have a different kind of contents, e.g. social contents on the two higher hierarchical levels and contents which concern risks on all three levels. There was also an information flow diagram in the first model, but it was soon realised that there can hardly be any causal relationships in such a process diagram as almost all of the relationships are interactive by their nature. Already in the first version of the theory it was noticed that internal models has to have connections to motivational and emotional systems of the driver. The connections were, however, not specified.

As a result of accident analysis, it was noted that a theory which is only concerning on knowledge and procedural bases of driving, was not successful enough. At the same time studies concerning life-style and accidents were published, as well as research results regarding the effects of self-control on accident involvement. As a consequence, a new highest level, Goals for life and skills for living was introduced (Keskinen 1996) into the model. This new model was called “Extended model of internal models in driver behaviour” It is possible to see already from the name of this highest level that it is especially important because it covers such a wide and not so easily described area as personality and motives. These concern especially driving but also more generally a person’s relation to life and the present life situation and lifestyle. A persons goals control his or her behaviour and these goals can e.g. be more or less congruent with the norms of the society or against them. Violations against traffic regulations are important negative results of acts where the goals are not gener-
ally accepted in the society. “Skills for living” concerns a person’s self-regulatory skills, controlling impulses and controlling effects of emotions. These are especially important to young male drivers, who often suffer from a lack of control of their driving behaviour. The three lower levels are almost identical to the original ones and the idea is that they are more like tools which a person uses when fulfilling the goals of his or her life in traffic. Of course driving is only one part of a person’s life but the overall goals and skills for living also affect in his or her behaviour in traffic.

**GDE- Goals and contents for driver education**

An extension of the model was used in the EU-project Gadget (Hatakka, Keskinen, Gregersen & Glad, 1999) to describe what kind of elements a good driver should have, and this description was also used to evaluate different training methods and their advantages and disadvantages. The theory was used in the similar way in the DAN-project (Bartl, Keskinen, Hatakka & Stummvoll 2000). The projects showed e.g. that basic training still concentrates on the two lowest hierarchical levels of driving and especially on knowledge and skills. Much less emphasis is put on risks as well as on evaluation of risks in driver examination. Skills for self reflection are rarely one of the goals basic driver training, but already to some extent in driver improvement. The goals of driver improvement and especially courses for rehabilitation were clearly focusing on the two highest levels of the hierarchy.

The GDE-model has after those first projects used in many others in the similar way as at the beginning: to have a common way of thinking and analysing driver training or driver testing. (ANDREA: Bartl, Assailly, Chatenet. Hatakka, Keskinen, Willmes-Lenz, 2002; NovEV: Sanders, & Keskinen, E, 2004; BASIC: Hatakka, Keskinen, & Baughan, Goldenbelt, Gregersen, Groot, Siegrist, Willmes-Lenz, Winkelbauer, 2003; TEST: Keskinen, & Baughan, 2002) The first scientific publication in a peer reviewed journal was published 2002. (Hatakka, Keskinen, Gregersen, Glad, & Hernetkoski (2002). The list of authors is one of the reasons behind the popularity of the GDE-model: authors represented three countries and were already at that time well known in the area of driver training.

**Problems of the GDE-model**

Popularity is one of the reason for some problems with the model in publications. Referring to the model differs, sometimes the name GADGET-matrix is used, sometimes GDE-model or framework. But
often the content of the model is not exactly the original one. One reason for this is that the model seems to be “easy” to understand: everybody does understand it, but in his or her own way. This creates difficulties for those who later read the publications. It is not sure at all if all readers notice the differences, because often the model is just presented in the way: “here is the model, you know it all”.

Other kinds of problems concern the idea of the model. There are sometimes difficulties in understanding the interaction between hierarchical levels and also that each lower level is part of the higher one. This is the common problem with hierarchical models for those who are not so familiar with this kind of abstract thinking.

As said earlier, there are also problems with new names of the contents. These new names can be so different that they tell about misunderstanding of the whole idea. In some presentations the original concept mastery of traffic situations has changed to mastery of demanding situations.

Because driving situation has so many elements and the original theory of inner models in driver behavior was concentrating to the cognitive contents, there are some difficulties in describing or connecting driver’s physical and mental state to the model. This is one of the things that will be concentrated in the new version of the model, which is now under writing.
References


The Norwegian category B curriculum and driver training

Lars-Inge Haslie & Christina Eriksen

The Norwegian Public Roads Administration

Introduction

In Norway the Public Roads Administration has been given the responsibility of managing and developing the driving licence training for all driving licence categories through laws and regulations. The actual training takes place at private driving schools, at some few 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 licence category. The organization is also in charge of developing curricula for all driving licence categories.

In 2005 the Norwegian Public Roads Administration introduced new curricula in all 16 driving licence categories. The introduction took place in the form of revision of regulations on driver training and driving tests etc. The new educational model was mainly based on the scientific developed GDE-model, with a particular emphasis on the upper levels of the model, as an effort to improve education within traffic safety.

This paper is based on our, Lasse Haslie and Christina Eriksen, presentation of the Norwegian Category B curriculum and driver training at the GDE conference in Umeå. In the first part of the paper we will try to explain the reasons why Norway introduced a new driver training in 2005. Then we will try to describe the main principles and features of the new curriculum and training. At last we will try to reflect on the experiences we have had with the new educational system so far.
**Background for introducing a new driver training**

The background for introducing a new driver training is to be found in the National Transport Plan presented by the government in the year 2000. In this plan The Ministry of Transport and Communications put forward that the training programs for all categories should be revised and developed.

The basis for the revisions was the study, “Revised Driver Training System. A proposal. “, prepared by the Directorate of Public Roads in 2002. The study suggested a common pedagogic platform and a training model intended to function as a basis for all driving licence categories.

In category B, special emphasizes was put on the fact that the curricula should define some objectives, but that there ought to be different ways to attain these objectives. This way it became up to the learner to choose the desired type of training program. He/ she could decide to complete all his/ her training at a driving school, even though a good combination of training at the driving school and private practice training or volume training seemed to be most economic and provide the best results.  

In category B, we decided to put special emphasizes on motivation and stimulation for more practice driving with a lay person or volume training as we like to call it in Norway, and on the progression of the driver training. A new curriculum should clarify which competence level the learner ought to attain at which time in the training.

Another emphasize was put on developing mandatory courses to cover objectives that were difficult to leave as parts of private training, or could not be tested during the driving test on the basis of safety, pedagogical or practical reasons. In addition we also wanted to focus more on awareness and reflection in the driver training with the intention of influencing the learners’ attitudes.

The Transport Plan was given wide enough support in the National Assembly to start the development of a new curriculum.

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1 Volume training means a great deal of training in areas where basic training already has been given.
**Accident involvement risk**

Young drivers have a high accident involvement risk immediately after they have passed their driving test. During the first months this risk falls sharply and approximately 10 months after the driving test, the accident involvement risk stabilizes. This shows that the driving experience obviously reduces the risk of being involved in accidents.

The new driver training system must be seen in connection with the vision Zero for road traffic we have in Norway. Vision Zero is our image of a future situation where nobody is killed or seriously injured in a traffic accident. One way of contributing to the vision Zero is to improve the driver training to make more capable drivers. If we could halve the risk it would be a great improvement.

**Main principles and features of the new curriculum and training**

**Driving test**

Traditionally, the driving test is the only way of measuring whether the candidate is a capable and responsible driver. Is this a sufficient measure? We think that the driving test to a large extent measures the person’s knowledge, whether he/she is capable of handling the vehicle and the interaction with other road users in that particular situation. But are these the only qualifications you need to be a safe and responsible driver?

In our opinion these are only some of the qualifications you need to be a safe and responsible driver. Because being a responsible driver is about more than just steering and shifting gear, it is about how you behave in society in general and particularly how this influence the way you interact in traffic. In this respect attitude, motivation, self-insight and will to be a responsible driver – that’s the highest level of the GDE matrix- are highly relevant factors that you hardly can assess within a limited time on the driving test.
Mandatory and non-mandatory training

This means that certain aspect of the desired driver competence must be secured through other means than the driving test alone. Training is essential to develop the competence. To ensure that the learner really develops this competence through the training, mandatory courses are introduced. Our curriculum consists of both mandatory and non-mandatory training.

Ideally the candidate should have reached the level required for passing the driving test about a year before the driving test. This means that the last year can be spent practising in a realistic environment – and then we have reason to believe that the number of novice drivers involved in serious accidents will fall.

Automation of actions

The new model also emphasizes the importance of automation of actions so as not to overload the cognitive system during driving. This means that it is important for the driver training that the technical driving skills have become reasonably automatic before the learner starts learning to solve more complex problems. Although learning is a continuous process, the driving instructor therefore ought to keep a step by step model in mind when organising the lessons. In the early stages of the training work should be devoted to automating simple tasks. The learner must, for instance, be able to control a vehicle before he/ she can start driving in the traffic.

Stepwise model

The new driver training implies that there are four steps of the training, and that 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 learner moves on to the next step. That is Step 1 is a prerequisite for step 2, step 2 is a prerequisite for step 3, and so on.

If we compare with traditional driver training we could say that it has consisted of step 2 and 3. In addition we have introduced a new element - an evaluation and guidance lesson at the conclusion of step 2 and 3.

With reference to the learner’s driving the learner and the driving teacher shall together reflect upon and decide whether the learner has complied with the objectives of the steps. In step 2 they have to decide whether the
learner possesses the technical driving skills that he/ she needs to be able to transfer his/ hers attention from the vehicle to the interaction with other road users. As far as step 3 is concerned they have to consider if the learner has the driving competence needed to drive independently in varied traffic. At the conclusion of each of the evaluation and guidance lessons, the learner driver will get an advice from the driving teacher on how to proceed in the teaching process.

Step 1 is a course in basic road traffic knowledge, which is mandatory for everyone who wants to obtain a driver’s license, regardless of category. The objective of this course is that the participants shall achieve a conscious understanding of the road traffic system and the risks involved, and how their attitudes and actions have relevance in this connection. The course includes training in first aid and night driving.

In Step 1 we deal with the highest level of the GDE-matrix, meaning that the goals and skills of life have relevance for what kind of driver you are.

Step 2 is about technical driver training. In step 2 the learner will learn the driving skills required to master the vehicle without the distraction of other road users. At this stage, instruction and volume training take place in areas with little or no traffic. There are no mandatory lessons in step 2, but the learner should achieve the objectives specified for the step. The objective is to practice until your vehicle handling skills become so automatic that you can begin to concentrate your attention to the traffic situation.

Trough Step 3 the learner shall be capable of driving in varied traffic. The learner must also have relevant knowledge of road traffic legislation. At the conclusion of Step 3 the skills should approach the level where the driver is capable of independent driving. No specific number of lessons has been stipulated, the training must be adapted to the learners experience and his/her possibilities for private practice driving. A safety and skid pan driving course is mandatory.

In Step 4 the learner shall besides gaining driving experience during demanding conditions also prepare mentally for the role as a driver. Subjects important during the first step, that is the learners understanding of risk and self- insight, will also be important here, but this time these subjects will be more connected to the actual driving.
Step 4 in category B consists of a mandatory on the road safety course in addition to continuing training in a realistic environment.

After completing Step 4, the learner shall possess the necessary competence to drive a car in accordance with the main objectives. That is, he or she shall possess the knowledge and skills, self-insight and understanding of risk required to drive in a manner which:

- Is safe
- Provides proper interaction
- Promotes traffic flow
- Shows consideration for health, the environment, and the needs of others
- Is in compliance with regulations in force

It is important to notice that we don’t think that the mandatory training itself is sufficient to reach the objectives desired in our curricula. It (the mandatory training) must be supplemented by other/more training at a driving school, private practice or both. We think it is essential to have a considerable amount of driving experience before the driving test is taken and therefore encourage people to undertake large amounts of private practice or volume training, particularly during the last year before they take the practical driving test.

**Training subjects**

Seven subjects have been defined as necessary parts of the driver training based on the GDE matrix and the evaluation of what is important for a driver to know. The different subjects are dealt with throughout the training, but to different extent in the different steps.
These subjects are:

1. Legislation and road traffic as a system. Before the student begins driving in traffic, it is advantageous that he/she has a certain knowledge on laws and rules that govern interaction, on traffic as a system and the drivers role in this system.

2. Vehicle manoeuvring. (The learner driver must learn to handle the vehicle safely and efficiently).

3. Road traffic skills. (The learner must learn to interact with other travellers, and master different traffic situations and conditions.)

4. Economic and environmentally friendly driving. (The learner shall learn about and get used to an economic and environmentally friendly manner of driving.) This subject was not originally picked up by the GDE matrix, but has been added to some earlier curricula and will probably become more and more important in the future. Economic and environmentally friendly driving was therefore included as a separate subject throughout the new curricula.

5. Planning and preparations for driving. (The learner driver shall learn to prepare for driving and make sensible plans before and during driving.)

6. Behavioural tendencies and judgement tendencies. (The learner driver shall learn how personality, social influence, lifestyles and similar factors affect personal choices.)

7. Self-insight regarding own competence and own personal behaviour tendencies and judgement tendencies. (The learner shall be schooled in realistic evaluation of own competence, to understand personal tendencies and how these tendencies affect reactions.)
Conclusions

Does the system work? What is the experience so far? The system was introduced in 2005 and due to a rather extensive transitional period lasting to mid 2006; it is first now that we start to see candidates with the new driver training in the traffic. In addition research about the implementation of the new curricula is in progress, and will hopefully be completed within the next couple of years. So unfortunately it is too early to say anything about the effects.

It is important however, to emphasise that success is largely depending on the cooperation of the driving schools, driving teachers and not at least the learners and their relatives. It is essential that the driving teachers adjust the teaching methods in accordance with the new curricula and that the learners are motivated and follow up the intentions of the curricula.

We realise that this is a process that will take some time, but we believe however that this is the right way to go to reduce the fatalities where novice drivers are involved.
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Development and Evaluation of the Self-efficacy Scale for Driver Competence

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Over the last few years, the driver education in some countries (e.g., Sweden, Norway and Finland) has come to include drivers’ perceived competence instead of focusing only on their performance regarding driving-related knowledge and abilities. In the Swedish curriculum for driver education, introduced in 2006, goals about drivers’ self-assessment are a new part (VVFS2004:110). In order to assess these goals, there was a need for a self-report instrument of perceived driver competence. Although many studies within the traffic psychological field have focused on perceived driving skill, the instruments commonly used ask the participants to compare themselves with the average driver (McKenna, Stainer, & Lewis, 1991; Soames Job, 1990; Svenson, 1981). Findings from these studies suggest that the majority of drivers overestimate their own competence compared to that of the average driver (Delhomme, 1991; Freund, Colgrove, Burke, & McLeod, 2005). However, this methodology is problematic because one cannot determine whether the drivers are overconfident as information about their actual competence is missing (Groeger, 2001). Thus, in order to examine whether drivers have an accurate perception of their own driving competence, or if they over- or underestimate their own skill, it is necessary to compare the perceived driver competence with measures of actual driving skill (Deery, 1999; Sundström, 2007b).

Accordingly, there was a need to develop an instrument to assess perceived driver competence in different domains that could be compared to actual driving performance in those domains. The self-efficacy construct was used as a basis for developing an instrument for perceived driver competence (Sundström, 2007a). Considering that the self-efficacy construct is future oriented, task- and situation-specific and that judgments
of the individual’s own competence are made with reference to some form of goal (Bandura, 1997), this construct seemed to be a valid indicator of perceived driver competence (Sundström, 2006a). Moreover, studies have indicated that self-efficacy is a good predictor of different types of performance (Choi, 2005; Pajares, 1996; Pietsch, Walker, & Chapman, 2003; Robbins et al., 2004).

The aim of this study was to examine the psychometric properties of the Self-efficacy Scale for Driver Competence (SSDC) as well as to gather evidence for construct validity.

METHOD

Development of the SSDC
The SSDC was based on a conceptual model for the construct perceived driver competence, consisting of two dimensions: theoretical and practical self-efficacy and five aspects of perceived driver competence corresponding to the content of the Swedish curriculum for driver education: Vehicle knowledge and manoeuvring, Economic driving, Traffic regulations, Traffic safety and Personal circumstances and goals in life. There were two parallel forms of the SSDC labelled A and B. Both consisted of 28 items about perceived theoretical and practical driver competence. Of these 28 items, 17 items occurred in both forms and 11 items were items specific to each form. The participants responded to the items by indicating how confident they were that they would successfully complete different tasks in the theory and practical driving license test. The response format in the SSDC consisted of a 10-point scale with the extremes labelled “not confident at all” and “completely confident”. The middle of the scale was labelled “fairly confident”.

Procedure
The two forms of the SSDC were administrated from July to October 31st in 2006 at three different driving test centres participating in a project conducted by the Swedish Road Administration where a new model for driver examination in Sweden was tested (Vägverket, 2006). The examinees completed the SSDC before taking the theory and practical test.

Participants
There were 1526 respondents that completed the two versions of the SSDC (n=805, n=721). Of the 1526 participants, 56 percent were men and 44 percent were women. Their age varied from 18 to 64 years (M=21.50, Mdn=18, SD=6.90).
Statistical analysis
A principal axis factor analysis (PAF) with promax rotation was used to examine the number of factors underlying the responses to the SSDC. Multiple criteria were used for factor retention: Eigenvalues-greater-than-one-rule, Scree test, Parallel analysis and Velicer’s Minimum average partial test (Gorsuch, 1997; Henson, Capraro, & Capraro, 2004). Beside these four criteria the decision concerning the number of factors to retain was also based on simple structure, factor interpretability and theoretical relevance. The correlations between factors, pattern and structure matrices, the communalities, proportion of variance accounted for post-rotation and the post-rotation traces were reported. The psychometric properties of the SSDC were analysed using classical item statistics. Item discrimination was assessed using Spearman’s rank order correlation, $r$, and the item mean was used as an indicator of item difficulty. The internal consistency of the scores was assessed through coefficient alpha. The relationship between average scores on the SSDC and the scores on the theory test were analyzed with Spearman’s rank order correlation. The association between average scores on the SSDC and performance on the practical test (pass/fail) were analyzed with Kendall’s tau b as the metric level of test performance was nominal.

RESULTS
The factor retention criteria obtained from the PAF indicated that one, two or three factors should be retained. As the criteria gave somewhat different results, a two- and a three-factor solution rotated with Promax rotation were compared regarding factor interpretability. In the three-factor solution the factors accounted for 64.10 and 62.47 percent of the variance in version A2 and B2 respectively. In the two-factor solution the total amount of variance accounted for by the two factors was 60.8 and 58.9 percent for version A2 and B2 respectively. Thus, the addition of a third factor did not contribute much to the amount of variance accounted for. It was concluded that the two-factor solution was the best solution from a theoretical perspective since it yielded clearly interpretable results. The two factors correlated strongly (in version A2:$r=.78$, B2:$r=.77$).
Table 1 shows that items (1-18) concerning perceived theoretical driver competence had large pattern coefficients on the first factor. This factor can be labelled \textit{Perceived Theoretical Driver Competence} (PTDC). Items (19-28) concerning perceived practical driver competence had large pattern coefficients on the second factor, which can be labelled \textit{Perceived Practical Driver Competence} (PPDC).

\textit{Item analysis}

Both versions had sound psychometric properties. The internal consistency for the subscales PTDC (A: =.96, B: =.94) and PPDC (A: =.95, B: =.94) were high for both versions of the SSDC. Generally, the item discrimination in both versions was high, indicating that items discriminate between examinees who rate themselves as being high and low on the instrument. For version A, the correlation between item and total score ranged between $r_s=.59$ and $r_s=.83$. For version B, the correlation ranged between $r_s=.55$ and $r_s=.79$. In the PTDC subscale, the items with the lowest means i.e. the items that were the most difficult to endorse are concerned with Vehicle knowledge and manoeuvring and Eco-driving. On the other hand, the easiest items to endorse were concerned with Personal circumstances. For the PPDC subscale, the items most difficult to endorse were those concerned with Vehicle knowledge and manoeuvring as well as Traffic safety. The easiest items for test-takers to endorse were concerned with Traffic regulations.
Table 1. Pattern coefficients (P) and structure coefficients (S) and communalities ($h^2$) for items in version A and B of the SSDC

<table>
<thead>
<tr>
<th>Items</th>
<th>PTDC</th>
<th>Version A</th>
<th>PPDC</th>
<th>Post-rotation</th>
<th>PPDC</th>
<th>Post-rotation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P</td>
<td>S</td>
<td>P</td>
<td>trace</td>
<td>S</td>
<td>variance (%)</td>
</tr>
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<td>.575</td>
<td>.184</td>
<td>.521</td>
<td>.344</td>
<td>.528</td>
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<tr>
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<td>.609</td>
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<td>.333</td>
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<td>.701</td>
<td>.200</td>
<td>.600</td>
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<td>.426</td>
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<td>.764</td>
<td>.800</td>
<td>.641</td>
<td>.333</td>
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<tr>
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<td>.058</td>
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<td>.767</td>
<td>.812</td>
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<td>18b.</td>
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<td>.541</td>
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<td>.657</td>
<td>.854</td>
<td>.845</td>
<td>.714</td>
<td>.333</td>
</tr>
</tbody>
</table>

Note: Entries in bold indicate pattern coefficients >32.
The correlation between average score on the SSDC and theory test score was for version A2 $r_s=.21$ (p<.01) and for version B2 $r_s=.11$ (p<.01). The association between items about perceived practical competence and performance on the practical test (pass/fail) was for version A2 $\tau=0.10$ (p<.001) and for version B2 $\tau=-0.001$ (n.s.).

DISCUSSION AND CONCLUSIONS

The purpose of the study was to analyze the psychometric properties and gather evidence of construct validity for the SSDC. The psychometric properties of the instrument indicated that the items are homogenous and discriminate between those who rate themselves high and low on the instrument. The exploratory factor analysis provided support for construct validity, as the two dimensions in the conceptual model were empirically supported by the two factors labelled Perceived Theoretical Competence and Perceived Practical Competence. The study provided some support for the criterion-related validity, as there was a weak relationship between self-efficacy ratings and performance on the theory and practical tests. However, the relationships between measures of self-efficacy and performance reported in other studies usually are somewhat stronger. For example, correlations between academic self-efficacy and performance in the range between .49 and .70 have been reported (Pajares, 1996). Moreover, in a preliminary study of the SSDC (Sundström, 2006b), where participants were informed about the use of the instrument, a substantial correlation between perceived theoretical competence and performance on the theory test was found ($r_s=.74$). In the present study, the participants were not informed about the use of the SSDC. Thus, one explanation for the weak correlations found in this study is that participants did not know how the scores from the SSDC were used. This may have affected participants’ ratings, which in turn may have distorted the relationship between SSDC and test performance. Thus, it is important to improve the information about the SSDC, e.g. that the ratings will not affect the driver examiners judgment, as previous studies have indicated that detailed information about the instrument improves the predictive validity (Fahr & Dobbins, 1989; Fahr & Werbel, 1986; Jones & Fletcher, 2002). An interesting subject for future studies is therefore to investigate if additional information about the SSDC affects the participants’ ratings as well as the relationship between perceived and actual driver competence.
REFERENCES


Self-assessment of driving ability among young drivers

Torbjørn Tronsmoen

Norwegian University of Science and Technology

BACKGROUND

The core aim of the present study was to examine the psychometric qualities of a measurement instrument of self-assessment of driving ability. The specific aims were to examine: 1) the role of driver education in such self-assessment 2) the associations between self-assessment and driving experience 3) the association between self-assessment and risk 4) gender differences in self-assessment of driving ability. This is a small part of a study examining differences between formal and informal practical driver education. Variables as content of the driver education, self-assessment of driving ability, safety attitudes, risky behaviour, risk, differences in form of instruction, etc. are focused in this research.

Overestimation of skills may be a reason to young drivers’ over-representation in crash and fatality statistics. This is taken into account in the “Goals for Driver Education” framework, the GDE-model, where self-evaluative skills are emphasised as an important educational aim. This model consists of four levels of driving ability. These are: vehicle manoeuvring, mastering traffic situations, goals and context of driving and on the top of the hierarchy finally goals for life and skills for living (Hatakka, Keskinen, Gregersen, Glad, & Hernetkoski, 2002; Peräaho, Keskinen, & Hatakka, 2003).

Driving as a self-paced task (Näätänen & Summala, 1974; Taylor, 1964) leaves to the driver to influence the demand of the task through behavioural choices. Self-assessment of driving ability is supposed to play an important role in this regulation of the driving process (Spolander 1983). This regulation of the driving process is placed into the two lowest levels of the GDE-matrix; seen as self-assessment related to calibration of performance factors as driving skills and car-control skills.
Self-assessment of driving ability has been focused in previous research, for example Svenson (1981), showed that 60 to 80% of the drivers estimate their own driving skills to be above average. Of course, from a statistical point of view this cannot be in accordance with the same drivers’ actual ability. Gregersen (1996) found that skill-trained drivers assessed their skills as better than insight trained drivers did. However, he did not find any difference between the two groups with regard to actual driving skills performed after attending the two courses. This indicates an overestimation of skills as a result of skill-oriented skid training courses.

Self-assessment has been measured within different frames of reference through the years, in comparison with ambiguous notions as the average driver, an expert driver, a novice driver and so on. In addition self-assessment of driving ability often is measured on a relatively general level of specificity. This may result in biases due to self-serving mechanisms (Dunning, Meyerowitz, & Holzberg, 1989; Groeger, 2000). As a result of self-serving mechanisms young drivers may have been led to express a driving ability they have not really attained. In the present study self-assessment of driving ability is attempted measured on a higher level of specificity in order to reduce ambiguities and self-serving assessments. Pajares (1996) gives further support for this through his conclusion from self-efficacy research indicating that the more specific the description of the task, the more predictive value the measured self-efficacy has to actual performance. This is also in accordance with the theory of planned behaviour (Ajzen & Fishbein, 1980). The theory claims that the predictor and the effect variables should have the same level of specificity for the prediction to be successful. In my measurement instrument comparison with ambiguous standards were left out and the present study aimed to measure self-evaluation by applying a direct strategy.

Merleau-Ponty (2002) suggests the car may be conceived as a prolonged part of the driver’s body. The extent to which the driver successfully experiences the car to be so may be associated with the driver’s immediate feeling of controlling the car itself in traffic surroundings. According to Gibson and Crooks (1938) the driver perceives “the field of safe travel” and “the minimum stopping zone” as important limitations when driving. These terms presuppose the same kind of bodily feeling of unity with the car and its properties as Merleau-Ponty suggested. This bodily feeling of unity and control may lead to overestimation. If so, it is reasonable to believe that this will play a role in the regulation of the driving process. In the present study it is hypothesised that the body dimension will be a part of the self-assessment.
Until now, this approach has not been taken into consideration in any measurement instruments of self-assessed driving ability. Consequently it may be an idea to measure this bodily dimension of self-assessment.

**The study**

The respondents of the present study were a sample of the Norwegian population of young drivers aged 18 – 20 years of age. 4000 persons were randomly drawn from the official driver licence registry - AUTO-SYS. They all held a driving license for passenger cars. The drivers responded to a mailed questionnaire. 1419 replied to the questionnaire (response rate 37%), of these 721 were women and 698 men, (50,8% and 49,2% of those who responded).

To measure self-assessment of driving ability a 31 items measurement instrument was applied. A five-point evaluation scale ranging from “Fits me perfectly” to “Doesn’t fit me at all” was applied. The questionnaire was based on two other instruments aimed at measuring self-assessment of driving ability (Gregersen & Nyberg, 2002; Spolander, 1983). In addition, indicators intending to measure the body dimension of self-assessment as well as highly specified task skills were included. Driving experience was measured by asking how often they drive, approximately how many kilomètres they drive every month, and how long they had held a driver license. The respondents were also asked to assess the amount of driver training with a lay instructor as well as the amount of driver training with a professional driving teacher. In Norway, learners usually have more or less both types of driver training. Also crash involvement was reported.

**RESULTS**

To examine the dimensionality of self-assessment of driving ability, an explorative factor analysis was carried out. The analysis showed that self-assessment fell into four dimensions (see Table 1). These were entitled as follows: General driving ability, Safety orientation, The body dimension and the fourth dimension Specific task skills. The Cronbach’s alphas (Cronbach, 1951) were found to be satisfactory (Nunally, 1978) for all the four dimensions.
Table 1. Dimensions of self-assessment of driving ability.

<table>
<thead>
<tr>
<th>Dimensions (Cronbach’s and average item total correlation)</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dimension 1: General driving ability</strong></td>
<td></td>
</tr>
<tr>
<td>(Cronbach’s : 0.845, average total item correlation =0.58)</td>
<td></td>
</tr>
<tr>
<td>I am a champion on slippery conditions</td>
<td>0.72</td>
</tr>
<tr>
<td>I am well skilled to drive fast if necessary</td>
<td>0.69</td>
</tr>
<tr>
<td>Driving effectively under high traffic density conditions</td>
<td>0.63</td>
</tr>
<tr>
<td>Well skilled to anticipate</td>
<td>0.63</td>
</tr>
<tr>
<td>Always judge gaps in traffic flow correctly</td>
<td>0.60</td>
</tr>
<tr>
<td>Have excellent driving skills</td>
<td>0.58</td>
</tr>
<tr>
<td>Well skilled in dark driving</td>
<td>0.58</td>
</tr>
<tr>
<td>Know exactly how to turn the wheel when skidding</td>
<td>0.57</td>
</tr>
</tbody>
</table>

| **Dimension 2: Safety orientation**                        |                |
| (Cronbach’s : 0.704, average total item correlation =0.45) |                |
| Dangerous situations rarely occur abruptly to me           | 0.66           |
| A driving style avoiding dangerous situations              | 0.64           |
| I am pretty good at driving safely                          | 0.64           |
| I recognize dangerous situations                           | 0.51           |
| Confident to cope with unexpected situations               | 0.51           |
| Lower accident risk than the average driver                | 0.47           |

| **Dimension 3: The body dimension**                        |                |
| (Cronbach’s : 0.788, average total item correlation =0.57) |                |
| I have the feeling of direct contact with the road surface | 0.75           |
| The car and I are united                                   | 0.75           |
| I know immediately if my car fits into a narrow passage    | 0.61           |
| I know exactly the position of the car                     | 0.52           |
| Know exactly stopping point if need of maximum braking     | 0.51           |

| **Dimension 4: Specific task skills**                      |                |
| (Cronbach’s : 0.764, average total item correlation =0.60) |                |
| Able to reverse fast and precisely into a garage           | 0.81           |
| Able to reverse easily by using back mirrors               | 0.75           |
| Well skilled in fast and precise parallel parking          | 0.72           |


Pearson’s r was used to examine the association between self-assessment on the one hand and driver training and driver experience on the other hand. Highest levels of self-assessment of driving ability were found among the most experienced drivers, drivers with high amount of informal driver training, male respondents, and among drivers with the lowest risk (Risk = Number of accidents x 100/Km driving experience). Table 2 and 3 show some of the correlation values. It was also found that male
respondents had higher self-assessment compared to females except with regard to the safety orientation dimension that did not show any gender difference. The gender differences remained after controlling for driving experience.

Table 2. Correlations between self-assessment of driving ability, driver training and driving experience.

<table>
<thead>
<tr>
<th>Pearson’s r</th>
<th>Driving school lessons</th>
<th>Amount lay instruction</th>
<th>Driving experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>General driving ability</td>
<td>.17**</td>
<td>-.11**</td>
<td>-.26**</td>
</tr>
<tr>
<td>Safety orientation</td>
<td>.11**</td>
<td>-.05</td>
<td>-.07*</td>
</tr>
<tr>
<td>The body dimension</td>
<td>.12**</td>
<td>-.13**</td>
<td>-.21**</td>
</tr>
<tr>
<td>Specific task skills</td>
<td>.23**</td>
<td>-.23**</td>
<td>-.31**</td>
</tr>
</tbody>
</table>

*p<.01, **p<.001 (To interpret the table it is important to note that low values of self-assessment correspond to high ratings)

Table 3. Correlations between the 4 dimensions of driving ability and risk.

<table>
<thead>
<tr>
<th>Pearson’s r</th>
<th>All drivers N=1419</th>
<th>Drivers with accidents N=587</th>
</tr>
</thead>
<tbody>
<tr>
<td>General driving ability</td>
<td>.07**</td>
<td>.15***</td>
</tr>
<tr>
<td>Safety orientation</td>
<td>.09**</td>
<td>.10*</td>
</tr>
<tr>
<td>The body dimension</td>
<td>.08**</td>
<td>.14**</td>
</tr>
<tr>
<td>Specific task skills</td>
<td>.12***</td>
<td>.22***</td>
</tr>
</tbody>
</table>

* = p <.05 ** = p <.01 *** = p <.001
CONCLUSIONS AND REFLECTION

The present study has provided new dimensions of driver skills related to ‘specific task skills’ and a dimension entitled ‘the body dimension’. The results have shown that there are significant associations between these two new dimensions and risk. The better the respondents perceived their driving ability to be, the lower was their level of risk. The youngest drivers and the less-experienced drivers were the most self-critical drivers in this study. This may indicate that young drivers have a realistic view into their own driving ability and that a parallel development of self-assessment of driving skills and actual driving skills takes place after licensing.

However, it is a possibility that young drivers with a self-critical view into their own driving skills are vulnerable for accidents; still of reasons related to their self-assessment. May be young drivers with the lowest level of self-assessment of their own ability disregard an appropriate regulation of the driving process and fake driving skills in social settings to avoid being perceived as unskilled drivers? If so, the problem might be present among the motivational aspects described in the GDE-framework. Consequently, the educational measure will be characterized by goals to enhance safety motivation, personal security, independence from others, trust in one-self and to reduce the vulnerability to expectations from peers.
REFERENCES


Spolander, K. (1983). Bilförarens uppfattning om egen körsäkerhet (Drivers’ assessment of their own driving ability) Report No. 252, Swedish Road & Traffic Research Institute, Linköping


Self-evaluation of driver competencies in Finland

Sami Mynttinen

Vehicle Administration (AKE)

Finnish driver training model

Finnish driver training has been divided into two phases. The first phase includes 20 theory lessons and 30 driving sessions. One driving session is 25 minutes, meaning the minimum driving practice the novice driver takes before the driver examination is roughly 15 hours. In average the amount of driving practice before licensing is 15.45 hours. The minimum driving sessions include two sessions on an artificial slippery track.

Driver training can be taken either in a driving school or with layman instructor. About 90 % of the novice drivers are choosing driving school.

After passing the driver examination (a theory test and a practical test) the novice driver gets a temporary licence, which is valid for two years. The second phase of driver training can be taken earliest half a year after licensing, latest two years from it. After the second phase the novice driver obtains the actual driving licence, which is valid until the driver turns 70 years.

Driver examination

Laapotti et al (1998) made an experiment which aimed at increasing driving test’s customer satisfaction by improving feedback. After a passed/failed conclusion the examiner did his part of the evaluation and prepared a structured feedback discussion. The candidate had already done his part of the evaluation before the test. Because of the good results the assessment elements have been applied to Finnish driving test procedure since the year 2000. Because of the added elements the driving test time was extended from 30 minutes to 45 minutes.
Therefore, before the driving test the candidate evaluates his driver competencies (subjective evaluation). After the driving test the examiner evaluates the same driver competencies (objective evaluation).

There are seven driver competencies to be evaluated: vehicle manoeuvring, showing consideration to pedestrians and cyclists, controlling traffic situations, advance planning, recognising and avoiding risks, social skills and economical driving. The evaluation scale is from one to five, one standing for poor and five for excellent.

A SELF EVALUATION STUDY

Data

In this study the data sample is 1470 B-class driving test candidates (first attempt). The data was collected from the southern province of Finland in September and October 2006.

Of all the candidates 981 passed the driving test at first attempt and 489 failed. There are 689 male and 781 female candidates. The mean age is 21.7 years. 56 % of the candidates are 18 years old. Of all the candidates 1317 obtained the driving instruction in a driving school. Average number of driving sessions before the driving test was 31.5.

Method

In the study candidates’ subjective evaluations were compared to examiners’ objective evaluations on seven driver competencies mentioned earlier.

There were three hypotheses:
1. Candidates overestimate their novice driver competencies
2. The results support the validity of the self-assessment procedure
3. Some interesting qualitative differences may be found between the grouping variables

There were used T-test to compare means and correlations to compare relations between the variables.
RESULTS

Hypothesis 1

The data was divided into two groups, passed and failed candidates on first attempt. Passed candidates give themselves better evaluations than driving examiners in all the other competencies but showing consideration to pedestrians and cyclists (candidates’ mean 3.4, examiners’ mean 3.5). In most of the competencies the difference between candidate and examiner evaluations is 0.1-0.2, examiners’ evaluation being lower. Only controlling traffic situations is evaluated just alike by both candidates and examiners.

Failed candidates overestimate all their driver competencies clearly when compared to examiner evaluations. The biggest differences are in recognising and avoiding risks (0.9) and controlling traffic situations (0.7). The subjective and objective evaluations are closest in the competence of showing consideration to pedestrians and cyclists (difference 0.4).

Hypothesis 2

There was computed a sum variable, sum of the seven competence variables. The difference between passed and failed candidates in examiner evaluations is very clear. The mean for failed is 19.0 and for passed 23.1. The trend of candidates’ self-evaluations is what was expected and the difference between passed and failed is very near to significant (t=-1.940, df=1455, p<.05). The mean for failed is 23.3 and for passed 23.7.

When looking only at the passed candidates, a strong positive correlation to the sum variable can be seen with all the examiner assessments (seven competencies). Candidate assessments’ correlations to the sum variable are weaker than examiner assessments’.

Hypothesis 3

Here we have examined closer only the passed candidates (N=981), grouping them by gender, age, driving experience and way of obtaining the driver training.

Male candidates’ driver competencies are better than female candidates’ according to the driving examiners (t=-3.64, df=931.61, p<.001). Also with self-evaluations the difference is alike. Male candidates assess themselves to be more competent than the female candidates assess themselves (t=-3.94, df=967.0, p<.001).
18 year old candidates have better driver competencies than older (19+) candidates according to the driving examiners ($t=-3.02, df=842, p<.01$). With the competence self-evaluations there is no significant difference between younger and older candidates (NS).

The group with minimum driving sessions taken before the driving test was assessed to have better competencies than the group that had driven more, when the examiner evaluations were looked at ($t=5.06, df=787, p<.001$). With the self-evaluations there was no significant difference between these groups (NS).

When grouping the candidates by the way of obtaining the driver training (driving school or layman instruction), no significant differences can be found, neither with examiner evaluations nor with candidates’ self-evaluations. The number of layman candidates was only 48 in the sample.

CONCLUSIONS
The first hypothesis related to candidates overestimating their driver competencies. This seems to be true, especially with those candidates who fail the driving test at first attempt. The only exception to overestimation is with passed candidates on how they show consideration to pedestrians and cyclists.

The second hypothesis asked whether the results support the validity of the self-assessment procedure. This seems to be given support by the results.

The third hypothesis suggested that some interesting qualitative differences may be found between the grouping variables. Significant differences were found, especially when grouping the candidates by gender.
Risk-concept applied in Finnish driver training and testing – Do we have a problem?

Marita Koivukoski
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INTRODUCTION
Risk in an important concept both in driver training and testing. If we want novice drivers to be safe drivers, we need them to learn to recognise and avoid various kinds of risks related to driving. Also the Goals for Driver Education matrix includes a column called “risk increasing factors”.

Risk recognition and avoidance is especially important in Finland, considering the amount of driving practice for novice drivers. Learner drivers practice driving average 15.75 hours before licensing. Well-developed risk awareness is needful for them while practising independently in traffic after licensing.

The question is, how driving instructors and driving examiners apply the meaning of “risk”? And even more importantly, how novice drivers learn to understand the meaning of “risk”?

An answer to the questions can be found by assessing systemically novice driver competencies. Here we have used three different assessment points. The first is subjective assessment by the novice driver himself just before the driving test, the second is objective assessment by the driving examiner just after the driving test and the third is subjective assessment by the novice driver himself after one year of driving experience.
Risk-concept

Before going into the data on those three assessment points the definition of risk-concept in the curriculum for driver training in category B and in the guidelines for assessing the driving test needs to be looked at.

The three main goals of the curriculum are safety, social interaction and ecology. Safety is the most important goal for driver education. One sub-goal under safety is for the novice driver to learn to know how to identify and avoid traffic risks or how to adapt his own driving to them.

The cornerstones of social interaction skills are taking others into consideration, anticipation and predictability of one’s own actions. The novice driver is also supposed to learn to recognise peer pressure and to know how to avoid the risks it causes.

Under the third main goal, ecology, the risk-concept is not mentioned at all. However, the novice driver needs to know how to identify and anticipate the development of traffic situations and to know how to plan driving routes and his own movements. Those subgoals under ecology are strongly linked with risk recognition and avoidance.

In the guidelines for assessing the driving test “recognising and avoiding risks” is one of the seven driver competencies that the driving examiners are assessing right after the driving test. Other six competencies are vehicle manoeuvring, control of traffic situations, showing consideration to pedestrians and cyclists, advance planning, economical driving and communication with other road users.

The risk recognising and avoidance –competence is defined as follows: The applicant must demonstrate that he can recognise and avoid various risks. The risks may, for example, be connected to the vehicle, control of the vehicle, control or flow or forward planning of traffic situations.

Candidates’ readiness as novice drivers

Driving examiners are assessing novice driver competencies, those seven mentioned above, promptly after the driving test. The numerical assessment is done only on the first attempt of the driving test. The assessment scale is from one to five, one standing for poor and five for excellent. The data goes back to year 2000. The N is 440 550.
When looking at the competence profile of novice drivers, risk recognition and avoidance is among the two weakest ones of all the competencies, no matter if the result of the test is pass or fail. With passed candidates only economical driving stays below risk recognition and avoidance. With failed candidates (on first attempt) the risk recognition and avoidance goes hand in hand with control of traffic situations. Those are the two lowest ones, and there is a clear gap to the other five, better obtained competencies.

With passed candidates the mean of risk recognition and avoidance – competence has stayed quite stable over the years, being around 3.3. With failed candidates the mean has been about 2.4 throughout the years.

When taking into account the age of the novice driver, risk recognition and avoidance – competence seems to be quite stable over the age. All the other competencies seem to be the lower the older the novice driver is. Especially vehicle manoeuvring skills seem to be decreasing quite rapidly over the age of the novice driver.

When looking at the competence profile of novice drivers grouped by the way of instruction, the two options being driving school and layman instruction, the novice drivers are doing about alike in the driving test on risk recognition and avoidance, not depending on the way of teaching. The mean for driving school candidates is 3.21 and for layman candidates 3.27 when taking into account all the passed tests since year 2000. However, professional driving school instructors seem to have success in teaching how to show consideration to pedestrians and cyclists. The mean for their learner drivers is 3.59 for that competence, being the best one, whereas the best competence for those learner drivers trained by a layman instructor is vehicle manoeuvring (3.82).

When looking at the competence correlations, risk recognition and avoidance has the strongest correlation with control of traffic situations (.471). Correlation with communication with other road users – competence is almost as strong (.440). With showing consideration to pedestrians and cyclists the correlation is only .368.
Candidates’ self-evaluated readiness

Candidates’ are assessing their own readiness as novice drivers just before the driving test on the same competencies as the driving examiners right after the test. The examiner is using the candidate’s subjective evaluation in the feedback discussion alongside with his objective evaluation.

Normally only the examiner evaluations are saved on the data base, but in this context we have looked at about thousand candidates’ self-evaluations from the southern province of Finland from autumn 2006. They have all passed the test on first attempt.

The candidates are over assessing themselves in all the other competencies except showing consideration to pedestrians and cyclists when compared to the evaluations done by the driving examiners. With risk recognition and avoidance the mean for candidates’ subjective evaluation is 3.38 when the mean for the objective evaluation by examiners is 3.23.

Candidates’ subjective evaluation of usefulness of driving instruction

AKE is mailing a questionnaire to 8000 novice drivers each year. Almost half of them are returned. The survey has been in use since year 2000. The questionnaire is sent one year after the novice driver has obtained the licence. They are asked among other things the amount of their traffic offences and accidents and the amount of driving they have done during the first year of their driving career.

One question applies to the usefulness of driver training they have obtained from a driving school or by layman instruction. The question is divided into nine themes: vehicle manoeuvring, driving in built-up areas, driving on motorways, driving independently, driving in difficult conditions, economical driving, self-control, recognising and avoiding risks and social skills.

Economical driving and driving in difficult conditions are the two themes in driver training that get the weakest evaluations when the usefulness of them is looked at. However, their mean has stayed between 3.3 and 3.5, when the scale is from one to five, one standing for poor and five for excellent. Recognising and avoiding risks is evaluated to be quite useful, the mean has been around four throughout the years. It is just above the mean of all the themes.
DISCUSSION

Risk recognition and avoidance is an important skill for novice drivers. However, it is among the two weakest competencies when the competence profile of novice drivers is reviewed. Novice drivers tend to overestimate their risk recognition and avoidance skill when compared to the objective evaluation by driving examiners. Furthermore, the novice drivers find the driver training on risk recognition and avoidance quite useful.

When looking at all the seven competencies, risk recognition and avoidance correlate with control of traffic situations, but not with showing consideration to pedestrians and cyclists. The latter is evaluated to be the best competence of novice drivers. Why is showing consideration to pedestrians and cyclists rated high by the examiners, but recognising and avoiding risks low?

The risk-concept itself might be too abstract and even too difficult both in the driver training curriculum and in the guidelines for assessing the driving test. The concept needs to be reviewed, analysed and defined in more details.

There seems to be a need for a research. In addition to the facts and ideas mentioned above it would also be of good value to find out how the examiner rating of risk recognition and avoidance competence is able to predict the future driving career of the novice driver in question, e.g. traffic offences and accidents.
The aim of this presentation was to describe how a changed test model, which was used during six months at three test centres, worked and how it influenced the test-takers’ test results. The new test model was built upon the new curriculum for the category B driving-license test, valid from 2006-03-01.

The old curriculum (VVFS1996:168) is very detailed, i.e. it contains 278 objectives for theoretic knowledge and 268 for practical (i.e. driving) ability. The new curriculum (VVFS2004:110) is goal-oriented, hence it only contains 50 objectives and the theoretical and practical objectives are integrated with each other. The new curriculum is based on the GDE model (Hatakka, Keskinen, Gregersen, Glad, & Hernetkoski, 2002), although it contains two dimensions rather than three, see Figure 1.

<table>
<thead>
<tr>
<th>Theory and skills</th>
<th>Self-appraisal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal circumstances and goals in life</td>
<td>1</td>
</tr>
<tr>
<td>Traveling by car under special conditions</td>
<td>2</td>
</tr>
<tr>
<td>Driving in different traffic Environments</td>
<td>3</td>
</tr>
<tr>
<td>Maneuvering, vehicles and the environment</td>
<td>4</td>
</tr>
</tbody>
</table>

Figure 1. Model of the curriculum for category B.
Areas 2-4 are measured in the old driving-license test. Areas 3-4 and 7-8 are measured in a satisfactory way in the new test model and areas 1-2 are to a certain extent measured in the new test model.

Both the old and the new theory test are computerized and have 65 items. The old theory test contained the following five content areas: vehicle knowledge, traffic regulations, limitations of driver’s abilities, risky situations in traffic and application of special regulations. The practical test is performed with the help of a test examiner who assess the test-takers’ behaviour in a number of traffic situations with respect to some competences. In the old practical test the following competences were of interest; manoeuvring, speed, placement, traffic behaviour and attention. In the new (integrated) driving-license test the following content areas are tested in both the theory and practical tests vehicle knowledge/manoeuvring (7), environmental driving (5), traffic safety (16), traffic regulations (32), and personal circumstances and goals in life (5). The numbers in parenthesis are the number of items in this content area in the theory test. It is important that all the objectives in the curriculum are measured in the test in a suitable way. A new test model was developed, in which the content in both the theory and practical test was revised. For the practical test, a new driving-test form was developed. The new test model was also integrated in time; i.e. both tests should be booked at the same time, and if a test-taker fails either of the tests the test which the test-taker had passed was only valid two months. In other words, the driving test was performed regardless of the result on the theory test. In order to make the test takers reflect upon their actions, questions related to the traffic situations they were in were given during the practical test. Together with these changes self-assessment was also performed (see Sundström’s presentation). These changes together with the new content area “environmental driving” are in line with the GDE framework.

The new test model was tested during six months on three (out of 32) test centres. The aim was to examine the use of the GDE model. Further to examine if higher pass-rates could be achieved and if it was possible to stimulate higher quality in driver education. After the try-out of the new model an evaluation was performed using the design shown in Figure 2. This design was used since we wanted to compare the results from the new test model with the results from the old test model as well as the results within the changed theory and practical test within the new test model.
DISCUSSION

The evaluation showed that the pass-rate of the theory test was 69% with the new test model compared with 49% using the old test model. Results concerning the pass-rate of the practical test showed that 70% passed with the new test model compared with 62% with the old test model. The relationship between the theory and practical test was stronger in the new test model compared with previous studies. Driving school students outperformed privately educated drivers on both tests. Women performed better than men on the theory test, but no gender difference was evident on the driving test. Overall, the test-takers performed better, i.e. achieved higher pass-rates. Another conclusion from this study was that it is possible to implement the GDE model by e.g. using the questions related to traffic situations and the new area environmental driving. As for higher levels of the GDE model it is probably more suitable to implement those by means of mandatory education.
REFERENCES


New curricula and driver license tests in driver education in Sweden

Hans Mattsson
Swedish Road Administration

A new curriculum, developed on the basis of the GDE-matrix, was coming into force 1st of March 2007. The aims and objectives of driver education were formulated in overall general terms, where theoretical and practical objectives were not separated. This curriculum had the format of a formal regulation by Swedish Road Administration (VVFS 2006:26). Added to that a specification was launched where there principles behind, the content and different levels of knowledge, insight and achievement was described more in detail.

For the test purposes, these documents were closely investigated and elaborated to find a good mix of examination tools. This work pointed to three types of tests to cover the large part of the learning objectives stated in the curriculum.

1. A knowledge test
2. A driving test
3. A self-evaluation test

Implementation of new driving licence tests

Initially a lot of work was done in defining and specifying the learning objectives, specifying aims for implementation sub-projects, planning additional development of the testing system etc. for the different kinds of tests proposed.

Development and transformation into a new knowledge test was handled separately. A fairly large scale trial was conducted that might be called the “Test model project”, involving new test types and test formats as well as new administrative routines in order to integrate the different parts of driver training and testing more efficiently. This research project can be described as containing three parts:
1. A new driving test (modelling, trials)
2. New administrative routines (modelling full system, booking, electronic protocol, regulations, trials)
3. Self evaluation test (model building, trials)

The conclusion from that project was that further work should in the first hand focus on the development of the new driving (because the curriculum already changed must be reflected in the driving test as well. Another conclusion was that only the administrative changes that are necessary to handle the new test should be considered. A conclusion was also that the new model of test system and the new self evaluation test should be taken care of later on. A lot of other changes in the licence register, automatic information routines as well as further training of the staff in handling these new features need quite some time.

The elaboration of the curriculum for testing purposes ended up in five main areas of competence:

- Knowledge about the vehicle/manoeuvring
- Environment/Low fuel consumption
- Highway Code/Application in practice
- Traffic safety/Behaviour
- Personal circumstances

The specifications of those objectives have been discussed more in detail with the training industry.

All five areas are more or less covered in the theoretical knowledge test, and later on probably in the self evaluation test as well. In the driving test only the first four are assessed in some way or the other.

**Knowledge test**

The theory test contains 65 items of which almost half of them will relate to the “highway code” and the interpretation of it. Half of the other items will be directed towards “traffic safety”. The last quarter of the items are directed towards “environment” and “personal circumstances”. Items relating to the higher levels of the GDE-matrix will mainly belong to “environment”, “traffic safety/behaviour” and “personal circumstances”.

52
To pass the test 52 items in total (80%) needs to be correct. The items are multiple choice questions (one correct alternative) with 2-6 alternatives to choose from. Test time is 50 minutes. This test was introduced the 4th of September 2006.

**Driving test**

The four competence areas, mentioned earlier, are assessed in different traffic environments and in different traffic situations. The driving time (30 – 40 minutes) should approximately be spent as follows: 10% for manoeuvring exercises, 30% on city streets, 60% on other roads.

Confirmative questions, related to the driving situation, may be used when needed to clarify the reasons for certain actions or decisions. A supportive test manual, “Test Key” will be developed, with criteria on what to judge, illustrations etc. An "Electronic protocol” with a digital pen will be introduced at the same time. The new test will be launched the 3rd of December 2007.

**Self evaluation and an integrated test model**

New models for test administration and the introduction of a specific self evaluation test will be launched after further development of the instruments as well as of the administrative procedures.
References


http://www.vv.se/templates/page31228.aspx
Alignment between curriculum and test in the Swedish driver education

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Umeå University

INTRODUCTION

A new curriculum for the Swedish driver education was introduced in March 2006 and in September 2006 a new theory driving licence test was introduced. The Swedish driver education system is criterion referenced. This means that the curriculum for the driver education regulates both the education and the driving licence test. Underlying this kind of system is the assumption that the knowledge and skills measured in the tests will be consistent with the knowledge and skills specified in the curriculum. The degree to which expectations and assessment are in agreement and serve in conjunction with one another is defined as alignment by Webb (2002). The notion of alignment has recently become one of the most important principles of education reform. Measuring alignment can be helpful when evaluating education, especially as it is important to have accurate information about what the tests measure (Koretz, 2006). The aim of this paper was to describe how alignment between the curriculum for the Swedish driver education and driving licence test can be examined.

Common aspects of alignment are content, cognitive complexity, balance and range (Rothman, Slattery, Vranek, & Resnick, 2002; Webb, 1997). The first aspect, content, handles the degree of match between the content in curriculum and test. Cognitive complexity attends what kind of cognitive demand that is expected. Do the objectives match the items when it comes to cognitive level? Within the aspect of range distribution of objectives in the curriculum is compared with that of items in the test. The last aspect of alignment, balance, appears when the objective and items are equally emphasized, or in other words the weight given to particular skills or knowledge in the curriculum correspond with the test.
Bhola, Impara and Buckendahl (2003) has divided methods for measuring alignment into three groups: low, moderate and high complexity models. Low complexity models focus on the content aspect of alignment, the degree of agreement between the content specified by an objective and the content measured by an item. Moderate complexity models do not only consider the content aspect but also the cognitive complexity of the items and the objectives. High complexity models consider both content and cognitive complexity, but they also address one or several more dimensions like, for example, the weight given to a particular skill or knowledge in curriculum and test.

To be able to study the alignment between curricula and tests a tool for analysing objectives and assessment items is required. One such a tool is for example Bloom’s revised taxonomy (Anderson et al., 2001). Bloom’s revised taxonomy consists of two dimensions, a cognitive dimension and a knowledge dimension. The cognitive dimension describes six levels of cognitive processes and the knowledge dimension describes four different categories of knowledge (Figure 1).

An empirical test of Bloom’s revised taxonomy was conducted to find out if the model can be considered reliable and relevant to use as a tool to describe the content in the old and the new curriculum of the Swedish driver education (Stenlund, 2006). The results of an inter-rater reliability study showed a good to excellent reliability. The study also showed that the model is useful, all objectives could be classified, and the model could also give a clear and varying picture of the content in both the old and the new curriculum.
<table>
<thead>
<tr>
<th>Knowledge Dimension</th>
<th>Cognitive Dimension</th>
<th>Remember</th>
<th>Understand</th>
<th>Apply</th>
<th>Analyze</th>
<th>Evaluate</th>
<th>Create</th>
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<tbody>
<tr>
<td>Factual Knowledge</td>
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<td>Conceptual Knowledge</td>
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<tr>
<td>Procedural Knowledge</td>
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<td>Metacognitive Knowledge</td>
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</table>

Figure 1. Blooms revised taxonomy.

With the help of Blooms revised taxonomy it is possible to measure alignment in all four aspects – content, cognitive complexity, balance and range – hence a high complexity model according to Bhola et al. (2003). The aspect of content is represented by the knowledge dimension in the taxonomy and the aspect of cognitive complexity is represented by the cognitive dimension. A measure of the alignment-aspect balance can be obtained by matching the number of objectives in the cells with the number of items. Range is an estimation of how the objectives are distributed in the different cells in the taxonomy as compared with the items.

A study in progress

In an ongoing study the purpose is to examine the degree of alignment between the theoretical objectives in the old curriculum and the old theory driving licence test for the Swedish driver education. As well as to study the degree of alignment between the theoretical objectives in the new curriculum and the new theory driving licence test. Subsequently, the intention also is to compare the degree of alignment of the old curriculum and test as well as of the new curriculum and test. This will be done, and has been done in part, with Blooms revised taxonomy as a tool.
The old curriculum (VVFS1996:168) contained a large number of objectives and these were exceedingly specified. It consisted of nine different areas and was divided in two parts, one theoretical and one practical. The theoretical part contained five areas and 247 objectives (Table 1). The old theory driving licence test contained 65 items and these were divided in the same areas as the theoretical part of the curriculum (Table 1).

Table 1. The distribution of the objectives in the theoretical part of the old curriculum and the distribution of the items in the old theory test.

<table>
<thead>
<tr>
<th>Theory</th>
<th>Objectives</th>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Vehicle-related knowledge</td>
<td>43</td>
<td>5</td>
</tr>
<tr>
<td>3. Traffic regulations</td>
<td>84</td>
<td>33-35</td>
</tr>
<tr>
<td>5. Risky situations in traffic</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>7. Limitations of driver abilities</td>
<td>41</td>
<td>6</td>
</tr>
<tr>
<td>9. Special applications and other regulations</td>
<td>71</td>
<td>13-15</td>
</tr>
<tr>
<td></td>
<td>247</td>
<td>65</td>
</tr>
</tbody>
</table>

The new curriculum (VVFS2004:110) is integrated, thus it no longer consists of two parts. There are only 50 objectives and these are very general. The new curriculum is built on the GDE-model (Hatakka, Keski-nen, Gregersen, Glad, & Herneckoski, 2002) and as a result of that new areas of knowledge, for example self-evaluation, have been added (Table 2). The new theory driving licence test contains 65 items and these are divided into five different areas adjusted to the new curriculum (Table 3).
Table 2. The distribution of the objectives in the new curriculum and the distribution of the items in the new theory test in the five different content areas.

<table>
<thead>
<tr>
<th>Contents</th>
<th>Knowledge domain</th>
<th>Theory test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory and skills</td>
<td>Self-evaluation</td>
</tr>
<tr>
<td>Manoeuvring, vehicles and the environment</td>
<td>18</td>
<td>3</td>
</tr>
<tr>
<td>Driving in different traffic environments</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Travelling by car under special conditions</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Personal circumstances and goals in life</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>10</td>
</tr>
</tbody>
</table>

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MAIN RESULTS

The objectives in the old and the new curricula and the items in the old and new theory test has been classified with Blooms revised taxonomy as a tool and the results from the classification is shown in Table 3 and 4. (Because no objectives were classified in the cognitive level create this level has been removed from the presentation of the results.) Table 3 describes the results from the classification of the objectives in the old curriculum and the items in the old theory test and Table 4 describes the result from the classification of the objectives in the new curriculum and the items in the new theory test.

Table 3. The result of the classification of the objectives in the old curriculum (printed in extra bold type) and the items in the old theory test (printed in italics) for the Swedish driver education.

<table>
<thead>
<tr>
<th>The cognitive dimension</th>
<th>The knowledge dimension</th>
<th>Remember</th>
<th>Understand</th>
<th>Apply</th>
<th>Analyze</th>
<th>Evaluate</th>
<th>Sum %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factual knowledge</td>
<td></td>
<td>43.9</td>
<td>30.8</td>
<td>4.0</td>
<td>3.1</td>
<td>1.4</td>
<td>6.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.7</td>
<td>0.7</td>
<td>50.7</td>
<td>40.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conceptual knowledge</td>
<td></td>
<td>20.1</td>
<td>20.0</td>
<td>6.5</td>
<td>12.3</td>
<td>0.4</td>
<td>15.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.2</td>
<td>1.5</td>
<td>1.4</td>
<td>30.6</td>
<td>49.2</td>
<td></td>
</tr>
<tr>
<td>Procedural knowledge</td>
<td></td>
<td>12.6</td>
<td>4.6</td>
<td>1.1</td>
<td>3.2</td>
<td>6.1</td>
<td>17.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.4</td>
<td>17.3</td>
<td>10.8</td>
<td>0.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metacognitive knowledge</td>
<td></td>
<td>0.7</td>
<td>0.7</td>
<td></td>
<td></td>
<td></td>
<td>1.4</td>
</tr>
<tr>
<td>Sum %</td>
<td></td>
<td>77.3</td>
<td>55.4</td>
<td>12.3</td>
<td>15.4</td>
<td>5.0</td>
<td>27.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.3</td>
<td>1.5</td>
<td></td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>
Table 4. The objectives in the new curriculum (printed in extra bold type) and the items in the new theory test (printed in italics) for the Swedish driver education.

<table>
<thead>
<tr>
<th>The cognitive dimension</th>
<th>Remember</th>
<th>Understand</th>
<th>Apply</th>
<th>Analyze</th>
<th>Evaluate</th>
<th>Sum %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factual knowledge</td>
<td>19.6</td>
<td>27.7</td>
<td>3.1</td>
<td>6.1</td>
<td></td>
<td>19.6</td>
</tr>
<tr>
<td>Conceptual knowledge</td>
<td>32.6</td>
<td>23.1</td>
<td>10.8</td>
<td>16.5</td>
<td>4.3</td>
<td>47.8</td>
</tr>
<tr>
<td>Procedural knowledge</td>
<td>4.3</td>
<td>4.6</td>
<td>4.3</td>
<td>6.1</td>
<td>21.7</td>
<td>23.9</td>
</tr>
<tr>
<td>Metacognitive knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.2</td>
<td>21.7</td>
</tr>
<tr>
<td>Sum %</td>
<td>56.5</td>
<td>55.4</td>
<td>13.9</td>
<td>13.9</td>
<td>26.1</td>
<td>100</td>
</tr>
</tbody>
</table>

REFLECTIONS

As this is a study in progress and the results of the classification have not yet been properly analyzed or calculated no assumptions can be made from the results in this stage.

The next step in this study is to examine and measure the degree of alignment between the curriculum and the theory driving licence test with the help of the four alignment aspects, content, cognitive complexity, range and balance.
REFERENCES


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Repeated test taking for the Swedish theory driving-license test

Hans Mattsson & Widar Henriksson

Swedish Road Administration
Department of Educational Measurement, Umeå University

BACKGROUND

Driver education in Sweden is related to a curriculum that is stated by the Swedish Road Administration (VVFS 2006:26). To determine if a certain individual has gained enough knowledge and competence according to the curriculum, a driving test is administered. The Swedish driving licence test consists of a theory test and a driving test. The Theory Driving Licence Test (TDL-test) consists of 65 items. It is administered by computer and the item format is multiple-choice. The number of alternatives for each item varies between 2 and 6. The test taker has to pass the TDL-test before taking the practical test. The test taker can repeat the test as many times as he/she wants until passing and repeated test taking can be applied for immediately after failing, for example the next day.

The overall summary of repeated test taking indicates that about 50 percent of all tests are taken by repeaters. There are also more repeaters (about 72%) when the test is in languages other than Swedish.

The model for selection that is used in this study for studying the effects of repeated test taking for the TDL-test. Selection of tests was done in three steps: The first step was to only use tests in Swedish. The second step was to select all test takers who did their first trial in August 2006 were selected (N=9,589). The third step was to divide this population into four groups, i.e., those with only one test score (N=7,107), those with two (N=1,235), three (N=635) and four test scores (N=610). The time period for selection from the data bank of test results that is collected by the Swedish Road Administration was about seven months.
The model for description of the effects of repeated test taking that was used in this study is based on pair-wise comparisons of obtained scores for those test takers who have repeated the test once, twice, or three times respectively. This means that for a test taker who has repeated the test once, the second test score is compared with the first. For a test taker who has repeated the test twice, the better of the two first scores is compared with the test score obtained on the third test occasion. And, finally, for a test taker who has repeated the test three times the best of the first three scores is compared with the obtained test score at the forth test occasion. This shows the gain or loss in test scores in relation to the best previous attempt (new personal record or not).

MAIN RESULTS

When relating repeated test taking to the background variables sex, age and education certain tendencies appear. There is a slight tendency that male test takers repeat the TDL-test more often than female test takers. There are, on the whole, no differences between different age categories (18, 19-24, 25-) but there is a difference with reference to education. Education is classified as “Driving school” or “Private” and the difference implies that test takers that are classified Private repeat the TDL-test more often than test takers who are classified Driving school.

Another finding is that repeated test taking is related to initial score on the first test occasion. There is a clear relation between willingness to repeat and initial score. This means that those test takers who has taken the TDL four times, i.e. repeated the test three times, had the lowest score on the first test occasion compared with the others. It also means that those who had taken the test three times had the second lowest test score as first result, followed by those test takers who had repeated the test twice.

When focusing on differences in score for the individual test taker another finding is that there is a great variety in obtained scores as a function of repeated test taking. This means for example that one test taker who had repeated the test three times (four test scores) obtained a score that was nine points lower on the fourth test occasion than the best of the three earlier test results. It also means that another test taker, with exactly the same test experience, obtained a score that was 12 points higher, i.e. 12 points higher than the best result of the three earlier test results.
Still another finding is that the effects of repeated test taking can be described as following the law of diminishing returns. This means that the increase in score, as a function of repeated test taking, is reduced when the number of repeated test is increases. The increase in mean was $M_1=4.07$, $M_2=2.23$, $M_3=1.11$ respectively for test takers who previously had taken 1, 2 and 3 TDL-tests.

CONCLUSIONS

One conclusion is that the willingness to repeat is related to the test takers ambition to reach the criterion for passing the TDL-test. Another conclusion is that low initial scores are strongly related to repeated test taking and still another conclusion is that low initial scores may indicate poor preparation for the TDL-test.

The motivation to repeat the test taking might be quite different in this kind of criterion referenced test, compared to a norm referenced test, for example the SweSAT that is used for selection to higher education in Sweden. For the SweSAT there is, in many cases, a desire for even higher scores also for test takers with a rather high initial score (Henriksson, 1995; Törnkvist & Henriksson, 2006). Scores from norm referenced tests are often used for “competitive” purposes. In the TDL-test the criterion for passing the test is the ultimate goal. No further testing is possible.

This means that the reasons for repeating the test are a result of test system as such and of the possible gain the test taker may see (Henriksson & Törnkvist, 2002). If it does not pay to make more of an effort than what is required to meet the minimum standard this might affect how students prepare for the test. It would be of great interest to find out what mechanisms affect testing patterns and test results under different circumstances.
REFERENCES

http://www.vv.se/templates/page31228.aspx


Analysis of traffic safety activities of an education organization

Mika Hatakka

Central organization for Traffic Safety in Finland

INTRODUCTION

GDE-framework has recently become an important tool in developing and evaluating driver training activities in European countries. In this paper I try to analyse Liikenneturva’s actions in traffic safety according to the framework. Liikenneturva is an organization responsible for developing and providing traffic educational methods and models, arranging safety campaigns, serving media and by other ways improving road-users knowledge, skills and attitudes as well as maintaining safety as an important criterium in local communities’ and state’s decision making.

I do not describe the GDE framework in detail here. It is based on Keskinen’s four-level model on driver/road-user behaviour. The model starts from mastery of vehicle manoeuvring and reaches the person’s life goals and skills. The lowest three levels are directly associated with driving task, the third being already in close connection with motivational aspects affecting also the lower levels. The fourth level describes personal attributes that guide person’s decisions in everyday situations. Traffic psychological research has shown a clear connection between e.g. personal impulsiveness and interest of cars and driving as a mean for self-enhancement. Thus, these aspects are reflected in practical choices the person makes in traffic.
<table>
<thead>
<tr>
<th>Goals for life, skills for living</th>
<th>Knowledge and skill</th>
<th>Risk increasing aspects</th>
<th>Self-assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lifestyle, age, group norms, motives, self-control, values</td>
<td>Sensation seeking, Group norms, Complying to peer pressure</td>
<td>Risky tendencies, Own preconditions, Impulse control</td>
</tr>
<tr>
<td>Goals and context of driving</td>
<td>Modal choice, Choice of time, Trip goals, Social pressure</td>
<td>Alcohol, fatigue, Purpose of driving, Rush hours, Competing</td>
<td>Planning skills, Typical goals, Typical risky motives</td>
</tr>
<tr>
<td>Traffic situations</td>
<td>Traffic rules, Observation, Driving path, Communication</td>
<td>Disobeying rules, Information overload, Unsuitable speed</td>
<td>Awareness of personal strengths and weaknesses</td>
</tr>
<tr>
<td>Vehicle manouvring</td>
<td>Control of direction, position, Tyre grip, Physical laws</td>
<td>Unsuitable speed, Insufficient automatism, Difficult conditions</td>
<td>Calibration and awareness of car-control skill</td>
</tr>
</tbody>
</table>

Figure 1. The GDE-framework (Hatakka, Keskinen, Glad, Gregersen, Hernetkoski, 2002).

Where can traffic education organization’s work be located in the framework?

I start with the easy ones. A traditional field of Liikenneturva’s work is training road-users by arranging courses for drivers and riders. Nowadays Liikenneturva is not that much arranging courses for road-users but developing training methods and training trainers. Liikenneturva’s basic idea in training is not to make drivers more skilful, but to increase their risk-awareness. This is done by easy exercises showing the effect of speed, demonstrations and analysing risky situations. Keep your options open (Lämna Spelrum) training model can easily be located in the two lowest levels with a clear emphasis on risk-increasing factors with some elements on self assessment. The mastery of driving task as a whole is referred in classroom lessons. Such aspects as fatigue, planning time table for trip etc are included. However the general emphasis on avoiding risk traffic situations at hands. GDE-model gives some ideas for further development. Especially in training for truck drivers, mastery of the driving task becomes essential. Other examples of same kind are)
- Actions for pedestrians and bicyclists (leaflets, campaigns for use of helmets and pedestrian reflectors)
- Mopedist guide (Lämna Spelrum)
- Motorcycle guide and courses (Lämna Spelrum)
- Course for truck drivers (Lämna Spelrum)

Liikenneturva has recently developed a self-evaluation guide for elderly drivers. In this material the emphasis is clearly on self-assessment. The idea is to help elderly drivers to be more aware of their strengths and weaknesses and to urge to adapt driving task accordingly. This material is clearly referring to all four levels as well as the three columns of the framework.

The analysis of traffic safety campaigns (Drink-driving, use of safety devices, speeding) from the perspective of the GDE-framework is rather straightforward. Typically campaigns are directed against risky behaviour models and connected with the preparation of the trip. There is also a set of campaigns emphasising risks of some more detailed traffic situations, such as wintertime driving or red-light-running. Campaigning seems to be a method with large possibilities for covering different levels of the framework and the target can be set rather accurately.

There are however activities in Liikenneturva’s work, that are not as easily put in the framework as the ones above. Such activities as actions with the media, traffic safety plan for schools, guide “Safely to hobbies”, improving the quality of traffic safety planning in communities or writing an expert statement on a planned new law have clearly a target out of the scope of the framework. However, the final aim may be on affecting road-user behaviour, but the effect is strived from not affecting the road-user him/herself, but via the society and it is structures as well as via affecting the physical and social life-context. For example traffic safety campaigns often strive for greater concern for safety issues in general, or a specific campaign against drink-driving emphasises the seriousness of the problem generally.
Later development of the four-level model on driver behaviour

Keskinen and his group have recently widened the perspective of the four level model to include also factors clearly independent from a single road-user but nevertheless, affecting on him or her. These factors are the general physical and social life-context and culture and norms in society. The culture of society is reflected e.g. in traffic legislation and efforts in traffic surveillance.

<table>
<thead>
<tr>
<th>Society</th>
<th>- Norms, legislation, culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life context/surroundings</td>
<td>- Physical, Social</td>
</tr>
<tr>
<td>Goals for life and skills for living</td>
<td>- The importance of cars and driving to personal development</td>
</tr>
<tr>
<td>Goals and context of driving</td>
<td>- Purpose of driving, environment, company, social</td>
</tr>
<tr>
<td>Mastery of traffic situations</td>
<td>- Adjustment to demands of traffic situations</td>
</tr>
<tr>
<td>Vehicle maneuvering</td>
<td>- Control of speed, direction and position</td>
</tr>
</tbody>
</table>

Figure 2. Keskinen’s extended model.

In this perspective the activities of a traffic safety organization can be divided in different levels of the framework according to the goals. Part of the work concerns improving directly the behaviour of road users by improving skills and knowledge or trying to affect opinions or attitudes. These refer to the four lower levels, and the means vary from courses to campaigning.

Improving the decisions of those who are responsible for our environment has become an essential part of Liikenneturva’s work. A lot of effort is put on work in communities to make safety of e.g. elderly pedestrians
to play a bigger role in planning. Also a planning tool for traffic safety in schools aims partly to integrate improvement and maintenance of safe environment and logistic solutions as a part of general school routines. Work of this kind aims at changes in physical environment that is guiding our everyday transportation needs and also safety.

In my opinion, the most important (however, most demanding) goal of our work is to make safety as a big issue in the society. Creating and maintaining a safety positive culture is done by finding means to interact with authorities and political institutions. Offering expert knowledge and also creating pressure by e.g. media are typical tools of our organization. This is done partly by direct interaction with decision makers, but also by doing traditional traffic safety work among citizens. By increasing road-users risk awareness political decision making concerning e.g. automatic traffic surveillance or alco-lock will be easier. The process of giving emphasis on safety progresses both top-down and bottom up. Work is needed in all levels of the “hierarchy”.
The teaching methods in traffic instruction – preparatory ideas for dissertation

Antero Lammi

University of Turku

The research task
The subject of my future dissertation is "The teaching methods in traffic instruction". Aim is to describe and evaluate the methods that the traffic instructors consider effective at different levels of driving behaviour. Teaching methods will also be analyzed using the ideas of GDE-matrix as a theoretical frame. The results will give information about what levels of driving behaviour are reached and how and what kind of possible problems there are.

Participants
The study will be conducted to the traffic instructors of Finland and possibly to another country. The participants will be traffic instructors working in driving schools and similar institutions. The amount of participants will be several hundreds.

Data collection methods
The primary data collection will be prepared with interviews to test the research questions and to plan the main data collection.

The main data collection will be done via a paper with open questions. The traffic instructors are asked to describe their most effective teaching methods. The idea is to focus on those teaching methods that the traffic instructors consider effective. The instructor’s choice is to decide what the ones worth describing are. The paper will contain assisting questions about the goals and aspects of learning.
Data analysis

The data will be descriptions of various teaching methods. That will be one of the goals of the research. The descriptions will be categorized and attention is focused to these main ideas: 1) what is taught, 2) how it is taught, 3) what makes the method effective, 4) what kind of elements does the method contain and 5) how the method is related to the ideas presented at the GDE-matrix.

The results

The study will give information about what kind of teaching methods are used in different levels of driver behaviour and what kind of personal specialties the instructors have developed to teach different subjects. The results will also give a possibility to get an overview to traffic instructors’ concepts of learning to cope in traffic. Results will also indicate what levels of driver behaviour the teachers feel that they have good methods for instruction and what levels need training and new ideas.
Nord-Trøndelag University College has 4500 students and 500 graduating students every year. The University College is organized into four faculties situated in the towns of Namsos, Steinkjer, Levanger and Stjørdal in Nord-Trøndelag County, Norway. The central administration office is located in Steinkjer. The distance between the outer faculties – that is Namsos in the north to Stjørdal in the south – is approximately 170 Norwegian kilometres.

Upgrading Driving Instructor Training in Norway

The Norwegian Training School for Driving Instructors has a long tradition and was established in 1973 by The Norwegian Parliament, and located in the smaller town Stjørdal outside Trondheim.

The Norwegian Training School was until 2003 organized as an upper secondary school as a one-year program. From 2003 the Driving Instructor Training in Norway was upgraded to a higher educational level. It was established as a two-year programme at Nord-Trøndelag University College from 1st January 2004. The education is given on behalf of the Ministry of Education and Research, and is financed by central government funds.

The upgrading is meant to be a contribution towards the further development of a culture of safety in line with the authorities’ goal for zero serious injuries or deaths on the roads (The Vision zero™).

Milestones

- 1-year programme from 1973
- 2-year programme from August 1st 2003
Government’s policy ("Vision zero"):  
- Improve road safety  
- Limit environmental problems

We are actually quite ‘young’ in the University College-system. 84 driving instructors graduate every year, it has increased from 72 students, and the aim is to graduate 100 instructors a year.

**Basic training programme:**

Our basic training programme is to educate driving instructors. But some time in the future we will have a bachelor- and a master programme. The bachelor is not far away. The master is a bit further away.

**These are our advanced training programmes:**

- Upgrading for driving instructors having 1 year training. 60 credits  
- Driving Instructors for Heavy Goods Vehicle. 30 credits  
- Driving Instructors and Traffic Engineers for transportation of dangerous goods (ADR). 1 and 2 weeks  
- Management of Driving Schools. 30 credits  
- Cross-cultural communication. 15 Credits  
- Driving instructors for motorcycles. 15 credits  
- Load-securing course. 6 credits  
- Evaluating practical competences. 30 credits

**Basic training programme**

There are 156 full time students in our Driving Instructor programme for License B. The degree is University College graduate.

Contents in a 2-years programme: (120 credits)  
1. Practice (30 credits)  
2. Educational theory/Vocational didactics (30 credits)  
3. Traffic in society (10 credits)  
4. Traffic and psychology (10 credits)  
5. Traffic and law (10 credits)  
6. Technical subjects (10 credits)  
7. Candidate thesis (15 credits)  
8. ICT in teaching (5 credits)
Driving instructors learn about the interaction between man, vehicle, traffic and environment. They are developing their own driving skills and commentary driving. Students will learn educational principles, planning, teaching and teaching assessment. Lectures in pedagogic and teaching methods constitute the theoretical basis of the course. Some times theory is thoroughly gone through in advance, and some times it is the other way around: practical training first, then lessons in the classroom.

Our students do have a license B, some of them also drive motorcycles, trucks and buses. They have had their license B for at least 3 years. We have students with a wide spread in age (21-50 years old), prior education, previous work experience and at last but not least: different motivation and reason to become a driving instructor.

Competences
Through the course the students will develop professional competence, educational competence, social competence, professional ethics competence and competence of change and development.

How do we work on these competences? Are we using the same principles as: "Goals for driving education" (GDE) to educate instructors? Are we good at teaching our students to be self-aware, as we expect them to help their learner-drivers to be self-aware? And if we do, how do we do it?

Driving instructor training
Practical training is obligatory and occurs one day a week, in the car or in a classroom. Students are either training their own skills as teachers or drivers, experimenting on other students how to teach, or teaching real learner-drivers. In the afternoon they practise theoretical-education with real learner-drivers. During this process the supervisor communicates with the student, both in advance and after the lesson, sometimes also during lesson. The point is to find out what the student is going to do; what, why, when and how. There is also half a day road-methodology in the classroom, this is also obligatory.
Driving skills, commentary driving and teaching skills

Our approach is to focus on knowledge, skills, attitude and the will to act upon this. All theoretical subjects in the programme are important, and it is necessary to integrate them into practise. We are helping students to be aware of risk-increasing factors, but to reach them we have to train them to evaluate them selves, so that they can help learner-drivers to evaluate themselves too. The way we work is mainly through dialogue.

- Dialogue with students, individually and in groups
- Dialogue among students
- Dialogue between student and learner-drivers
- Communication with other road-users

As you can see, we are in the process of driving, we perceive the woman and everything around her: pedestrian crossing, car, behind etc. They do have a drivers license our students, but what are they looking for? When and why? What makes the student seek information? How do students interpret the situation? It depends on, among other things: age, experience, attitude and will. Out of this a decision is made, and the student acts.
We can see the action, we can see what students look at, but we can not know what they are thinking and why? So we have to communicate with the student to find out what happens behind this driving-process. This is to guide students in their teaching skills too, so that they can make learner-drivers reflect on their actions on the road.

Driving skills consists of vehicle competence, motoring competence, social competence and society competence. First semester includes commentary driving, economy driving, slippery road driving and darkness driving. Students also start practising their teaching competence by teaching first aid to real learner-drivers.

Teaching competence is mainly focused on during second, third and fourth semester. The following areas are important: social and societal-ethical competence, teaching competence, change and development competence and vocational competence.

Content:
- Methodology
- Driving-lessons with real learner-drivers
  i.e. in Stjørdal, in Trondheim, on the highway, overtaking, slippery-driving and darkness driving.
- Theory-lessons with real learner-drivers. Obligatory courses and voluntary courses
- Attending a driving school for two weeks for observation
- Process evaluation
- Driving skills continues

There are 9 supervisors for practical training, and they operate both in classroom and in the car. Practical training is accomplished at our driving school, at the university college. We have 15 cars for this purpose. Supervisors focus on interdisciplinary and a close link between theory and practise. Learner-drivers do not pay for their lessons, only a symbolic fee. There are comprehensive student responsibilities.
### Table 1. GDE matrix - Goals for Driver Education

<table>
<thead>
<tr>
<th>Level/Dimension</th>
<th>Knowledge and skill</th>
<th>Risk increasing aspects</th>
<th>Self assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goals for life and skills for</td>
<td>Lifestyle, age, group, culture, social position etc. Vs driving behaviour</td>
<td>Sensation seeking, Group norms, Peer pressure</td>
<td>Introspective competence, Own preconditions, Impulse control</td>
</tr>
<tr>
<td>living</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goals and context of driving</td>
<td>Modal choice, Choice of time, Role of motives, Route planning</td>
<td>Alcohol, fatigue, low friction, Rush hours, Young passengers</td>
<td>Own motives influencing choices, Self-critical thinking</td>
</tr>
<tr>
<td>Driving in traffic</td>
<td>Traffic rules, Cooperation, Hazard perception, Automation</td>
<td>Disobeying rules, Close-following, Low friction, Vulnerable road users</td>
<td>Calibration of driving skills, Own driving style</td>
</tr>
<tr>
<td>Vehicle control</td>
<td>Car functioning, Protection systems, Vehicle control, Physical laws</td>
<td>No seatbelts, Breakdown of vehicle system, Worn-out tyres</td>
<td>Calibration of car-control skills</td>
</tr>
</tbody>
</table>

Students are quite early in their 2-year programme introduced to the GDE-matrix in theory, but to understand it and to be able to use it, is not that easy. But it is an important issue, since our new curriculum license B (and the others) build upon this way of thinking. This is why we have to focus even more on how we educate our driving instructors in the future, even though we think we are quite good at it, we will always be able to do better.
APPENDIX 1. PROGRAM FOR THE CONFERENCE

Monday May 7:th

Start at approximately 12.00 with lunch and a presentation of the program and the attendants

13.00 Widar Henriksson (Umeå University), Presentation of our department and Umeå University
13.30 Esko Keskinen (University of Turku): What is GDE all about and what it is not.
14.00 Lars-Inge Haslie & Christina Eriksen (Norwegian Public Roads Administration): Norwegian category B driver training

14.30 Break for coffee/tea

15.00 Anna Sundström (Umeå University); Development and Evaluation of the Self-efficacy Scale for Perceived Driver Competence
15.30 Torbjorn Tronsmoen (Norwegian university of science and technology): The relationship between self-assessment, driver training and risk
16.00 Sami Mynttinen & Marita Koivukoski (Vehicle Administration Centre, AKE); Self-evaluation
16.30 Sami Mynttinen & Marita Koivukoski (Vehicle Administration Centre, AKE); Risk-concept

19.00 Dinner at “Sävargården”, sponsored by the Swedish Road Administration
Tuesday May 8:th

09.00 Marie Wiberg (Umeå University): *Changes in the Swedish Driver test*

**09.30 Break for coffee/tea**

10.00 Hans Mattson (Swedish Road Administration): *New curricula and theoretical driver test in the Swedish driver education*

10.30 Tova Stenlund (Umeå University): *Alignment between curricula and test in the Swedish driver education*

11.00 Hans Mattsson & Widar Henriksson (Umeå University): *Repeated test taking for the Swedish theory driving-license test*

**12.00 Lunch at “Universum”**

13.00 Mika Hatakka (Central organization for Traffic Safety in Finland): *What I see when I look at a traffic safety organization’s work through GDE?*

13.30 Antero Lammi (University of Turku): *Teaching methods in traffic instruction analyzed through the GDE-matrix.*

14.00 Eva Dalland & Hilde Kjelsrud (Nord-Trondelag University College): *Our Education in a GDE-perspective*

**14.30 Coffee/tea. Summary and plans for further collaboration (Widar Henriksson)**
APPENDIX 2. PARTICIPANTS

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