SWOV Fact sheet

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 focuses on unsafe behaviour, on the group that performs this behaviour and on the mental and physical capacities that bring about this behaviour. The influence of education is limited if it concerns behaviour that has become habitual over time and if it concerns road traffic situations that provoke mistakes. In the first situation earlier intervention is needed, while in the second the traffic situation needs adaptation. The research method is of great importance in research on the effectiveness of education. Especially the 'self selection bias' of subjects is a difficult matter which should be considered in the research design. In addition, it is necessary to involve a control group in order to distinguish between the education programme's effects and effects that have different causes. Criteria such as crash involvement or numbers of casualties are not suitable for measuring the effect of education. Self-reported behaviour or observed behaviour are useful indicators of safety.

Background and content
Measures aimed at preventing road crashes traditionally belong to 'The 3 Es': Engineering, Enforcement, and Education. Engineering includes all measures aimed at road infrastructure. Enforcement includes all measures to deter road users from committing offences. Finally, the E of Education comprises 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. The basis for this fact sheet is a literature review about traffic education (Dragutinovic & Twisk, 2006). For more information about driver training see SWOV fact sheets *Young novice drivers*, *The graduated driving licence*, *Driver training in steps (DTS)*, *Accompanied driving* and *Simulators in driving training*. The effectiveness of traffic education programmes for children is discussed in the fact sheet *Traffic education of children 4-12 years old*. More on public information can be found in the fact sheets *Public information about road safety* and *Fear-based information campaigns*.

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 must all be done 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 acquired, among other things by practicing frequently. Some traffic rules are 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 for example illustrated by the high frequency of speeding. Exceeding the posted speed limit rarely evokes feelings of fear, whereas crash studies show that speeding does indeed increase the crash rate (see also SWOV fact sheet *The relation between speed and crashes*). What is more, research shows that road users often assess their own capacities incorrectly. They overestimate themselves, underestimate traffic's complexity, and insufficiently recognize it when they perform badly, for instance due to fatigue or stress. All this can lead to unnecessary and dangerous errors. All the above shows that education is a necessary measure to inform, persuade, and train road users.

How do you measure the effectiveness of an education programme?
We often assess the extent to which a measure contributes to road safety on the basis of empirical evidence. A good assessment study is designed in such a way 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 this programme to produce the same results in similar groups? There are many manuals that specify the requirements 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 requirements concerning the control group and those concerning self-selection 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, so who have had no course or information. By comparing the control group and the experimental groups, one can determine whether any changes, including undesired ones, have appeared through external influences. For example, a change that cannot be ascribed to an education programme occurs when the police greatly increases their enforcement efforts. As both groups encounter these increased efforts, both will be influenced by them. Only if the education group does demonstrably better than the control group, we can conclude that the difference is caused by the education programme.

Self-selection bias
A control group is particularly valuable if the researcher has allocated the subjects to the control or experimental group, preferably at random. After all, if the choice is left to the subjects themselves, the risk of self-selection bias is greater. This means that those who choose for the education programme may differ too much from those who choose 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, self-selection bias still plays a role. The choice to participate is not accidental, but is often influenced by an interest in road safety. Similarly, those participants who do not see the point of traffic education will not readily volunteer. In such a case it is doubtful whether the effects of the education programme that are found can be generalized, and whether the effects would occur in a group that did not volunteer. Therefore, self-selection bias threatens the generalizability of the education effects here.

Because it is often impossible to meet these scientific requirements, it is important to know the differences between the control and experimental groups. That is why, as an extra check, a pretest is necessary, i.e. a measurement among all subjects before the education programme begins.

Which effect of education should be measured?
The main goal of road safety is preventing casualties. Therefore 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 figures (Dragutinovic & Twisk, 2006). This is not really surprising because education programmes need an assessment criterion that is directly related to the behaviour that is to be taught. Crashes are therefore 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, but also the actual behaviour. For example, when children get lessons about safe behaviour in the vicinity of lorries, the evaluation will in the first place focus on children's safer behaviour around lorries; the criterion will not be not the number of casualties among children due to crashes involving lorries. The choice for such intermediate criteria is also the only possibility to improve 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 in a small-scale experiment the self-selection bias can be overcome by paying the subjects, this is seldom affordable in a large-scale assessment with thousands of subjects. Self-selection bias could be excluded by making an education programme obligatory, but the disadvantage of this would be that there cannot be a control group.

What are the characteristics of a good education programme?
Assessment studies can still teach us a great deal about what good education programmes are like, but a number of general features that point to good programmes have already been identified (see for example Bartholomew et al., 2000). Logical cohesion between the road safety problem, behaviour, and the didactic method is necessary for effective education. That is why a good education programme has the following characteristics:

– *The programme concentrates on behaviour that has a clearly demonstrated relation with safety*. Examples are speeding, alcohol and drugs, but also tailgating and pedestrians crossing. This means that when this behaviour changes as intended, safety will increase. After all, the relation with safety had already been demonstrated.
– *The programme concentrates on the group that behaves unsafely*, or may do so, and that has the mental and physical abilities to change its behaviour. This description indicates that the expectations of the effectiveness of traffic lessons for very young children should be low. You can train them endlessly, but you will quickly reach the boundaries of their mental development (see also SWOV fact sheet *Traffic education of children 4-12 years old*).
– *In developing the programme the background of the target group's behaviour is taken into account*. This, for example, icludes the following questions:
  - 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 willing 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 used?

Once the above questions have been answered, the educational goals of the programme can be formulated. For example: the learner knows the danger of the combined use of alcohol and drugs, and knows which drugs it concerns. These learning goals do not only provide structure in an education programme; they are also 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?
The question whether all behaviour can be changed or taught by means of education is still to be answered. How far do the effects of education reach?

Learning mainly from one's own experiences
The most important limitation of education is the relatively short period of formal lessons. This implies 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 notion 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 for errors made due to gaps in knowledge, insight, or skills. However, the cause of errors can also lie in the complexity of the task or the the road layout not being suited for the task. In that case it is effective to first adapt the task to human capabilities and then teach road users how to cope with the task. When people make errors, one should first determine whether the traffic layout has contributed to the error. If this is so, the remedy lies in adapting the layout, not in adapting the road user.

Some people make more errors than others
Some people will always make more mistakes than others, despite training. This indicates that these people are 'less suitable' and not, not yet, or no longer capable of carrying out the task correctly. This may be temporary, for example because of medicine use, but it can also be permanent, for example as a result of getting older or having poor concentration. Education can still play a part but not in trying to improve performing the task. Education is especially suitable for showing these people their limitations and to stimulate them in avoiding the situations that are the most dangerous to them.

Not everyone is motivated
So far, we have assumed that people will actually apply their knowledge and skills in relation with safe traffic behaviour; that there is, as it were, a striving for safe behaviour. Yet, 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 this is difficult when they have to stop bad habits. For example, someone who has always driven without a seatbelt and has never been involved in a crash, has learned from experience that 'it's alright'. What is more, this behaviour has

become an automatism, which makes it hard to change. We do not expect that education, on its own, will be sufficiently useful in this type of situation.

The influence of education on its own is even smaller 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; it might not be any safer for him, and perhaps even less safe, because of an increase in speed differences. Only when we all keep to the speed limit it will become safer (see also fact sheet *The relation between speed and crashes*). In this situation, education is a necessary but insufficient precondition to persuade people to drive safely. Especially needed are to enlarge the advantage of desired behaviour and to enlarge the disadvantage of undesired behaviour by, for example, rewarding and fining.
Where motivation is the problem, police enforcement can encourage people to more often obey the rules and put into practice what education has taught them (see also fact sheet *Police enforcement and driving speed*).

Conclusions
The value of a study of the effectiveness of education strongly depends on the research method. Especially problematic is the phenomenon of self-selection 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 distinguish between the effects of an education programme and the effects of 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 allows assessment of small-scale programmes as well as interim assessment and improvement of existing programmes.

Publications and sources
[SWOV reports in Dutch have a summary in English]

Batholomew, L.K., Parcel, G.S., Kok, G. & Gottlieb, N.H. (2000). *Intervention mapping; designing theory and evidence based health promotion programs*. McGraw-Hill, Boston [etc.].

Damoiseaux, V., Molen, H.T. van der & Kok, G.J. (Red.) (1993). *Gezondheidsvoorlichting en gedragsverandering*. Van Gorcum, Assen.

Dragutinovic, N. & Twisk, D.A.M. (2006). *Effectiveness of traffic education; A literature review*. R-2006-6. SWOV Institute for Road Safety Research, Leidschendam.

Meertens, R.W., Buunk, A.P. & Vlist, R. van der (ed.) (1991). *Sociale psychologie & voorlichting en maatschappelijke problemen*. VUGA, 's-Gravenhage.

Wegman, F. & Aarts, L. (eds.) (2006). *Advancing Sustainable Safety; National road safety outlook for 2005-2020*. SWOV Institute for Road Safety Research, Leidschendam. See also www.sustainablesafety.nl