



Urgency of early traffic education: A systematic review of Indonesian policy implementation

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ABSTRACT

The high rate of traffic accidents in Indonesia involving children underscores the urgent need for preventive strategies, such as early traffic education, which is not yet systematically integrated into the national curriculum. This study systematically reviews existing policies and the implementation of early traffic education in Indonesia, comparing them with international best practices to propose an integrated framework for improvement. A systematic literature review was conducted on sources from 2019 to 2025, utilizing VOSviewer for a bibliometric analysis to map thematic clusters from relevant articles. The analysis revealed four dominant themes, with a central finding being the lack of structural integration of traffic education in Indonesian schools, which contrasts sharply with the successful interactive models abroad. The findings underscore the urgency of embedding traffic education into the formal curriculum as a component of character building. Key recommendations include formulating a national policy, enhancing teacher training with active learning methods, developing contextual media, and fostering cross-sectoral collaboration to cultivate a sustainable road safety culture.

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ABSTRAK

Tingginya angka kecelakaan lalu lintas di Indonesia yang melibatkan anak-anak menyoroti kebutuhan mendesak akan strategi preventif seperti pendidikan lalu lintas usia dini, yang belum terintegrasi secara sistematis ke dalam kurikulum nasional. Penelitian ini bertujuan meninjau secara sistematis kebijakan dan implementasi pendidikan lalu lintas usia dini di Indonesia, membandingkannya dengan praktik terbaik internasional untuk mengusulkan kerangka kerja terpadu. Kajian literatur sistematis dilakukan terhadap sumber dari tahun 2019 hingga 2025, dengan memanfaatkan VOSviewer untuk analisis bibliometrik guna memetakan kluster tematik dari artikel relevan. Analisis mengungkapkan empat tema dominan, dengan temuan utama berupa tidak adanya integrasi struktural pendidikan lalu lintas di sekolah Indonesia, yang sangat kontras dengan model interaktif yang berhasil di luar negeri. Temuan ini menggarisbawahi urgensi untuk memasukkan pendidikan lalu lintas ke dalam kurikulum formal sebagai komponen pembentukan karakter. Rekomendasi utama mencakup perumusan kebijakan nasional, peningkatan pelatihan guru dengan metode pembelajaran aktif, pengembangan media kontekstual, dan pembinaan kolaborasi lintas sektor untuk menumbuhkan budaya keselamatan jalan yang berkelanjutan.

Kata Kunci: budaya keselamatan jalan; integrasi kurikulum; pendidikan lalu lintas usia dini

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INTRODUCTION

Traffic problems are a serious challenge in many countries, including Indonesia, along with population growth and motor vehicle ownership, which trigger an increase in the number of accidents, especially among children and adolescents. The growth in the number of vehicles in major cities in Indonesia has shown an increasing trend from year to year. However, this increase has not been offset by adequate road infrastructure capacity, resulting in congestion in many areas. Additionally, the current traffic management system has not demonstrated optimal performance and remains characterized by irregularity. Therefore, an effective and integrated approach is needed to overcome traffic congestion problems sustainably (Harahap et al., 2019). According to data from the National Police Traffic Corps, in 2024, there were 28,000 traffic accidents. Traffic violation data in Lumajang Regency for 2017 showed that the student age group accounted for the majority of violations. There were 1,678 cases recorded involving violators aged 0-15 years, while in the 16-21 age group, the number of violations reached 3,728 cases. This finding indicates a high rate of violations among adolescents and students (Sholihin, 2023).

WHO (2022) statement states that road traffic accidents are the leading cause of death globally for the 5-29 age group. Children aged 6-10 years have a four times higher risk of injury than adults (Zare et al., 2019). While developed countries have experienced a decline in child accidents, according to the OECD, child road safety remains a critical issue in low- and middle-income countries. In Iran, Road Traffic Injuries (RTIs) are the leading cause of injury and the second leading cause of death. In recent years, like most developing countries, various interventions and programs have been designed. Moreover, implemented to reduce RTIs (Aghdam et al., 2020). WHO emphasizes the importance of strategic measures to improve road safety through education and traffic skills (Kourmousi et al., 2024). Law of the Republic of Indonesia Number 22 of 2009 stipulates that the primary objective of the government in organizing traffic and road transportation is to achieve a safe, secure, fast, smooth, orderly, and regular transportation system through the implementation of management, traffic engineering, and traffic regulations (Sholihin, 2023). A safe transportation system, especially for road users, both adults and children. These regulations, along with several others, need to be understood in conjunction to prevent deaths due to traffic accidents.

A lack of understanding of traffic rules is one of the primary causes of road accidents and fatalities, underscoring the importance of early traffic education as a long-term preventive measure. Socialization conducted at Lagosi Junior High School showed significant improvement in students' understanding and positive attitude towards traffic safety (Ali et al., 2024). In Greece, traffic education was implemented through the E-drive Academy interactive program at the primary school level, which proved effective in improving traffic skills and preventing risky behavior (Kourmousi et al., 2024). Support for the use of digital technologies, such as electronic games, which showed a positive relationship between game use and traffic behavior, as well as their potential in building a culture of safety (Gounaridou et al., 2021; Riaz et al., 2019).

Research in the Czech Republic and Central Europe Reveals That Transportation education is an integral part of basic education. Research was conducted with 644 responses from grade

4 elementary school teachers. The practical part of Traffic Education (TE) was primarily implemented in the traffic playground (86%). Schools also implement TE through lectures with external parties, such as the police (38%), and holding TE project days (30%), with the results that students' safe traffic behavior was clearly visible in TE (Drimlová & Sucha, 2025). Further research investigated the effects of active learning-based educational interventions on road crossing behavior in seven-year-old children. This study was conducted in Mehriz City, Iran. Participants were randomly divided into two experimental groups (n = 103, Active Learning [AL]-based training group (n = 52) and Active Learning with Parental Involvement [PI & A.L]-based training group (n = 51) and one control group (n = 46, no training group). Results confirmed the positive effect of active learning-based education with a parental involvement approach on improving road crossing behavior of 7-year-old children (Zare et al., 2019).

This study presents a novel contribution by positioning early traffic education not merely as a set of technical driving instructions but as a strategic component of character formation, civic responsibility, and behavioral discipline within the basic education curriculum. While numerous initiatives have emerged globally, including in Indonesia, the systemic integration of traffic education into school curricula remains limited and inconsistent. This review synthesizes the best international practices, such as the incorporation of traffic safety into Physical Education, use of interactive and localized learning modules, and the promotion of active transportation through games and physical activities, to show how road safety education (RSE) can be both engaging and impactful for children aged 6 to 12. Furthermore, the study underscores the pivotal role of teacher training in delivering effective RSE, emphasizing that educators' preparedness and attitudes are central to fostering a safety-oriented culture in schools. By aligning with Sustainable Development Goal (SDG) 3.6, which aims to halve global deaths and injuries from traffic accidents by 2030, this research offers an integrated and context-sensitive framework for sustainable traffic education reform.

The primary issue with traffic education in Indonesia is that it has not been systematically integrated into the formal educational curriculum. Currently, traffic education is only provided on a limited basis through sporadic activities in certain areas, such as Desa Tertib Lalu Lintas Kebak, Karanganyar, which collaborates with the police through role-playing methods and routine socialization with children aged 7-13 years (Dea & Trisiana, 2020). Furthermore, the implementation of socialization at the primary to secondary school level in certain areas, such as Central Java, has not been accompanied by adequate training for educators (Wahyono et al., 2022). Other barriers include the absence of a binding national policy, low public awareness, and weak law enforcement. Although the approach to traffic education has shifted towards developing attitudes and values for safe traffic behavior, there is a limited amount of research that systematically examines the policy and implementation of early traffic education in Indonesia.

The purpose of this study is to compile a systematic review of policies and the implementation of early childhood traffic education in Indonesia. This study aims to: 1) identify and analyze applicable policies related to traffic education; 2) evaluate the implementation practices of traffic education at the elementary education level; and 3) provide strategic recommendations based on literature to strengthen the integration of traffic education in the national education system. The urgency of this study lies in the need to establish a robust policy foundation for forming a generation that is aware of and concerned about traffic safety.

With an educational approach that begins early, it is hoped that changes in the behavior of Indonesian people on the road will occur in the long term, ultimately reducing the number of accidents and promoting highway safety.

LITERATURE REVIEW

The importance of traffic education for urban communities in Indonesia

The urgency of traffic education is increasingly recognized, not only as a response to the growing number of accidents, but also as a crucial systemic intervention to establish a sustainable road safety culture. Traffic violations, being the leading cause of accidents, have shown that human factors still play a dominant role in traffic incidents, both through driver and pedestrian behavior (Santos et al., 2021; Tan et al., 2022). In this context, traffic education cannot be narrowly understood as formal instruction or technical courses alone. However, it should be designed as a cross-age and cross-context, personalized learning process. Research indicates that children benefit from pedagogical approaches that align with their stage of cognitive development, such as child-centered models and game-based learning. In addition, school and community engagement is integral to the collective responsibility of ensuring children's safety on the way to and from educational settings (Santos et al., 2025).

This urgency is also reflected in the importance of multisectoral collaboration and moral construction as the cornerstone of developing a safe traffic culture, especially among young drivers and urban communities. As such, traffic education should be positioned as a strategic agenda that combines education, systems engineering, and social values to create a safe, inclusive, and sustainable transportation system for all. Traffic education is no longer seen as a separate effort, but as an integral and sustainable part of developing a safe transportation system. However, empirical evidence on the direct effectiveness of this education in reducing crash rates is still relatively limited and has not shown strong consistency. This highlights the urgency of formulating a context-based strategy that includes the integration of school education, driver awareness, and road infrastructure improvements as an integrated approach to improving traffic safety. Globally, the issue of traffic education has been recognized as a relevant and important research theme, as demonstrated by previous studies (Ledur, 2024; Riaz et al., 2019; Santos, 2018; Santos, 2021; Sarto & Gimenez-Paschoal, 2020; Sousa et al., 2020). Based on these findings, traffic education is viewed as a strategic approach to promoting traffic law awareness among learners of various age groups, as well as the broader community, thereby contributing to safety. The importance of this initiative is further reinforced by the fact that traffic violations are one of the leading causes of accidents, which is significantly correlated with people's perceptions and attitudes towards road safety.

The Urgency of Early Traffic Education

Traffic education plays a strategic role in shaping safe, responsible, and rule-conscious behavior from an early age. Children aged 0–6 are in a critical phase of character and socio-emotional development, making it essential to introduce traffic safety principles in a structured and contextually relevant manner (Indarti, 2021; Rusli et al., 2023). This

education not only introduces traffic signs but also nurtures awareness, discipline, and social responsibility. From a developmental perspective, Piaget's cognitive theory emphasizes the importance of introducing traffic concepts during the pre-operational and concrete operational stages, utilizing visual aids, games, and simulations to facilitate learning. Meanwhile, Bandura's social learning theory emphasizes the importance of behavioral modeling by figures such as teachers or traffic officers to encourage prosocial actions (Sumianto et al., 2024). The synergy of cognitive and social learning approaches forms the basis of effective early childhood traffic education. Erikson emphasized the importance of the initiative versus guilt stage at this age, where children learn to take initiative through play and interaction with the social environment in a safe manner.

A suitable educational approach is Developmentally Appropriate Practice (DAP), which prioritizes learning through real-world activities and scaffolding support from adults, tailored to the child's zone of proximal development. A UK study found that adult-led training significantly improved children's ability to judge safe places and understand traffic dynamics, leading to more adult-like pedestrian behavior (Zare et al., 2019). The US NHTSA organization also emphasizes that complex skills, such as understanding distance, speed, and traffic prediction, do not develop automatically but must be taught through repetition and reinforcement.

Several countries have successfully integrated traffic education into their national education systems. In Indonesia, Law No. 22 of 2009 emphasizes the importance of traffic safety, yet it lacks a mandate for its inclusion in early childhood education. Several cities in Indonesia have initiated promising programs. Traffic education parks in Salatiga and Klaten provide experiential learning environments, while the "Road Transport Safety Preparedness" program in Tegal has improved children's understanding of traffic signs and safety equipment (Pembuain & Mattitaputti, 2024). These practices reflect the growing awareness and potential of localized interventions.

Despite good practice, implementation faces persistent challenges. Studies show that lecture-based methods still dominate, while teacher training, standardized materials, and formal guidelines are lacking (Hidayati et al., 2024; Rosyiddin et al., 2023). Conversely, research suggests that play-based learning, interactive simulations, and participatory methods have a more significant impact on children's behavior and awareness (Rahman, 2019; Saputro et al., 2020).

Implications for National Policy and Curriculum

The rising incidence of traffic-related accidents involving children in Indonesia highlights an urgent need to formalize traffic education within the broader national character development agenda. Although macro-level policies advocating road safety are in place, their implementation at early childhood and primary education levels remains inconsistent and insufficiently structured. This gap underscores the need to integrate traffic education as a core component of comprehensive curriculum reform. Establishing a sustainable traffic safety culture requires the early institutionalization of traffic education within national character-building efforts. Designing a national curriculum that is child-centered and informed by

cognitive-social learning theories, while also integrating community-based learning strategies, is critical to achieving long-term behavioral change.

A well-designed curriculum must be grounded in sound theoretical frameworks and aligned with the socio-cultural context. Empirical studies have demonstrated that child-centered pedagogical models, particularly those grounded in cognitive-social theories and experiential learning within community settings, are more effective in shaping students' attitudes and behaviors (Kaizar & Alordiah, 2023). Nations such as Japan and Germany have successfully implemented such models through interactive simulations, structured pedestrian education, and collaborative parent-teacher initiatives (Alizadeh & Habibi, 2025). In contrast, Indonesia's current curriculum tends to marginalize traffic education, often relegating it to extracurricular activities or incidental content areas, thereby limiting its pedagogical effectiveness and impact.

Furthermore, the integration of traffic education into national curricula necessitates coherent intersectoral policy alignment. Ministries of Education, Transportation, and Health, along with law enforcement agencies and local communities, must collaborate in the design, implementation, and evaluation of early road safety programs. In the Indonesian context, the lack of institutional synergy has led to uneven and fragmented implementation. Policy coherence can be strengthened through the development of national standards, teacher training modules, and age-appropriate instructional materials grounded in evidence-based practices. To ensure equity and sustainability in educational reform, disparities in access to quality traffic education across diverse geographic and socioeconomic contexts must be addressed. Leveraging digital learning platforms, mobile teaching units, and locally adapted learning materials in regional languages can help bridge gaps, particularly in underserved or rural areas. Additionally, the long-term success of these reforms depends on continuous monitoring, longitudinal impact evaluations, and regular curriculum renewal informed by data and stakeholder feedback. Without robust mechanisms for measuring behavioral outcomes and learning effectiveness, traffic education risks becoming symbolic rather than transformative.

METHODS

This study employs a systematic literature review method to examine several articles related to Traffic Education. The data sources obtained are from Google Scholar articles searched using Publish or Perish (POP) with Vosviewer. This systematic review examines the policy dynamics, institutional structures, and cross-sector collaborations that support and hinder the implementation of SSA principles. It is hoped that the results of this synthesis will provide a basis for developing evidence-based safety strategies that are more effective and adaptive to local challenges (Khan et al., 2024). There is a negative correlation between the intensity of traffic safety education and the incidence of traffic accidents—greater exposure to traffic education and awareness campaigns tends to correspond with a lower likelihood of accidents. While student motorcyclists generally demonstrate a sound theoretical understanding of traffic safety, their consistency in applying this knowledge remains inadequate.

Consequently, it is essential to enhance the frequency and reach of traffic education initiatives to ensure that all students have equitable access to this critical information

(Subaryata et al., 2022). This study is based on several questions: 1) How should traffic policies be applied to the elementary school curriculum?; 2) What are the dominant themes in elementary school traffic policy studies?; 3) What types of mapping are used in elementary school traffic implementation policies?; 4) What topics are related to the urgency of Traffic Education policies? The article review process is carried out in two stages: article search and topic mapping, followed by an analysis of topics and a discussion of concepts related to early traffic education policies and their implementation in Indonesia. This review is based on structured steps aimed at identifying, evaluating, and synthesizing methodologically relevant literature. This review focuses on early traffic education in the context of policy and implementation in Indonesia. Keywords: traffic education, traffic safety, and policy, with the categories article title, abstract, keywords, in the period 2020 - 2025, by obtaining Overlay Visualization data in 2025 (see **Figure 1**).

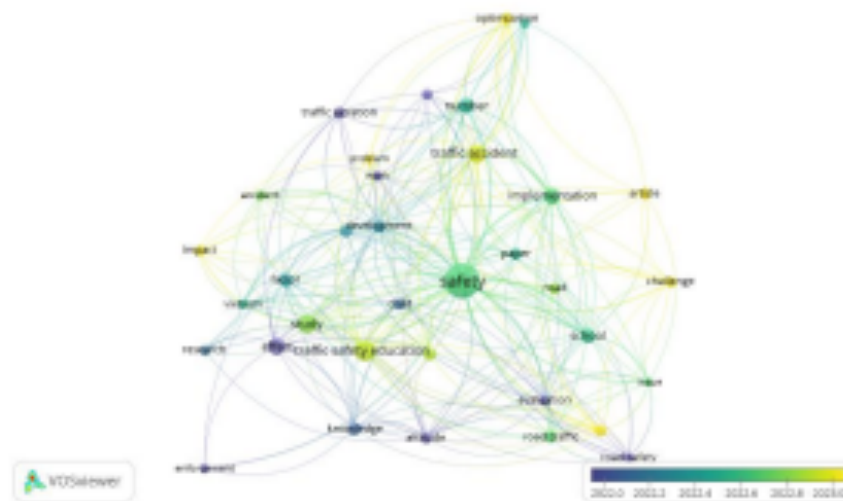


Figure 1. Overlay Visualization
Source: VosViewer 2025

RESULTS AND DISCUSSION

In this context, the presentation of the results and discussion is illustrated through several visualizations directly related to the research focus. The novelty of this research is achieved through a bibliometric analysis approach, carried out with the help of VOSviewer software. The results of this analysis categorize the discussion into four main clusters (see Figure 2), each representing dominant themes identified from approximately 100 articles accessed through Google Scholar. This figure displays the keyword co-occurrence network from around 100 articles reviewed through Google Scholar. This visualization consists of four clusters (marked with different colors), each of which shows the relationship between dominant themes. The size of the circle (node) indicates the frequency of occurrence of a keyword, while the thickness of the line indicates the strength of the relationship between keywords.

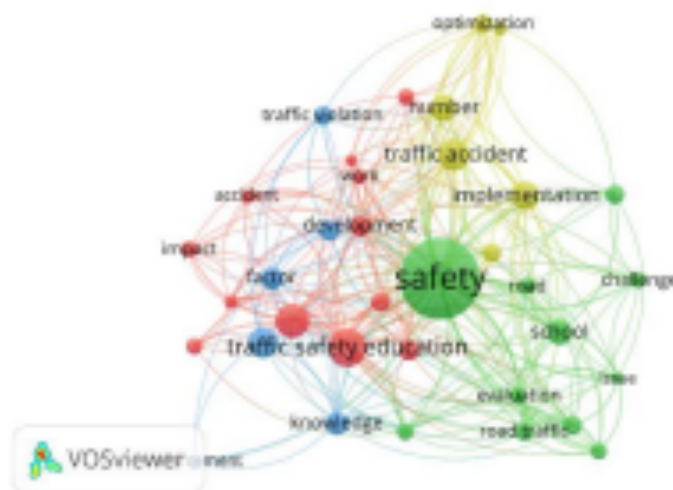


Figure 2. Network Visualization
Source: VosViewer 2025

Based on bibliometric analysis and VOSviewer visualizations, this paper identifies thematic clusters in research related to traffic policy, particularly in the educational context. This discussion aims to reveal the essence of these findings and relate them to the research questions at hand.

Implementation of traffic policies in the elementary school curriculum

Based on VOSviewer analysis, the green and red clusters directly inform the implementation of traffic safety policies in elementary schools. The green cluster, which focuses on policy implementation and program evaluation, emphasizes the need to integrate traffic safety initiatives into the education system. This suggests that implementation cannot be partial or ad hoc but must be an integral part of the formal curriculum. Ideally, policy implementation should encompass several key aspects, including. Traffic education programs should be designed with clear learning objectives that align with the cognitive development of elementary school-aged children. Materials should include an introduction to traffic signs, an understanding of road etiquette, and basic safety practices, such as how to cross a street safely.

Traffic safety issues can be integrated into various subjects, not just the curriculum to which they are directly relevant. For example, accident data can be discussed in math lessons, or road etiquette can be discussed in moral education lessons. The green cluster also highlights the importance of program evaluation. Implementation should be accompanied by mechanisms to measure its effectiveness, such as pre- and post-program student knowledge surveys or analysis of student behavior data within the school. These evaluation results are crucial for identifying systemic challenges and implementing comprehensive improvements.

Dominant themes in elementary school traffic policy studies

The bibliometric analysis visualized by VOSviewer in **Figure 3** clearly identifies four dominant themes that are the primary focus of traffic policy studies. 1) Traffic Safety Education Red

Cluster, this theme is most relevant to the elementary school context. Studies in this cluster focus on the critical role of education in preventing accidents and its impact on awareness of risk factors. This includes the development of educational interventions and analysis of the long-term impact of structured programs; 2) Blue Cluster, Violations, and Law Enforcement. This cluster highlights the correlation between an individual's knowledge of traffic laws and their driving behavior. While focusing on violations, this cluster emphasizes that early legal education (such as that taught in elementary school) is the foundation for reducing future violations; 3) Green Cluster, Policy Implementation and Program Evaluation. This theme focuses on the practical aspects of implementing traffic safety policies, particularly in schools. This cluster highlights implementation challenges and the importance of evaluating program effectiveness to ensure the policy's sustainability and success; 4) Yellow Cluster, Traffic Accidents and Prevention Strategies. This cluster highlights the connection between structured policy implementation and traffic optimization, leading to reduced accident rates. This theme demonstrates that traffic education in schools is an integral part of a broader, data-driven prevention strategy at the national level.

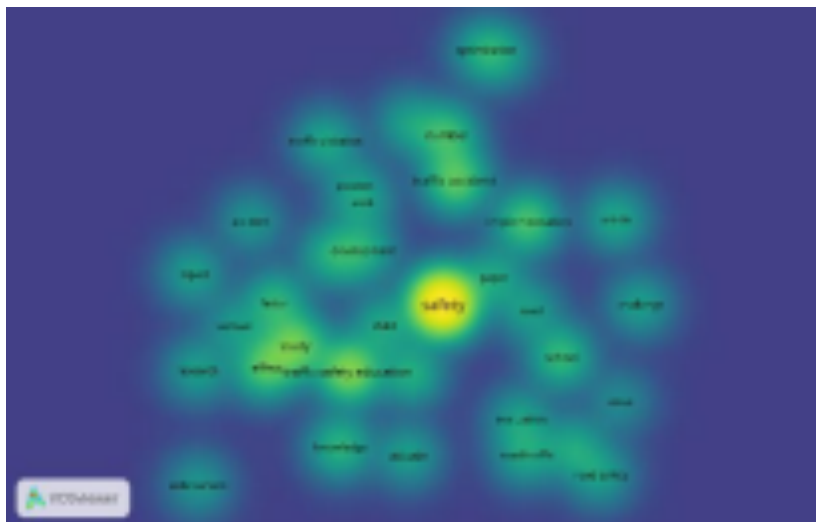


Figure 3. Density Visualization
Source: Vosviewer 2025

The urgency of traffic education policy can be understood through a synthesis of findings from all identified clusters. Topics demonstrating this urgency include the red and yellow clusters, which indicate that early childhood traffic education is the foundation for building a safety culture. By instilling awareness and knowledge from an early age, potential accidents can be proactively prevented, rather than relying solely on reactive intervention after an accident occurs. The blue cluster suggests that legal education can prevent future violations. Legal literacy instilled from an early age will create a generation of more compliant and responsible road users. The green cluster highlights the fact that traffic policy implementation in school environments faces various technical and contextual challenges. These challenges underscore the need for developing comprehensive and structured policies with the full support of policymakers. The density visualization shows that the keyword "safety" is at the center and has the highest density, indicating that traffic safety remains a critical and unresolved issue. This fact underscores the urgency of continued research and the implementation of effective policies.

Discussion

Vosviewer's study on network visualization comprehensively explains the urgency of implementing traffic education policies in Indonesia, supported by four main thematic clusters. The first cluster, referred to as the Red Cluster, focuses on traffic safety education, with an emphasis on key terms such as education, impact, development, and crashes. In this context, the experience of traffic education at the primary level globally, which highlighted the importance of hands-on experiences, curricula, and their impact on child safety as the core of this cluster (Santos et al., 2025). This research strongly suggests that early childhood education plays a key role in shaping long-term safety awareness. The second cluster, or Blue Cluster, focuses on knowledge, violations, and enforcement, with keywords including traffic violations, enforcement, and knowledge. These methods have been tested and proven effective for teaching students to strengthen their understanding of traffic laws (Lawer et al., 2025). The relevance of the themes of violations and knowledge makes this research particularly important in this cluster, confirming that an early understanding of the law can prevent violations in adulthood, thus supporting education-based preventive policies. The third cluster, the Green Cluster, addresses evaluation and implementation in schools, with keywords including schools, challenges, evaluation, and road safety. The studies included in this cluster evaluate the implementation of traffic education in primary schools from the perspective of teachers. Challenges and effectiveness in the school environment, as well as the vital role of teachers in successful policy implementation (Drimlová & Sucha, 2025).

Finally, the fourth cluster, the Yellow Cluster, is related to optimization and accident prevention strategies, with keywords such as implementation, traffic accidents, numbers, and optimization. Conducted research on implementation optimization strategies based on the number of accidents. This research is highly relevant for data-driven policy analysis aimed at systematically reducing the number of crashes, with traffic education being one of the primary approaches (Walugembe et al., 2025). Overall, these visualizations show that the urgency of early traffic education has a strong scientific basis. This includes accident prevention through shaping children's knowledge and attitudes, as reflected in the Red Cluster and Green Cluster. Additionally, legal compliance, emphasized in the Blue Cluster, is an important pillar from an early age. Furthermore, optimizing data-driven policies to reduce crash rates, outlined in the Yellow Cluster, demonstrates a measured approach. Finally, the importance of evaluating and strengthening implementation in schools as social and cultural learning spaces for traffic confirms the crucial role of educational institutions in shaping public behavior and awareness.

Vosviewer's study on density visualization provides a comprehensive explanation. This analysis underscores the importance of early childhood traffic education as a vital strategy in promoting a sustainable safety culture. Traffic education was not limited to schools. In a society where the use of cars was rapidly increasing, traffic awareness became an urgent necessity for the wider public. This knowledge encompasses both theoretical and practical aspects, relevant to nearly all citizens—from drivers to pedestrians—since they are all part of the same traffic system. It was transmitted in various ways, both informally through everyday experiences on the road and formally through driving schools, classroom-based traffic education, and traffic safety campaigns directed at children (Landahl, 2022).

Children are the most vulnerable group on the road, and early habit formation through traffic education acts as a long-term investment in creating safe behavior that will be carried into adulthood. Children's knowledge and awareness of rules, risks, and how to protect themselves on the road must be instilled from an early age, as evidenced by the extensive research in Cluster 3, which highlights the importance of child safety education and research. Early childhood traffic education is also directly correlated with efforts to reduce the risk of accidents in children, as reflected in Cluster 4 (accident, impact) and Cluster 2 (traffic accident, number). By providing the proper knowledge and skills, the potential for children to become victims of accidents can be minimized, making this education a key preventive strategy. In addition, Cluster 1 demonstrates that safety is at the heart of traffic research and policy, with children's education being a crucial pillar in achieving a comprehensive safety vision. Children who understand the concept of safety will grow up to be more responsible drivers or pedestrians. The existence of schools in Cluster 1 and the focus on children in Cluster 3 confirm that schools are a strategic environment for implementing traffic education.

The family environment also plays a crucial role in promoting the development of safety behaviors. Policy support that integrates traffic education into the school curriculum will strengthen efforts to create a culture of orderly traffic. In addition, the keywords factor and evaluation in Cluster 3 indicate that the effectiveness of education is not solely determined by implementation, but also depends on supporting factors and periodic evaluation. This emphasizes the importance of policies that are not only normative but also adaptive and evidence-based through continuous monitoring and evaluation. Incorporating traffic safety into kindergarten curricula plays a crucial role in minimizing future traffic-related risks. It highlights the need for creating interactive and age-appropriate learning materials, while also stressing the importance of cooperation among schools, families, and communities to extend safety practices beyond the classroom. Such an integrated strategy is fundamental for fostering a culture of safety in younger generations (Anggoro et al., 2024). Thus, this item density analysis reveals that the scientific and practitioner communities consistently prioritize children's traffic education as a key focus of important interventions aimed at improving road safety and reducing accident rates, particularly among children. Strengthening integrated and evidence-based policies for early childhood traffic education is urgently needed to shape individual safe behavior and create a better safety culture collectively.

CONCLUSION

Overall, literature and practice indicate that while awareness of the importance of traffic education is increasing, its integration in primary schools remains weak. Existing policies are essentially campaign initiatives rather than standardized curriculum provisions. Classroom implementation faces resource constraints, teacher training needs, and methods that require overhaul. In contrast, international models have shown that structured and enjoyable traffic education can reduce accident rates.

Strategic recommendations: First, the central government should establish an official policy (e.g., Permendikbud) that mandates traffic safety education in the elementary school curriculum, as supported by the National Police and Jasa Raharja. This curriculum should be tiered from lower levels, consistent with Dutch/Japanese practices. Second, increasing teacher capacity through special training and socialization is essential. Training materials can

refer to active learning methods (games, simulations) that have proven effective. Third, the development of textbooks and interactive media (applications, educational videos) needs to be encouraged, for example, by utilizing smartphone technology as proposed by several researchers, so that learning becomes more interesting. Fourth, cross-institutional programs, such as SALUD and cross-curricular development (Korlantas-Kemdikbud), need to be continued consistently.

Collaboration with the business world (such as insurance and automotive) and the community can expand the reach of this education. Fifth, continuous monitoring (implementation of the Dutch-style RSE checklist) is necessary to evaluate the effectiveness of the materials and methods used and to refine them based on evidence. The implementation of these recommendations is expected to strengthen the safety culture among elementary school students, increase the young generation's awareness of traffic, and ultimately reduce the number of traffic accidents significantly.

AUTHOR'S NOTE

The authors declare that there is no conflict of interest related to the publication of this article. The authors emphasize that the data and content of the article are free from plagiarism.

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