Evaluating cycling programs for 10- to 14-year-old children

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1 INTRODUCTION

Children between the age of 10 to 14 increasingly use their bike as a means of transport. Unfortunately, they still show deficits in competencies needed for safe traffic participation (e.g. erratic attention or self-awareness). This is reflected in an increase in the risk of accidents involving bicylces for 10- to 14-year-olds: 56.8% of 10- to 14-year-old children who have had road traffic accidents in 2020, had bicycle accidents [1].

In Germany, there are various programs to improve bicycle safety for children. In contrast to the „Fahrradführerschein" (bicycle driving license which usually takes place in fourth grade), programs for 10 to 14 year-olds are less standardized and various offers exist. There has been no evaluation on the quality of these programs yet.

Therefore, we developed an evaluation standard for programs that aim to improve cycling safety for 10- to 14-year-olds. To do so, a catalogue of criteria was developed which helps describe and evaluate cycling projects for children in this age group. We then evaluated existing projects and collected them in a web-based database. Our aim is to provide a guideline to evaluating cycling safety programs for 10- to 14-year-olds and to offer an overview about various existing programs.

2 CRITERIA CATALOGUE USED TO DESCRIBE AND EVALUATE CYCLING PROGRAMS

First, we developed a criteria catalogue to describe and evaluate current programs. For this, we conducted a literature search on developmental aspects of children's cycling abilities and on the design of learning and instruction programs [2]. We also obtained data from police accident statistics and analysed them with regard to age-specific accident characteristics. In total, 9.003 accidents involving cyclists between the age of 10 and 14 were analysed. The literature review and the accident data analysis were used to derive criteria for cycling safety programs targeted at 10- to 14-year-olds. We discussed this preliminary criteria catalogue with four experts in the field of road safety education and adjusted it based on their comments.

The resulting criteria catalogue consists of two main parts. The first part consists of criteria to describe projects (e.g. type of program or description of target group). Criteria in this part can only be answered in a dichotomous manner (criteria met vs. not met). The second part consists of criteria used to describe the extent to which certain quality criteria are met (e.g. evaluation of media design or general concept). Criteria in this evaluative part are answered on a four-point scale (very true, somewhat true, rather not true, not true at all). The final criteria catalogue is four pages long and consists of 15 criteria which 2 to 8 items each. Table 1 gives an overview about the lists of criteria used.

Table 1: Overview about structure of criteria catalogue used to describe and evaluate cycling safety programs for 10- to 14-year-olds

	Criteria	Number of items
Description of program	Description of topic	4
	Description of target group and addressees	4
	Content about: safety, social, health and/or environmental education	6
	Type of program material	6
	Accessibility and implementation	8
	Inclusion of age-specific accident characteristics	6
Evaluation of program	Inclusion of cycling competencies	7
	Concept	3
	Understandability for target group and addressees	2
	Empowerment to act	2
	Content design	5
	Media design	4
	Practicability	2
	Transfer	4
	Quality assurance	3

Next, we then used the criteria catalogue to describe and evaluate existing programs. For this, 10 programs aimed at improving cycling safety of 10- to 14-year-olds were identified via web searches. Programs contents were analyzed and for each the different criteria were filled in. This pilot study enabled us to test the feasibility of the catalogue. We concluded that it is best when each program is evaluated by at least two experts who read and analyze the material. This is due to a high variety of programs and ensures a common understanding about the programs' contents.

3 RESULT: THE DATABASE AND DESCRIPTION OF USE CASE

The criteria catalogue was implemented to a web-based database. The database was developed at Fraunhofer IVI Dresden. It serves as a storage for the cycling safety programs and their respective evaluations. This means that for each program in the database, items of describing and evaluating criteria are stored and can be retrieved.

In the future, we aim to make this database publicly available. Interested stakeholders, practitioners and researchers can use it to research cycling programs for 10- to 14-year olds. Figure 1 shows a first draft of the user interface. Users can select their desired criteria (e.g. type of program or duration) via a search template. The database then provides a list of matching programs, including further information on the sources of the programs.

The following use case would be possible: Many traffic safety programs aim to take place in a school setting, since many students between the ages of 10 to 14 come to school by bicycle. However, there is no standardized, predefined way for implementation, so implementation heavily relies on teacher engagement. A teacher could therefore look for a short program with the duration of one teaching unit and does not require additional material. The teacher can use the database to search for programs that meet these requirements by indicating his/her preferences using the search template. The resulting lists of programs provides the teacher with an overview about possible programs he/she could implement.
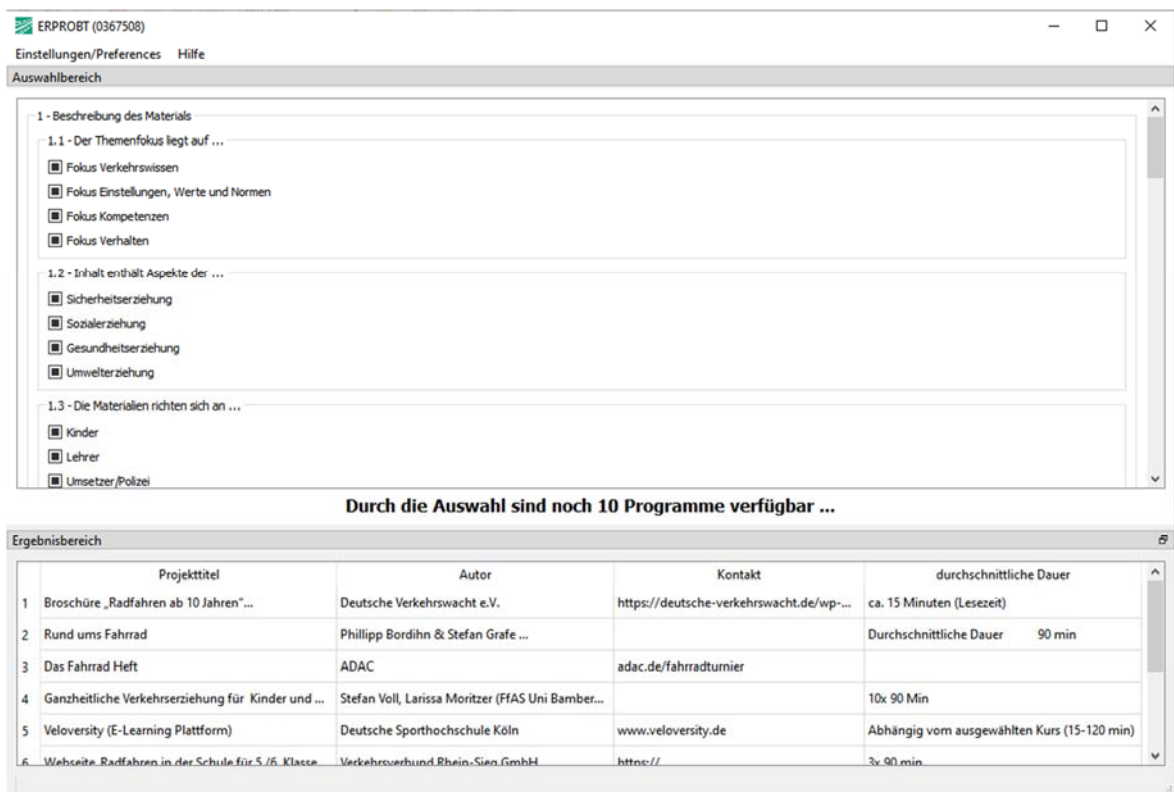

Figure 1: Screenshot of database. Upper part ("Auswahlbereich") shows search template and lower part ("Ergebnisbereich") shows resulting list of matching programs.

4 OUTLOOK

The criteria catalogue and the corresponding database offer an important tool in collecting, describing and evaluating cycling safety programs for 10- to 14-year olds. At the moment, the database contains about 40 programs. More programs will be added in the future. Additionally, we will use the database for the following two goals.

4.1 Identification of gaps in programs

The collection of programs in form of the database allows to analyze and compare programs regarding their content. In this way, missing content can be identified. As part of our pilot study including 10 programs, it became evident that many projects did non focus on age-specific accident characteristics. For example, none of the 10 projects addressed the danger of distraction using smartphones or headphones. It should be noted that these are still preliminary results and analysis of additional projects are pending. The identification of gaps enables further development of programs and provides direction for future research.

4.2 Evaluation of database by users

The search template is a central aspect of the database as it helps users find their desired programs. We are therefore planning to evaluate the usability of this search template with various stakeholders (e.g. teachers, parents, practitioners). Depending on the type of user, different criteria are of interest. A teacher or a parent, for example, might be more interested in facts regarding the feasibility of programs and therefore use criteria that describe simple facts about the programs. A researcher or a traffic safety practitioner, on the other hand, might be more interested in the evaluation of programs and thus use criteria that describe the quality of programs. The results of these usability tests will be used to further adjust the search template.

5 CONCLUSIONS

Children are prone to cycling accidents between the age of 10 to 14. There are numerous programs targeting cycling safety exist of this age group. Our work has two objectives: one is to develop a standardization tool in form of a criteria catalogue to describe and evaluate these programs. The other is to provide an overview about these programs in form of a web-based database. The database can be used by practitioners to search for suitable programs (e.g. teachers looking for a program to implement during the lessons or parents looking for brief information to provide to their child). It also serves to identify gaps in current programs to enable further development and provides direction for further research.

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