

Contents and assessment of traffic education programmes

Summary

The purpose of traffic education is to equip road users so well that they can participate safely in traffic. A good traffic education programme aims at unsafe behaviour and, of course the group that performs this behaviour and can change it. A programme should also take the background for this behaviour into account. The effects of an education programme can best be measured by examining the self-reported or observed behaviour that the education was aimed at, and not by a criterion such as crash involvement. In an effect measurement it is important to have a control group as well as an experimental (in this case education) group in order to separate the effects of education from other influences. It is also necessary to exclude volunteer bias as much as possible, i.e. the subjects should be drawn as randomly as possible for either the control or experimental group. In addition, it is essential to determine any differences between the two groups by means of a pre-test.

Background

Measures aimed at preventing road crashes are traditionally subdivided among 'The 3 Es': Engineering, Enforcement, and Education. Engineering contains all measures aimed at road infrastructure. Enforcement contains all measures to deter road users from committing offences. Finally, the E of Education consists of all means to sufficiently equip road users to participate safely in traffic. These means include knowledge transfer, the training of skills, and influencing opinions in all manner of ways, e.g. by driver training, school education, or information campaigns, for instance via leaflets.

This fact sheet concentrates on the question of how the effectiveness of education programmes can be measured. What does one have to bear in mind when assessing such a programme? It also describes the requirements that good education programmes should meet. This fact sheet also makes a comparison with public health education in order to determine whether certain bottlenecks are unique to traffic education or whether they apply to education in general. The basis for this fact sheet is a recently conducted literature review about traffic education (Dragutinovic & Twisk, 2006). For more information about driver training see the fact sheets [Young novice drivers](#), [The graduated driving licence](#) and [Driver training in step \(DTS\)](#). The effectiveness of traffic education programmes for children is discussed in the fact sheet [Traffic education of children 4-12 years old](#).

Why is education necessary?

Participating in traffic is a complex task that requires road users to correctly apply rules, to recognize dangerous situations, and to anticipate others' behaviour. This all is happening in a traffic environment in which a large quantity of information must be rapidly processed to make an adequate decision. We are, as humans, not born with the necessary skills to do this, they have to be learnt and then practiced frequently. Traffic rules are often so complicated that few road users know them well and apply them correctly.

In addition, drivers do not always assess dangerous situations and dangerous behaviour as such, as is shown, for example, by the high frequency of speeding. Exceeding the posted speed limit rarely leads to feelings of fear, whereas crash studies show that speeding really does increase the crash rate. What is more, research shows that road users have a false image of their own capacities. They overestimate themselves, underestimate traffic's complexity, and insufficiently recognize it when they perform badly, for instance by fatigue or stress. All this can lead to unnecessary and dangerous errors. This all shows that education is a necessary measure to inform, persuade, and train road users.

How do you measure the effectiveness on an education programme?

We often assess the extent to which a measure contributes to road safety by means of empirical evidence. A good assessment study is one which is designed in such a manner that one can be fairly sure about the causal relationship between measure and effect. In this case: is the observed effect indeed a result of the education programme, and can we exclude alternative explanations? Can we

expect that this programme will produce the same results in another, similar group? There are many manuals that specify the requirements that this sort of assessment study should meet (see Damoiseaux et al., 1993; Meertens et al., 1991). We have limited ourselves here to two requirements that are especially important for road safety, viz. the control group and the volunteer bias.

Control group

A control group is a group of subjects whose characteristics are similar to the experimental group (or education group) but who have not received any education, e.g. a course and/or information. By comparing the control and experimental groups, one can determine whether any effects, including undesired ones, have appeared through external influences. Suppose that during the study, the police had greatly increased their enforcement efforts. As both groups encounter these increased efforts, both will be influenced by them. If, in spite of this, there are demonstrable differences between the groups, we can conclude that these were caused by the road safety education.

Volunteer bias

A control group is particularly valuable if the researcher, preferably at random, has allocated the subjects to the control or experimental group. After all, if the choice is left to the subjects themselves, the chance of volunteer bias is greater. This means that those who chose for the education programme will differ too much from those who chose for the control group.

However, in most education studies the subjects themselves choose to take part in an experiment. Even if they are randomly assigned to control and experimental groups, volunteer bias still plays a role. After all, their choice to participate is not accidental, but is often influenced by interest in road safety. On the other hand, those participants who do not see the point of traffic education do not volunteer just like that. In such a case it is doubtful if the effects of the education programme found can be generalized, and would occur in a group that did not volunteer. So, volunteer bias also threatens the generalizability of the education effects here.

Pre-test

Because it is often not possible to meet all these scientific requirements, it is important to know what the differences are between the control and experimental groups. That is why, as extra check, a pre-test is necessary, i.e. a measurement among all subjects before the education programme begins.

Which correct effect of education should be measured?

Seeing preventing casualties as road safety's most important goal, it stands to reason to express the safety effects of measures in the number of casualties saved. However, the effects of traffic education are hardly ever studied in terms of crash or casualty numbers (Dragutinovic & Twisk, 2006). This is not really surprising because education programmes need an assessment criterion that is directly related to the behaviour to be taught. Crashes are thus not a good measure, also because they rarely happen and are caused by a concurrence of, often random, circumstances. That is why researchers often choose to measure education effects by using intermediate variables such as self-reported behaviour, this can also be actual behaviour such as the frequency of drink driving. For example, if children get lessons about safe behaviour in the vicinity of lorries, the evaluation in the first place looks at children's behaviour around lorries, and the criterion is not the number of children that were killed or injured by a lorry. The choice of such intermediate criteria is also the only possibility of improving education programmes before implementing them on a large scale. Large-scale education programmes do offer the possibility of examining crash data, but these also introduce other limitations to an evaluation design. Although volunteer bias can be overcome in a small-scale experiment by paying the subjects, this is seldom affordable in a large-scale assessment with thousands of subjects. Volunteer bias could be excluded by making an education programme obligatory, but the disadvantage of this is that there is no control group.

Comparison with health education

In order to determine whether the use of intermediate assessment criteria is exclusive to traffic education, Dragutinovic & Twisk (2006) made a comparison with other preventative education, viz. health education about 'good eating' and 'safe sex', for instance. In general, health programmes are not assessed using 'health damage' as the final criterion, but an intermediate criterion, such as the eating habit. The final criterion plays a background role, but is not seen as a compelling prerequisite for effectiveness. The latter can possibly be explained by the fact that the health damage often only becomes visible after many years. Examples of this are smoking and lung cancer, too intensive sunbathing and skin cancer, eating and obesity and/or diabetics, stress and heart attacks. What is

also relevant here, is that the ultimate state of health is also influenced by very many other factors than healthy behaviour. Therefore, health education is regarded as being successful when the behavioural change intended, the intermediate criterion, has been achieved.

The parallels between health and traffic education show once again that behavioural change is also the correct success criterion for traffic education, and not the number of casualties saved. Just as in health education the effects come 'too late' to be included in an assessment study, in traffic education crashes are, fortunately, 'too rare' to be used. In addition, all sorts of other factors are of influence in both health and traffic education; it is not possible to isolate the intended final effect of education only. This is why, in traffic as well as health education, the relation with the intended behaviour is stronger than with the intended final effect.

There is, however, a closer relation between traffic behaviour and the final effect in road safety than there is between healthy behaviour and good health. After all, someone behaving unsafely increases his risk of being immediately involved in a crash, whereas unhealthy behaviour increases the risk of a disease that manifests itself often only much later. This closer relation makes the related behaviour the more reliable as assessment criterion in traffic education.

What are the features of a good education programme?

From assessment studies we can learn a great deal about what good education programmes look like, but there are already a number of general features that point to good programmes (see for example Bartholomew et al., 2000). A logical cohesion between the road safety problem, the behaviour, and the didactic method is necessary for effective education. That is why a good education programme has the following features:

- *The programme concentrates on behaviour that has a clearly demonstrated relation with safety.* Examples are speeding, alcohol and drugs, but also e.g. tailgating and pedestrians crossing over. This means that when this behaviour changes as intended, safety will increase. After all, the relation with safety had already been shown.
- *The programme concentrates on the group that behaves unsafely, or possibly will do so, and that has the mental and physical possibilities to change their behaviour.* This description indicates immediately that there should be low expectations of the effectiveness of traffic lessons for very young children. You can train them endlessly, but you will quickly reach the boundaries of their own mental development (see also SWOV fact sheet [Traffic education of children 4-12 years old](#)).
- *The programme takes the background of the target group's behaviour into account when developing the programme.* For example, the following questions were discussed:
 - Does the target group know that there is a problem?
 - Does the target group know what to do to solve the problem?
 - Does the target group know what the desired behaviour is?
 - How prepared is the target group to show the desired behaviour?
 - Can the target group overcome barriers to apply the desired behaviour?
 - Is the correct didactic method being used?

Once the above mentioned questions have been answered, the educational goals of the programme can then be formulated. For example: the learner knows what the danger is of the combined use of alcohol and drugs, and knows which drugs are meant. These learning goals are not only structural for an education programme, but moreover, they are the measurable criteria of an effect assessment. For an elaborate description of developing good programmes see Bartholomew et al. (2000).

Is education the answer to everything?

Finally there is still the matter of whether all behaviour can be changed or taught by means of education. How far do education's effects reach?

Learn especially from one's own experiences

Education's most important limitation is the relatively short period of formal lessons. This means that road users have to learn mainly from their own experiences. This is a powerful mechanism, because the traffic task is so complex that it cannot be learnt in the relatively short period of formal lessons.

The most effective traffic education is a mixture of formal instruction and one's own practical experience, similar to learning to play a musical instrument (see also Wegman & Aarts, 2005).

Errors continue to occur accidentally

Education is sometimes seen as *the* solution to all road safety problems. This incorrect way of thinking is supported by the fact that about 90% of all crashes can be attributed, directly or indirectly, to human error. Education is a good measure if these errors are made because of gaps in knowledge, insight, or skills. On the other hand, the reason for the errors can lie in the complexity of the task or the inconsistency with the traffic layout. In that case it is effective to first adapt the task to human capabilities and then teach road users how to cope. When people make errors, one should first determine whether the traffic layout has contributed to this error occurring. If this is so, the remedy lies in adapting the layout, and not adapting the road user.

Some people make more errors than others

In spite of a lot of training, some people make more mistakes than others. This indicates that these people are less suitable and not, not yet, or no longer capable of carrying out the task correctly. This can be temporary, for example because of medicines taken, but also permanent, for example as a result of getting older or having a poor concentration. Education can still play its part but not by trying to improve task operating. Education is especially suitable for showing these people their limitations and to stimulate them to avoid the most dangerous situations.

Not everybody is motivated

Until now we have assumed that people will also apply their knowledge and skills to safe traffic behaviour; that there is, as it were, a striving for safe behaviour. But we all know that this is not always the case! The question is whether education can play an important role here. Can education convince people to apply their knowledge and skills? Yes it can, but it is difficult when they have to get rid of bad habits. For example, someone has always driven without a seatbelt on and personal experience has taught that 'it's alright'. What is more, this behaviour has become an automatism. It takes a lot of effort to change one's automatisms. The motorist has to keep thinking about it repeatedly and consciously choose to wear a seatbelt. We do not expect that education, on its own, will be sufficiently useful in this type of situations.

The influence of education on its own has even less effect when people collectively behave dangerously, and more so, when it benefits them individually. An example is speeding. Suppose that someone decides to keep to the speed limit; perhaps it won't get any safer for him, and maybe even less safe because of an increase in speed differences. Only if we all keep to the speed limit will it get safer (see also the fact sheet [The relation between speed and crashes](#)). In this situation, education is a necessary but insufficient precondition to persuade people to drive safely. What is especially needed is to enlarge the advantage of desired behaviour and the disadvantage of undesired behaviour by, for example, rewarding and fining.

With a lack of motivation for correct behaviour, traffic education is eventually in a better position than other types of education that are also aimed at prevention. Because safe behaviour has been defined in terms of laws, it can be enforced. Thus, when motivation is the problem, police surveillance can encourage people to more often obey the rules and put into practice what education has taught them.

What is the most recent research?

In its 2003-2006 research programme, SWOV has studied the effectiveness of traffic education in the Netherlands. This assessment study, that was carried out together with a large number of partners, assessed 11 projects. The assessments focussed on the effects on actual or self-reported behaviour. The study showed that approximately half of the programmes resulted in a small, but statistically significant, improvement that was still present one month after the programme had terminated. The other programmes did not show to be effective. These findings led to adjustments being made in some of the programmes that were studied (Twisk et al., 2007)

Conclusions

The power of persuasion of a study in the effectiveness of education strongly depends on the research method. What is especially difficult is the phenomenon of volunteer bias, which must be taken into account in the research design. It is also necessary to include a control group in order to be able to make a distinction between the effects of an education programme and external factors. Criteria such as crash involvement or numbers of casualties are not suitable for measuring the effect of education. Self-reported or observed behaviour are valuable indicators of safety. The choice of these indicators makes it possible to assess small-scale programmes and also to make an interim assessment of existing programmes to improve them.

Publications and sources

[SWOV reports in Dutch have a summary in English]

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