

# Test-oriented rider training and its effect on safety for powered two-wheeler classes in Norway – a qualitative study.

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Powered two-wheeler riders have a particularly high accident risk. This elevated risk has received a lot of attention both nationally and internationally, and it is a stated goal for various stakeholders that the accident rates for powered two-wheelers must be reduced. The quality of the rider training and the content of the rider test, which should reveal the level of the rider's competence, are important factors that can help reduce the risk of severe accidents. The aim of this study was to explore the extent to which today's motorcycle rider training is in line with the curriculum's intentions regarding rider competence and whether there are elements that can be directly attributed to the test itself that might adversely affect riders' competence such that this becomes a safety risk for powered two-wheeler riders. A total of 16 rider instructors were interviewed, including 14 male instructors and 2 female instructors. The interviews were semi-structured, and the research question was: *Are there elements of test-oriented training in Norwegian motorcycle rider training, and if so, how do these affect the development of rider competence and rider safety?* This work is part of a larger project on risk and safety factors for motorcycle riders in Norway. Our findings were sorted into the following three themes: 1) Reason for obtaining the rider license, 2) The structure and content of the practical test, and 3) GDE-matrix relations. Our conclusion is that there are elements of test-orientation in the Norwegian motorcycle training system that might have a negative effect on rider safety.

*Keywords: motorcycle, training, testing, safety, empowering, motivation*

## 1. Introduction

Road traffic accidents are the 8<sup>th</sup> most common cause of death in the world and are the most common cause of death in the 5–29 year-old age group (WHO, 2018). In the European Road Safety Strategy 2011–2020, training of road users is viewed as an important contribution to increasing safety and to reducing deaths on the roads (EU, 2010). Rider instructors thus carry out a socially useful assignment to increase traffic safety. The Norwegian rider-training programme is part of the national road safety work and is discussed in political strategic documents such as the National Transport Plan (NTP, 2017) and the National Strategy and Action Plan for Motorcycles and Mopeds (NPRA, 2018).

The main objective of this study was to look at the Norwegian rider-training processes in the powered two-wheeler categories in order to explore whether the safety aspects of the training

are in line with the curriculum's intentions or if there are elements of test-oriented training in the rider training. The intentions of the regulations and curriculum (NPRA, 2016) are to provide sufficient rider skills to achieve the objectives of the training, which are for the learner rider to obtain basic knowledge and skills so that they can further develop their competence after passing the final practical test. The intention is thus to provide training in line with such further development and not to have the test itself as the final goal. Despite this, there might be several reasons for test-oriented training. First, there might be a need to know what the test contains and what competence is required so that the learner rider can perform best in the test situation (Oermann & Gaberson 2017). Second, the desire from the learner rider to pass the test as quickly as possible might be another reason for practicing the test itself. Third it could be the use of standardised exercises and test routes that lead to targeted training towards

the practical test (Jonsson et al. 2003). The research question was thus: *Are there elements of test-oriented training in Norwegian motorcycle rider training, and if so, how do these affect the development of rider competence and rider safety?*

Next, we will present the GDE-matrix that the Norwegian training programme for powered two-wheelers is based on. Then we will present the content of the practical test provided by the Norwegian Road Department and the content of the education of the Norwegian rider instructors. After this, we will present the methods and results. Finally, a discussion linking the findings and the related theoretical framework is presented prior to the conclusions.

### 1.1 GDE-matrix

The Norwegian rider and driver training curriculum is based on the Goals for Driver Education matrix (Peräaho et al. 2003). The training programme has had a long period of development and follows a step-by-step process and was originally based on the work of McKnight and Adams (1970) showing the different tasks that a driver must solve. Later, Michon (1985) divided these tasks into three hierarchical levels. The lowest operational level is where the driver manoeuvres the vehicle. The second level, the tactical level, is where the driver must make the right choices in relation to the situation in terms of factors such as speed, distance, and traffic. The third level, the strategic level, is where the scheduled part of the journey is to take place, including choice of route and time of travel.

In the European research project GADGET (Guarding Automobile Drivers through Guidance, Education and Technology (Christ, et al., 1999; Keskinen, 1996), these hierarchical levels were used to develop a matrix containing four different steps. This GDE matrix (Goals for Driver Education) (Keskinen, 1996; Peräaho, Keskinen & Hatakka, 2003) has been used in all driver training for all driving license classes in Norway, including powered two-wheelers. As figure 1 shows, the fifth level was incorporated in 2010 in order to describe and demonstrate what the social environment means to developing young people and their choices in society (Keskinen et al., 2010).

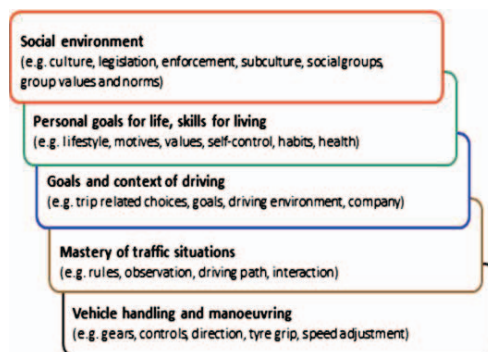


Fig 1. The five-level driving hierarchy. Keskinen et al. (2010).

Proper operation of the motorcycle, as described as level 1 in the GDE matrix, is important for the learner rider to be risk-averse in relation to their own technical skill level. However, manoeuvring the motorcycle is not enough without knowing the consequences of different levels of skills, and this can lead to an excessive belief in one's own skills, which in turn can have major safety implications. At level 2, regarding the choice of actions in traffic situations, the learner rider should learn about their own and others' cognitive processes while riding and learn the proper traffic skills, which are rooted in laws and regulations. In addition, the learner rider at this level should know the traffic regulations and should know what can increase the risk in various traffic situations and how to reduce this risk. At level 3, regarding choices for travel and conditions related to travel, the learner rider should know how to plan their ride. This could affect and reduce the risk of becoming tired, or at worst falling asleep while riding. Furthermore, the learner rider should learn about the effects of drugs and alcohol and what consequences these can have for traffic safety. At level 4, regarding general actions and assessments and ways of seeing the world, the learner rider should learn how their own attitudes, lifestyles, self-control, impulsivity, and perceptions can negatively affect their own choices so that the learner rider can work to counteract these trends even after the riding test has been passed. At level 5, regarding the social environment, the learner rider should learn how the environment can affect driving in a risky way. By highlighting the student's values and norms, the student can make choices that counteract negative influences from peer pressure, speed

pressure, lack of riding gear, and other negative influences in the immediate environment (Keskinen et al. 2010).

### **1.2 Rider testing**

Powered two-wheelers are classified as mopeds (category AM) or motorcycles (Penumaka, et al., 2014). In addition, motorcycles can be divided into light (A1), standard (A2), and heavy (A) vehicles. The minimum age for receiving a light motorcycle license is 16 years in Norway, while the minimum age for receiving a license for a standard motorcycle is 18 years and for a heavy motorcycle is 20 years (EUR-Lex, 2006). There are differences in the curriculums of these powered two-wheeler classes, and there is more mandatory training for A2 and A licenses than for A1 licenses. However, the curriculums for all powered two-wheeler classes follow a step-by-step training format, and the riding test contains the same three elements for all three classes.

The final practical test is based on requirements and regulations set down by the EU in Directive 126 2006. This directive governs the content and form of the riding test, but individual EU countries (including Norway through the EEA Agreement) may have different national regulations in terms of time use and content elements. The directive describes various skills and knowledge that the individual rider must acquire, and riders of powered two-wheelers are tested in terms of both riding skills and road traffic knowledge and understanding.

The Norwegian Public Roads Administration conducts the riding test measuring the individual rider's competence. The practical powered two-wheeler test is divided into three different areas. The first concerns the technical state of the motorcycle. The rider learner should show knowledge of the various technical components of the motorcycle and should be able to test the functioning of these components. The next part takes place in an off-road location where the following five exercises must be performed: 1) braking from approximately 50 km/h to a full stop, 2) cornering a left-hand curve at the same speed or accelerating, 3) cornering the same left-hand curve but with a stop in the middle of the curve, 4) obstacle avoidance at 50 km/h, and 5) a low speed and balance exercise. The third part of the practical test covers road traffic where the learner rider must show sufficient competence in a real-life road traffic environment such as

steering precision and insight into the risk factors that can be fatal for a motorcycle rider.

## **2. Method**

This study was part of a larger project on the understanding of risk and behaviour and rider training for powered two-wheelers (BAPT – Behavioural Analysis of Powered Two-wheelers) and is reported to the Norwegian Centre for Research Data (NSD). This study took a qualitative approach, and was based on 16 semi-structured individual interviews with 16 informants, including 14 male instructors and 2 female instructors. All informants were Norwegian, and their education was based on the Norwegian road traffic education system. The selection of informants was based on geographical affiliation, including both rural parts of Norway and inland areas, and their age range was approximately 25–55 years. The informants were divided into two main groups. The first group was informants who had worked only with the youngest learner riders (16–18 years old). The other group was informants who had been working with both young and more adult learner riders in all categories. The informants were informed about the project and that they could withdraw their participation at any time during the interview. All informants agreed to participate, and the research team got their authorisation to record the interviews.

All interviews except one were conducted over the telephone. The researchers were in a closed room without any possibility for an audience, and the informants were asked to be in private when we conducted these interviews so as not to be overheard by others. The interview guide was semi-structured (Kvale, 1996), and the interview was divided into different topics such as general questions, the number of learner riders each year, the rider instructors levels of experience, the motivational factors among their learner riders, the training process, and the riding test processes. All interviews were conducted by at least two researchers, and each interview lasted approximately one hour. All interviews were listened to, and the most relevant sections were transcribed, especially the answers to questions like: Can you describe how you plan and conduct training for the A categories? How do you conduct level assessments for the different motorcycle classes? Notes were taken from the

remaining interview data, and all interviews were part of the analysis. Thematic analysis was used to identify themes in the interview material (Aronsen, 1994).

### 3. Results

In addressing our research question of whether there are elements of test-oriented training in Norwegian motorcycle rider training and whether these affect the development of rider competence and rider safety, we found the following three themes in the interview data: 1) Reason for obtaining the rider licence, 2) The structure and content of the practical test, and 3) GDE matrix relations.

Table 1 Themes related to test-oriented training and their effect on safety.

	Illustrative explanation
1 Reason for obtaining the rider license	The aim is to pass the practical test instead of achieving the main goal, which is to be as safe a rider as possible.
2 The structure and content of the practical test	The content of the practical test has an impact on how the rider instructor organises and prioritises the training.
3 GDE matrix relations	Over the instructional period, the rider instructor focuses on situations and manoeuvres that the learner rider will be tested on, and this might be inconsistent with the intentions and learning content of the GDE matrix at all five levels.

#### 3.1 Reason for obtaining the rider license

Our results showed different motivations for obtaining the rider's license depending on the age group and license class. The following quote

describes this challenge: *"The youngest riders on light motorcycles, category A1, have a lack of motivation to learn. They do not know their own limitations in terms of what knowledge and skills they must have. They are young and do not have the experience that most learner riders in categories A2 and A have"*. The youngest riders often have a desire to get their rider's license in as short a time as possible, and without making any great effort either on the practical or the theoretical subjects. The riders in category A2 and A are more concerned with the learning process itself, and the rider instructor needs to use less energy to motivate both theory and practice. When it comes to the riding test itself, we find elements of a strong desire to succeed on the test among all categories. They want their rider's license and they know that the exercises in the off-road part of the test are necessary to succeed in the practical test. This leads to an extensive focus on taking the practical test, especially towards the end of the training period.

#### 3.2 The structure and content of the practical test

Parts of the practical test on powered two-wheelers take place in an off-road location with specific tasks to be solved. The learner rider is assessed on precision, speed, and technique. The following quote shows how the rider instructor thinks about the content of the practical test: *"A lot of practice in the off-road location is aimed at the riding test itself."* Most of our informants acknowledged that certain elements of these exercises are demanding for many learner riders, so it is necessary to train for the specific exercises under the same conditions as the test. The following quote is one example of this finding: *"There is too much focus on the specific exercises in this off-road location, and the learner rider themselves focus too much on just the exercises before the practical test."* Our informants had some future wishes for the practical test, especially making the tasks more in line with current challenges that a motorcyclist will face, and they were critical of the time and resources the learner rider must spend in order to pass this test. When asked if there were parts of the practical riding test that should be changed, most of the informants said that there should be less focus on the tasks in this off-road location and especially the low-speed balance exercise. Many

informants did not see that the current use of resources had great utility when it came to road safety. As one informant said: *“Spending too much time in this off-road location can go beyond the time we should spend on the road and on practicing what really matters for motorcyclists and traffic safety.”*

### 3.3 GDE matrix relations

The rider instructors reported focusing on content in the training that is in line with Norwegian regulations (Lovdata, 2019) and the curriculum (NPRA, 2016), but at the same time they reported elements that are rooted in the test situation itself, which is not in compliance with the overall content of the five different levels of the GDE matrix. There are indications that throughout the training period, and especially at the end of the rider training period, the rider instructors organise the learning process to aim for the practical test as the following quote shows: *“We often say, ‘You have to keep this in mind, and you have to keep that in mind before the test; your speed when approaching a crossroad will be important for the examiner, so you have to slow down’.”* This quote shows in all probability that the learner rider has not achieved the goals set for the training. The learner rider does not make independent choices based on acquired competence, and the rider instructor must therefore contribute with such guidance prior to the test. Our findings show that the rider instructors’ work in preparing the student for the driver test can be a challenge for all levels of the GDE matrix. At all five levels, the learner rider should learn what factors can affect their riding and how these factors can affect risk and consequences. In particular, the last session prior to the practical test is used for such a purpose. Specific advice is given before the riding test, and the rider instructor trains the learner rider during this session using the test as the basis for the tasks that are practiced. Some rider instructor often repeat the assignments because they are tested on the same concrete assignments shortly thereafter, as the following quote shows; *“The last session is largely directed towards the riding test”*. The rider instructor wants the learner rider to have the best possible basis for passing the practical exam.

## 4. Discussion

In this study, we wanted to explore whether there are elements of test-oriented training in the

Norwegian motorcycle training programme, and if so, if this is a challenge for rider competence and safety. Our findings were divided into the following three themes: 1) Reason for obtaining the rider license, 2) The structure and content of the practical test, and 3) GDE matrix relations.

### 4.1 Reason for obtaining the rider license

The first findings regarding the desire for studying and obtaining a rider license are about how the rider instructor, the learner rider, and other actors perceive the purpose (the “why”) of the rider training. Some rider instructors believed that the motivation of some young learner riders was exclusively the desire for a rider's license as the following quote shows: *“For many, the desire for a rider's license is based on being independent in terms of mobility. This might be a greater motivation than the desire to become sufficiently proficient”*.

The main objective of the training requires something more from the learner rider than just passing the actual test (NPRA 2016) or getting the rider's license. When the learner rider does not see this, and the test or licence becomes the major goal, this might affect how the learner rider approaches their learning. The rider instructors described poor motivation for learning, especially among the youngest riders. This was applicable to the theoretical basis of the training, but also to the practical training. The following quote emphasises this: *“The knowledge base is too poor. This leads to some challenges for the practical training. There is a lack of motivation among the youngest riders.”* Another problem raised by the rider instructors was motivating to meet the goals contained in the curriculum. Previous studies have indicated that some novice learners overestimate their competence (Mynttinen 2008), and if the learner rider does not understand what competence is required there will be a gap between self-assessment and the curriculum's criteria for safe and secure behaviour.

### 4.2 The structure and content of the practical test

The second theme regarding the structure and content of the practical test includes how the test's design and its requirements can influence the way the rider instructor and the learner rider carry out the training. Several types of education are considered successful if the participant passes a

test after the education (Lawrence & Lonerio 2008). However, it will not be enough to simply know the content of the riding test because all training is expected to change subsequent behaviour so as to have measurable effects on reducing accidents (Lawrence & Lonerio 2008). It may be easy to believe that the way the learner rider learns to ride has no influence on traffic safety so long as the learner rider passes the riding test. However, this contradicts the theoretical basis in the GDE matrix upon which Norwegian rider training is based (NPRA 2016). It is not enough to simply learn how to ride the motorcycle or to have been shown how to ride in different traffic conditions. If the rider instructor is practicing mastering specific test routines in the last session before the rider test and gives advice that empowers the learner rider to pass the test without the learner rider really understanding every aspect of the curriculum, then the consequences could be that the examiner gets a wrong picture of the rider learner during the test, which might allow the rider test to pass on an incorrect assessment.

The riding test affects the rider instructor's allocation of teaching time, for example, by spending much of the time in the off-road location when maybe the rider instructor should focus on other training aspects. In the opinion of the instructors, these other aspects such as training on highways would have a greater effect on traffic safety. The rider instructors want to train other elements such as counter-steering skills that they see as more important and, in their opinion, can lead to fewer severe accidents. In Norway most of the deaths on motorcycles are accidents in curves, and 46% of all fatalities on powered two-wheelers can be traced back to accidents occurring at curves in the road (Høye, A., Vaa, T., Hesjevoll, I.S. 2016). The misallocation of time and resources due to the structure and content of the driving test might be a threat to safety and rider competence because important lessons receive less attention and will therefore get less practice. If time and resources become a scarcity, the rider instructor will often prioritise the lower levels of the matrix and ignore the holistic approach that the GDE matrix is based upon. Previous studies have indicated that traditional training has been less focused on relevant skills, and this can be a challenge that leads to more crashes among novice riders (Rodwell et al. 2018).

As previous research shows, young riders on powered two-wheelers have a high accident risk, and in Europe the accident rate among riders of powered two-wheelers is significantly higher than for other road users (e.g. ERSO, 2018; Bjørnskau, 2016; Penumaka, Savino, & Baldanzini, 2014). In Norway, 27% of light motorcycle (A1) drivers are involved in self-reported accidents in the first year after passing the riding test (Sagberg & Johansson 2018). During the training, most rider instructors use the actual area where the test takes place as an exercise area, and the cones for the various tasks are set up in the same way as the actual task given in the riding test. Previous studies from other areas of testing have indicated that knowing about the test conditions might have a positive effect on learning, and learners need to know about the conditions under which they are to be tested (Oermann & Gaberson 2017). Despite this, most informants felt that the learner rider put too much effort and resources in mastering these exercises.

#### **4.3 GDE matrix relations**

Our findings in the third theme of GDE matrix relations show how the rider instructor approaches the intentions of the GDE matrix, and especially the higher levels of the matrix. According to the GDE matrix (Keskinen et al. 2010), it is important for road safety that the learner rider is cognisant of the consequences of different choices in traffic. Understanding the risks in different traffic situations gives the learner rider the best possible starting point for further learning and for being able to correct their own riding after the actual riding test. Our findings show that there may be several positive aspects of using the tests requirements and content as a reference in riders training, but the negative aspects of such training are often referred to as test oriented. This article seeks to elucidate if the riders training does not deliver on some parts or the whole of the intentions of the GDE-matrix, such as:

- Does not work to further develop the learner rider self-insight, understanding and reflection
- Does not develop the learner riders understanding of risk
- Does not address this on all five levels

Practicing only on the test itself can compromise the learning content of the GDE matrix.

Training only to pass the riding test therefore easily fails at every level of the GDE matrix and fails to meet the curriculum's intentions because the teaching lacks reflection, knowledge, and risk analysis. Rider instructors who choose to train in areas where the test will be conducted in order for the learner rider to master these specific traffic situations do not work sufficiently with the learner rider's own plans and strategies for information processing, which are emphasised as an important part of the higher levels of the GDE matrix. In the worst case, this might mean that the application of the rider instructor's professional competence and knowledge before the practical test determines whether the riding test is passed or not. Further, a low failure rate for the practical test might at first glance be an argument for the high quality of traffic training, but a low failure rate might also be a sign of training aimed at the test itself and not necessarily at the material in the curriculum.

Our findings show that the rider instructors often focus on a selection of exercises that can be traced directly to the content of the riding test. If they only practice in specific areas and train on specific tasks that are known to be relevant for the test, there is a danger that the learner rider will not be able to practice all elements that are important in relation to reducing accidents and can therefore lead to a rider who uses fewer cognitive processes and fails to become a perceptive rider.

## **5. Impact and further research**

The study has tried to give insights into the quality and the state of rider training in Norway, which is important knowledge in order to further develop Norwegian rider training. Our research can give insights and a better understanding of the conditions that the rider training industry is operating under. Quality in traffic training can have a major impact on accident rates in the future, and the results presented here show that even more knowledge should be linked to Norwegian traffic training. This is work that we will continue through our BAPT project regarding the understanding of risk and behaviour and rider training for powered two-wheelers in Norway. Further research should be conducted through observational studies that can provide further answers on how the rider instructor operationalises the training and whether it is a training that aims to prepare the learner rider for the riding test and to what extent the rider

instructor uses the GDE matrix in their rider training.

## **6. Conclusion**

We conclude that test-oriented training is to some extent present in Norwegian motorcycle rider training and that this might pose a challenge to rider competence and rider safety. For the youngest riders, the desire to obtain a license in the shortest possible time and with the least possible effort can limit the rider's level of competence and therefore represent a safety hazard. The structure and content of the practical test may in some cases require prioritising training for the test such that other important elements are abandoned. Such abandoned elements are defined in the curriculum as part of the total competence a rider is considered to need in order to be able to safely ride in traffic and to reduce severe accidents such as run-off-the-road accidents, also described as a "single accident, where only the rider is involved in the accident". We also find instances of not following the GDE matrix when it comes to self-assessment and self-insight. Training and preparing the learner rider for the test itself can be a challenge to changing subsequent behaviour, which in turn will have an impact on accidents among powered two-wheeler riders.

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