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CHALLENGES AND OPPORTUNITIES IN DEVELOPING TRAFFIC CONTENT IN PRIMARY SCHOOL TEACHING

Predrag Brlek[a*], Maja Mačinko[b], Lana Račić[c], Goran Kos[d]

[a]University of Zagreb Faculty of Transport and Traffic Sciences, ZUK Borongaj, Borongajska cesta 83a, 10000 Zagreb, e-mail: pbrlek@fpz-unizg.hr, orcid.org/0000-0003-4890-2583
[b]Primary School „Ivana Cankara", Cankareva 10, 10000 Zagreb, e-mail: maja.macinko@skole.hr
[c]Trafiki, Ivanićgradska 59b, 10000 Zagreb, e-mail: info@trafiki.hr
[d]Institute for tourism, Vrhovec 5, 10000 Zagreb, e-mail: goran.kos@iztzg.hr, orcid.org/0000-0001-8531-5893

Abstract: Every day, many children in the Republic of Croatia cross the road, ride a bicycle or sit in a tram — and they do it without formal traffic education that would go beyond memorizing traffic signs. The subject of Technical Culture is one of the rare places in primary school education where pupils not only learn traffic rules but also apply them with their hands and feet: they build intersections, set up signs, simulate situations and make decisions. However, currently, traffic safety content is placed in one class and within a limited timetable, which leaves no space for the systematic development of competences and repetition in different contexts. The new amendments and additions to the curriculum proposal — in the context of all-day school project — opens space for this potential to finally be fully exploited. However, obstacles ranging from the different availability of school premises to the lack of traffic polygons among schools await teachers and children in implementing traffic content. As part of the research conducted for the purposes of this paper, data was collected on spatial conditions and the availability of school areas for implementing traffic content in Technical Culture classes. A total of 523 completed questionnaires were received, covering main and branch schools from different parts of Croatia, which provided insight into the actual working conditions in schools of different sizes, spatial capabilities and geographical locations.

Keywords: traffic education, child safety, traffic curriculum

1. INTRODUCTION

Given that more than 25,000 people continue to lose their lives on European roads each year, it is crucial to take all measures to improve road safety. Alongside vehicle safety measures, infrastructure solutions, and regulatory enforcement, education on road safety and mobility also plays a vital role in enhancing safety on European roads. Education is considered an essential part of the integrated approach to traffic safety.

Although road safety education is provided to primary school children across Europe, in 19% of countries it is generally not implemented for children and young people in secondary education. Those countries are the Republic of Croatia and the Netherlands, Serbia and Wallonia

∗ Corresponding author. e-mail address: pbrlek@fpz-unizg.hr (P. Brlek).

(part of Belgium). In both primary and secondary education, instruction on road safety and mobility is not a separate subject in most countries (72% and 83%, respectively). Furthermore, the number of hours primary school students spend acquiring knowledge about road safety varies significantly across Europe, and even within individual countries. Only in the Czech Republic, Ireland and Germany is road safety education provided at all levels.

Although road safety education is considered a key component of an integrated approach to road safety, little is currently known about its effectiveness. Therefore, more needs to be done to improve the quality and increase the number of evaluations of road safety and mobility education programs.

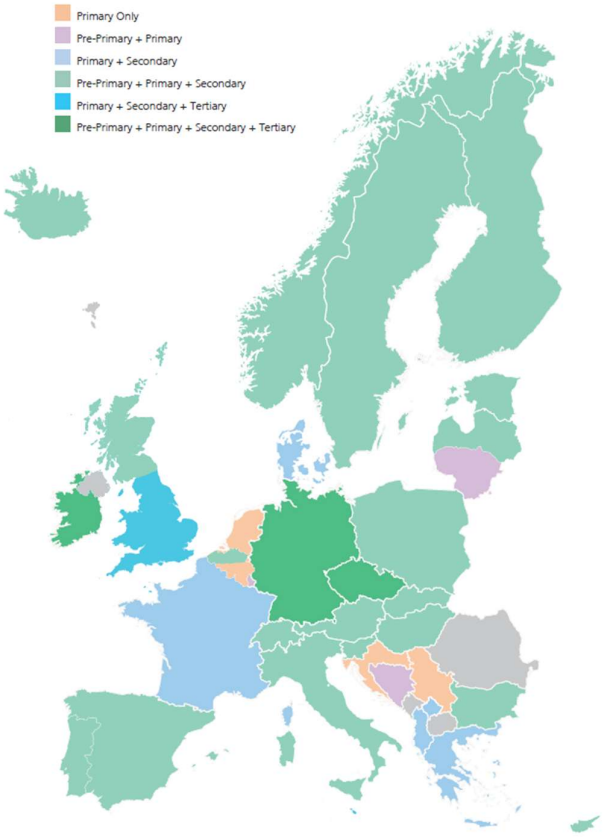


Fig. 1. Overview of the levels of education at which traffic safety and mobility education is given (Source; The status of traffic safety and mobility education in Europe, ETSC, 2019)

In most countries (81%), the ultimate responsibility for road safety education lies with the Ministry of Education. This responsibility is sometimes shared with other stakeholders, such as the Ministry of Transport (5), the police (5), a government agency (2), and non-governmental organizations (3).

2. TRANSPORT-RELATED CONTENT IN THE EXISTING TECHNICAL CULTURE CURRICULUM

Under the current curriculum for the subject of Technical Culture, traffic safety-related topics are primarily covered in the first and the fifth grade of primary school. Pupils are introduced to the basic rules of safe participation in traffic, traffic signage, rules for pedestrian and cyclist movement, and proper conduct at intersections and in various traffic situations. The emphasis is not solely on the theoretical acquisition of knowledge, but rather on understanding traffic situations and applying that understanding in everyday life.

Although the existing curriculum provides a solid foundation for developing pupils' traffic literacy and safety awareness, the scope and implementation of practical activities depend largely on the organizational, temporal, and spatial constraints of individual schools. Practical work proves to be a key element in the successful teaching of traffic-related topics, as it enables active pupil participation, the development of spatial awareness, a better understanding of traffic situations, and the linking of theoretical concepts with real-life experiences.

Traffic safety-related content in educational materials most often covers:

- pedestrians and cyclists in road traffic
- traffic signs and signals
- rules of conduct at intersections
- traffic lights and light signals
- right-of-way rules
- road user safety
- practical tasks and simulations of traffic situations.

The Technical Culture curriculum places special emphasis on pupils' practical work, the development of technical skills, the use of technical documentation, and active pupil participation in the learning process. Consequently, traffic safety-related topics often extend beyond the scope of traditional instruction on traffic rules; instead, they are addressed through practical activities such as constructing scale models, simulating traffic scenarios, analysing intersections, modelling traffic problems, and working on school traffic training grounds. This approach enables experiential learning and the development of functional knowledge that pupils can apply when participating in traffic in their daily lives.

Although the existing model enables the implementation of numerous high-quality activities, the level of their execution varies across schools. The feasibility of conducting practical instruction is influenced by the size and availability of school facilities—including the use of outdoor areas, traffic training grounds, and sports courts—as well as by the available teaching hours and the school's organizational structure. Consequently, an analysis of the actual spatial and organizational conditions in schools can provide valuable insight into the potential for further developing traffic-related content within the context of future curricular reforms and the all-day school model.

2.1. Practical work and experiential learning in transport content

One of the peculiarities of the Technical Culture classes is the emphasized focus on practical work and experiential learning of the pupils. Traffic content represents an area in which pupils can directly connect the acquired theoretical knowledge with the everyday situations in which they find themselves as pedestrians, cyclists and future road users.

Unlike the purely theoretical approach to learning traffic rules, practical work enables pupils to better understand traffic relations, spatial situations and the consequences of improper behaviour in traffic. Through modelling, simulations and problem tasks, pupils actively

participate in the teaching process, develop spatial perception, logical reasoning, precision and the ability to make decisions in traffic situations. Through practical work, pupils more easily understand the relationships between road users, right-of-way rules, the importance of traffic signs and signals, and the consequences of failing to observe traffic regulations.

A particular value of practical work involving traffic-related topics lies in the opportunity to simulate real-life traffic situations. Using models and problem-solving tasks, pupils analyse the correct and incorrect behaviour of road users, determine right-of-way at intersections, assess potential hazards, and propose safer traffic solutions. This approach enables active learning and the development of a traffic safety culture based on hands-on experience.

3. ANALYSIS OF THE SPATIAL CAPABILITIES OF SCHOOLS FOR THE IMPLEMENTATION OF TRAFFIC EDUCATION CONTENT

As part of the research conducted for this study, data were collected regarding spatial conditions and the availability of school grounds for implementing traffic-related content within Technical Culture classes. The questionnaire was distributed to coordinators and teachers responsible for traffic safety education in primary schools across the Republic of Croatia, with responses gathered digitally via a Google Form. A total of 523 completed questionnaires were received, covering both main and satellite schools from various parts of Croatia; this provided insight into actual working conditions across schools differing in size, spatial capabilities, and geographical location.

Of the 523 responses collected, 410 (78.4%) pertain to main schools (central institutions), while 113 (21.6%) relate to satellite schools (detached facilities). This distribution reflects the actual structure of the primary school network in Croatia, where satellite schools are often located in smaller settlements with limited spatial resources. Smaller schools predominate in terms of size: as many as 251 responses (48.0%) came from schools with fewer than 200 pupils, confirming the significant fragmentation and the prevalence of small schools in rural areas.

Table 1. Distribution of surveyed schools by size (number of pupils)

School size (number of pupils)	N	%
Less than 200	251	48,0 %
200 – 300	67	12,8 %
300 – 400	63	12,0 %
400 – 500	49	9,4 %
500 – 600	36	6,9 %
600 – 800	36	6,9 %
More than 800	20	3,8 %
TOTAL	523	100,0 %

3.1. Availability and condition of playgrounds and courtyards

The sports hall is a key space for conducting practical activities, including traffic situation simulations, bicycle riding practice, and demonstrations of traffic rules in a controlled environment. Questionnaire results show that 328 schools (62.7%) have their own sports hall, while 34 schools (6.5%) use the facilities of another institution. As many as 134 schools (25.6%) do not have a sports hall at all, which poses a significant limitation for carrying out practical activities, particularly during winter or rainy weather (Fig. 2.).

An assessment of the condition of sports halls—where they exist—shows that 185 schools (35.4%) rate the condition of their hall as good, 116 (22.2%) as satisfactory, and 58 (11.1%) as poor. It is worth noting that 75 schools (14.3%) do not use a sports hall for practical instruction, pointing to organizational and spatial challenges that go beyond the mere question of whether such a facility exists. Respondents' open-ended comments frequently describe the condition of flooring, windows, lighting, and changing rooms as inadequate for modern teaching needs; furthermore, some halls are shared with external users (such as sports clubs or other schools), which further reduces their availability during school hours.

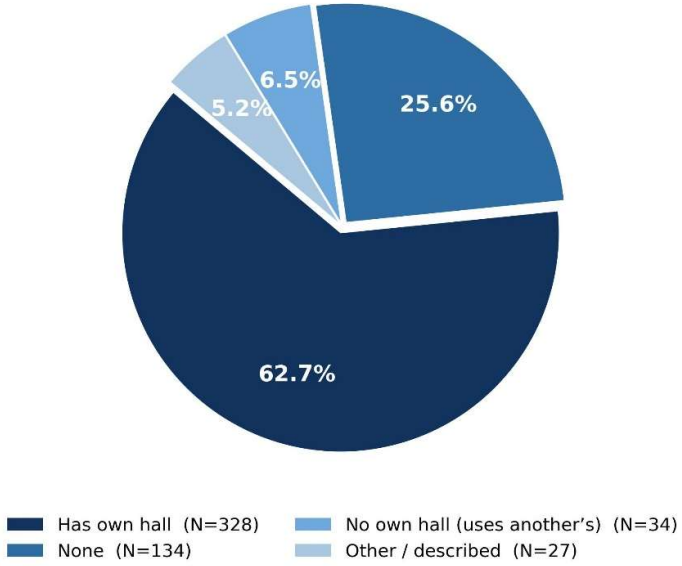


Fig. 2. Possession of a sports hall (N = 523 schools/locations)

3.2. Availability and condition of the sports hall

School playgrounds and courtyards are particularly important for conducting outdoor traffic-related activities, simulating traffic scenarios involving bicycles, and setting up traffic safety grounds. The results show that 361 schools (69.0%) have their own playground, while 39 schools (7.5%) use the playground of another institution. However, 100 schools (19.1%) have no playground at all, while the status of the remaining schools is described as temporary due to ongoing construction or renovation (Fig. 3.).

An assessment of the condition of school courtyards and playgrounds is presented in the following chart, which compares three key indoor and outdoor school spaces. The comparison reveals that school courtyards are relatively accessible and rated somewhat more favourably than sports halls and playgrounds; however, a significant proportion of respondents do not use them for practical instruction, primarily due to inadequate surfacing, a lack of equipment, or organizational constraints.

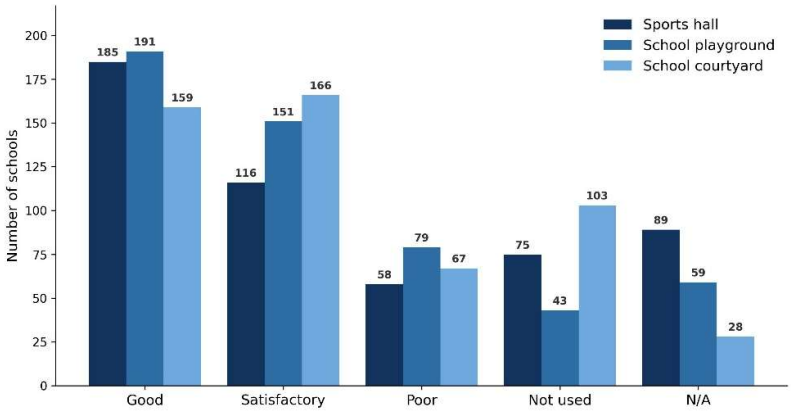


Fig. 3. Assessment of the condition of school premises for conducting practical classes (N = 523 schools/locations)

3.3. Availability and use of the traffic training ground

A traffic training ground (or traffic practice area) is one of the most important spaces for conducting practical traffic-related activities, particularly for bicycle training, demonstrating traffic rules, and simulating traffic situations with pupils. Questionnaire results reveal significant disparities in the availability of these facilities among schools across Croatia.

A particularly concerning finding is that only 112 schools (21.4%) use a traffic training ground for instruction, while as many as 407 schools (77.8%) do not utilize this infrastructure. The reasons for this are manifold: significant distance to the nearest ground (Fig. 4.), insufficient time allocated for organizing visits, a lack of companions for pupils, and logistical constraints.

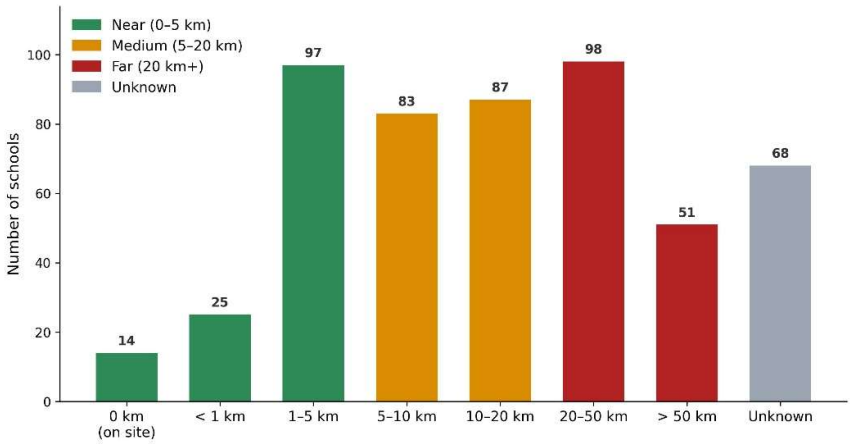


Fig. 4. Distance to the nearest traffic training ground (N = 523 schools/locations)

When the use of a traffic training ground is examined in relation to school size, one might expect larger schools to have a clear advantage, given their greater number of pupils, larger capacities, and more frequently urban location (Fig. 5.). However, the data does not reveal such

a difference. Even the size categories with the highest usage do not exceed approximately 35–36% of schools, while the smallest schools remain around 16%. This suggests that the limited use of traffic training grounds is not confined to a single category of school but rather extends across schools of all sizes. In other words, the availability of practical traffic surfaces appears to be a matter that transcends school size, pointing instead to a broader, systemic shortage of accessible infrastructure.

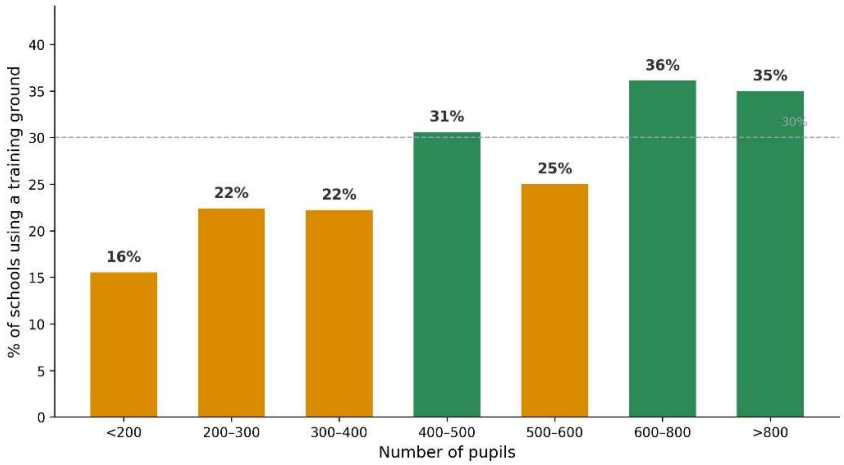


Fig. 5. Use of the traffic training ground based on school size (N = 523 schools/locations)

3.4. Non-material challenges in conducting classes outside the classroom

Respondents could select multiple organizational and institutional difficulties encountered when conducting instruction outside the classroom. The results reveal a complex picture of intertwined organizational, safety, and logistical challenges that limit the implementation of traffic-related and practical activities outside the classroom environment.

Table 2. Non-material challenges of teaching outside the classroom (top 10, multiple choice)

Type of challenge	N	%
Limited availability of space	160	30,6 %
Schedule overlap with other classes	110	21,0 %
Security protocols make organization difficult	92	17,6 %
Environmental distractions (noise, passers-by)	83	15,9 %
Overcrowding / too many users of the space	71	13,6 %
Time lost upon departure/return	67	12,8 %
Organization of larger groups outdoors	54	10,3 %
Lack of support (staff, supervision)	47	9,0 %
Administrative obstacles, approvals	47	9,0 %
External users of the premises	46	8,8%

The most prevalent difficulty is the limited availability of space, which is cited by 160 schools (30.6%), which is in line with the previously described space limitations. This is followed by

overlapping schedules with other classes (110 schools; 21.0%), security protocols that make organization difficult (92 schools; 17.6%) and distractions from the environment such as noise and passers-by (83 schools; 15.9%). Crowding and too many users of the space were recorded in 71 schools (13.6%), while 67 schools (12.8%) highlighted the loss of time when leaving and returning to the classroom.

3.5. Summary of findings

The collected data clearly confirm that the spatial and organizational conditions for implementing traffic-related content within Technical Culture classes vary significantly from school to school. More than a quarter of the surveyed schools lack their own sports hall, nearly a fifth do not have a school playground, and only 2.9% possess a traffic training ground on their premises. Moreover, as many as 77.8% of schools do not utilize a traffic training ground in their instruction, indicating a systemic lack of infrastructure for delivering practical traffic education.

Schools with extensive outdoor areas can offer pupils the opportunity to engage in various practical activities, such as simulating traffic scenarios, cycling on makeshift traffic grounds, practicing proper pedestrian and cyclist movement, and demonstrating traffic rules in real-world settings. Conversely, schools with limited space often focus on conducting activities within the classroom using models, mock-ups, and simulations.

These disparities between schools are particularly evident in urban areas, where schoolyards are often small and some schools lack access to traffic grounds or large outdoor spaces. Under such conditions, teachers are frequently compelled to adapt their activities to the available space and the time constraints of the lesson.

These findings have direct implications for the development of future curricular solutions. Increasing the number of teaching hours for Technical Culture and implementing the all-day school model could create opportunities for the higher-quality delivery of traffic-related activities; however, without parallel investment in school traffic infrastructure and the resolution of organizational obstacles, this potential cannot be fully realized.

The data obtained can serve as an important foundation for considering future curricular solutions, particularly in the context of increasing instructional hours for Technical Culture and developing the all-day school model; these developments offer the opportunity to expand practical activities and improve the delivery of traffic-related content in primary education.

4. OPPORTUNITIES FOR DEVELOPING TRANSPORT-RELATED CONTENT WITHIN THE NEW CURRICULUM AND THE ALL-DAY SCHOOL MODEL

Discussions regarding amendments and additions to the new Technical Culture curriculum offer an opportunity to consider the further development of traffic safety-related content and its more effective implementation in primary education. An analysis of the current situation reveals that traffic safety-related topics already possess significant practical potential; however, their implementation often depends on available teaching hours, the school's spatial constraints, and organizational conditions.

One significant change associated with the new all-day school model is the increase in teaching hours for Technical Culture in the fifth and sixth grades. This organizational structure enables better planning of practical activities, extended time for project work, and greater pupil engagement in experiential learning through traffic safety-related topics.

Although the existing model fosters basic traffic literacy and a culture of safety among pupils, opportunities for a more in-depth exploration of traffic topics and more systematic practical work

often depend on the teacher's additional effort, the school's organizational capacity, and the availability of suitable space for activities.

Increasing the number of teaching hours in the new curriculum allows for a more gradual acquisition of content, more time for experiential learning, and better organization of practical work. This creates the possibility of viewing traffic safety-related content not merely as a theoretical unit, but as an ongoing area for developing pupils' functional knowledge, safety awareness, and technical competencies.

An increased number of teaching hours would facilitate a more gradual and detailed mastery of traffic safety-related content, allow more time for practical work, and strengthen the link between theoretical concepts and real-world traffic situations. Through these additional activities, pupils could devote more time to modelling traffic scenarios, working on traffic training grounds, planning their route to school and the other routes they use in everyday life and engaging in simulations and project tasks that foster a culture of road safety and safety awareness.

Integrating traffic safety-related topics with other areas of technical culture and STEM offers significant potential. These topics can be linked to technical drawing, modelling, spatial planning, digital tools, the analysis of traffic scenarios, and modern transport technologies. Such an interdisciplinary approach enables pupils to develop practical knowledge and gain a better understanding of the transport challenges facing modern society.

Within the framework of the all-day school model, extracurricular activities, project-based learning, and various forms of field-based and experiential learning provide additional opportunities to develop traffic safety-related content. This would facilitate more practical activities outside the classroom, foster collaboration with the local community and transport experts, and increase pupil engagement with real-world traffic situations and issues.

However, the quality of the implementation of traffic safety-related content will continue to depend largely on the actual working conditions in schools. Increasing instructional hours and expanding the curriculum could represent a significant step toward higher-quality traffic education; yet, successful implementation will require adequate facilities, traffic training grounds, equipment and materials for practical work, and an organizational structure that fosters active pupil participation.

Traffic safety-related content within Technical Culture classes has the potential to become an even more significant component in developing pupils' functional knowledge, safety culture, and technical literacy.

Amendments and additions to the Technical Culture curriculum offers the opportunity to expand traffic-related content to include topics that are increasingly important in pupils' daily lives. In addition to basic traffic rules and signage, greater emphasis can be placed on:

- safety of pedestrians, cyclists and users of personal transport devices
- responsible behavior in traffic
- risk assessment and making safe decisions
- visibility of road users
- impact of distractions and technology on traffic safety
- traffic in urban environments
- sustainable mobility and eco-conscious transport
- traffic situations from pupils' everyday lives.

5. CONCLUSION

Traffic safety-related content within Technical Culture classes plays a vital role in developing traffic literacy, safety awareness, and practical competencies among primary school pupils. The existing curriculum provides a solid foundation for acquiring basic traffic knowledge and

fostering safe traffic behaviour; the instruction is particularly valuable due to its emphasis on practical work, the modelling of traffic situations, and experiential learning.

An analysis of how traffic safety-related content is implemented reveals that practical activities play a significant role in understanding traffic dynamics and developing functional knowledge, while also highlighting challenges related to available teaching hours, school facilities, and organizational constraints. Opportunities for practical work often depend on the availability of school grounds, traffic training grounds, and material resources, resulting in inconsistent implementation levels across different schools.

The proposed amendments and additions to the curriculum and the increase in teaching hours for Technical Culture in the fifth and sixth grades offer the potential for a higher-quality and more comprehensive approach to traffic safety-related content. Greater scope for practical work, project-based activities, experiential learning, and contemporary traffic topics can foster a culture of traffic safety and awareness among pupils, enabling a more modern approach to traffic education in primary schools.

Traffic safety-related content holds significant potential for linking pupils' technical, safety-related, and functional knowledge with real-life situations. Consequently, future curricular changes present an opportunity to further strengthen practical work and modern teaching methods, thereby enhancing the quality of traffic education within Technical Culture classes.

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