



Educational proposal for training responsible citizens through road safety education in Ecuadorian schools

Propuesta pedagógica para la formación de ciudadanos responsables desde la educación vial en escuelas ecuatorianas

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ABSTRACT

Traffic accidents are a priority issue in Ecuador, mainly affecting the young and economically active population. The aim of this research was to develop a comprehensive educational proposal for training responsible citizens through road safety education in Ecuadorian schools. A systematic review was conducted following PRISMA criteria, analyzing 25 specialized references published between 2012 and 2025, including national and international studies. The results present a proposal structured around five strategic areas: specialized teacher training, cross-curricular design, implementation of interactive technological resources, active community participation, and continuous evaluation of educational impact. International evidence confirms that systematic road safety education programs significantly reduce risky behavior and generate multiplier effects in family and community settings. Implementation requires substantial changes in teacher training, curriculum design, and the availability of technological resources, demanding institutional commitment and sustained strategic planning.

Descriptors: civic education; moral education; motor vehicles. (Source: UNESCO Thesaurus).

RESUMEN

Los accidentes de tránsito constituyen una problemática prioritaria en Ecuador, afectando principalmente a población joven y económicamente activa. Esta investigación tuvo por objetivo desarrollar una propuesta pedagógica integral para la formación de ciudadanos responsables desde la educación vial en escuelas ecuatorianas. Se realizó una revisión sistemática siguiendo criterios PRISMA, analizando 25 referencias especializadas publicadas entre 2012 y 2025, incluyendo estudios nacionales e internacionales. Los resultados presentan una propuesta estructurada en cinco ejes estratégicos: formación docente especializada, diseño curricular transversal, implementación de recursos tecnológicos interactivos, participación comunitaria activa y evaluación continua del impacto educativo. La evidencia internacional confirma que los programas sistemáticos de educación vial reducen significativamente comportamientos riesgosos y generan efectos multiplicadores hacia ámbitos familiares y comunitarios. La implementación requiere transformaciones sustanciales en formación docente, diseño curricular y disponibilidad de recursos tecnológicos, demandando compromiso institucional y planificación estratégica sostenida.

Descriptores: educación ciudadana; educación moral; vehículo automotor. (Fuente: Tesauro UNESCO).

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Research articles



INTRODUCTION

Over the last few decades, the number of road accidents in Ecuador has grown exponentially, making this issue an unavoidable national priority. Official records show that traffic accidents are one of the leading causes of mortality and morbidity in Ecuador, particularly affecting the young and economically active population. This reality transcends the health sphere to become an educational challenge that requires comprehensive responses from the national education system.

Understood as a pedagogical process aimed at developing the knowledge, skills, and values necessary for safe participation in road traffic, traffic education is a fundamental strategy for addressing this crisis. In this context, it is worth noting that Algora-Buenafé et al. (2017) identified alarming trends in road accidents in Ecuador during the period 2000-2015, revealing the urgent need to implement preventive measures from the earliest stages of education. In line with this, Aguilera-Almeida and Alcívar-Junco (2024) examined the legal and constitutional dimensions related to traffic accidents in the country, highlighting the importance of addressing this issue from multiple perspectives, including education.

International studies show that road safety education programs implemented in school settings produce significant positive changes in student behavior and attitudes. Specifically, it is worth noting that Alonso et al. (2018) demonstrated that road safety education significantly reduces risky behavior in Spanish children and adolescents, while Ben-Bassat and Avnieli (2016) found that these interventions also favorably modify the behavior of families. Complementarily, Kourmoussi et al. (2024) evaluated the effectiveness of interactive road safety education programs in Greek educational institutions, confirming their transformative potential.

Likewise, the work carried out by Marín-Escobar et al. (2022) in the Colombian context revealed significant effects of road safety training programs on student attitudes and knowledge, while Nawaz et al. (2025a) explored gamified



approaches to digital road safety education, demonstrating the methodological versatility available. This international background provides solid evidence of the effectiveness of systematic road safety education, establishing theoretical and empirical foundations for its implementation in the Ecuadorian context.

However, it should be noted that Oñate-Cervantes (2022) identified substantial limitations in Ecuador's public road safety policies from the perspective of citizen education, highlighting the need to strengthen current pedagogical approaches. In line with these approaches, the results of Chifla-Villon (2025) analyzed road safety education as a means of persuasion in university student environments, suggesting the need for earlier and more systematic interventions.

The purpose of this research is to develop a comprehensive pedagogical proposal for the training of responsible citizens through road safety education in Ecuadorian schools.

Theoretical framework

Conceptual foundations of road safety education

Road safety education is a specialized field of pedagogy that integrates knowledge, skills, and values aimed at developing safe and responsible behavior in public spaces. In this regard, Pacheco-Cortés (2017) argues that road safety education in the digital age should be conceptualized as a permanent process that transcends traditional approaches focused exclusively on normative traffic knowledge. From this perspective, the author proposes a comprehensive approach that incorporates road safety culture and ongoing training as essential components.

In relation to the above, the research carried out by Poó et al. (2015) delves into the relationship between road safety education and mobility during childhood, establishing that educational programs must consider the developmental characteristics of students to maximize their effectiveness. The authors emphasize that road safety education for children requires methodologies



specifically designed for each stage of cognitive and social development, recognizing that children gradually build their understanding of the road environment.

From a technological perspective, it is worth mentioning that Fernández-Escobar et al. (2017) propose teaching-learning models assisted by three-dimensional technologies for road safety education, arguing that these tools significantly increase the effectiveness of the training process. Their proposal integrates elements of virtual reality and simulation that allow students to experience road situations in a safe and controlled manner, facilitating experiential learning without exposure to real risks.

Complementing these perspectives, Abdellah and Rachid (2021) conducted a situational analysis of road safety education in Moroccan primary schools, identifying determining factors that influence the successful implementation of educational programs. Their research reveals the importance of considering contextual, cultural, and socioeconomic variables in the design of educational interventions, an aspect that is particularly relevant for the adaptation of programs in diverse contexts such as Ecuador.

Methodological approaches in road safety education

The specialized literature identifies various methodological approaches for the implementation of school road safety education programs. In this regard, Deepika et al. (2023) developed protocols for teacher-led activity-based learning, emphasizing the importance of the educator's mediating role in the training process. Their methodological proposal integrates active learning strategies that encourage student participation and collaborative knowledge building.

In the specific context of physical education in schools, Follana-Soler et al. (2024) conducted a literature review on road safety education in primary schools, identifying opportunities for the cross-curricular integration of road safety content into different areas of the curriculum. The authors highlight that physical



education offers ideal opportunities for the development of psychomotor skills related to road safety, including coordination, balance, and spatial perception.

Likewise, gamification emerges as a promising methodological strategy according to Nawaz et al. (2025b), who developed playful approaches to digital road safety education aimed at secondary school students. Their research showed that game elements increase student motivation and facilitate the retention of road safety knowledge, especially when combined with interactive technologies and immediate feedback systems.

With regard to digital tools, it is worth noting that the research by Zulkifli et al. (2021) evaluated the satisfaction and learning performance of primary school students who used educational software specialized in road safety, confirming the effectiveness of these tools when they are appropriately designed for the characteristics of the users. Their results suggest that well-designed educational technology can overcome the limitations of traditional approaches (), especially in terms of student motivation and engagement.

Family and community impact of road safety education

Road safety education in schools has effects that transcend the individual sphere to impact family and community dynamics. In this regard, Ben-Bassat and Avnieli (2016) documented that road safety education programs aimed at kindergarten children positively modify the behavior and knowledge of their parents, demonstrating a significant multiplier effect. This phenomenon suggests that children act as agents of change in their homes, transmitting knowledge and promoting safe practices.

Complementarily, Joubert et al. (2012) analyzed the paradoxical situation of road safety education in rural South African schools, identifying specific challenges related to limited road infrastructure and the socioeconomic characteristics of these communities. Their research reveals that rural road safety education requires methodological adaptations that consider the particularities of the local



context, including types of vehicles, road characteristics, and specific mobility patterns.

In terms of community perception, it is worth noting that the research by Nawaz et al. (2025a) explored the perspectives of parents and teachers on the acceptability of child road safety education programs in Pakistan, using mixed methodologies that combined quantitative and qualitative approaches. The results showed that community acceptability is a determining factor for the success of these programs, requiring awareness-raising strategies and active family participation.

Educational technologies in road safety education

The integration of educational technologies into road safety education programs is a growing trend with significant transformative potential. In this regard, Zulkifli et al. (2021) evaluated the satisfaction and learning performance of primary school students who used educational software specialized in road safety, confirming the effectiveness of these tools when they are appropriately designed for the characteristics of the users.

At the same time, Minaya-Vera and Mendoza-Loor (2018) investigated the influence of ICT-based teaching resources in promoting road safety culture among Ecuadorian university students. Their study revealed that the systematic implementation of educational technologies significantly increases the level of road safety knowledge and positively changes students' attitudes towards safety.

For their part, Kourmoussi et al. (2024) evaluated the interactive program "E-drive Academy" in Greek elementary schools, involving 834 fourth-grade students. The results showed that interactive programs generate significant improvements in knowledge, attitudes, and behavioral intentions related to road safety, surpassing the effectiveness of traditional approaches based exclusively on verbal transmission of information.



Active mobility and road safety education

The promotion of active mobility is an essential component of contemporary comprehensive road safety education programs. In this regard, Canosa-Pasantes et al. (2024) conducted a systematic review of bicycle use in school settings, identifying multiple benefits that include improvements in physical health, the development of specific road safety skills, and the strengthening of environmental awareness.

Similarly, Sáez-Padilla et al. (2022) analyzed the benefits and barriers of active travel to schools, providing evidence on the importance of integrating road safety education with the promotion of healthy lifestyles. Their research revealed that students who use active modes of transportation develop greater road safety awareness and demonstrate safer behaviors compared to those who use motorized transportation exclusively.

In the Ecuadorian context, it is worth noting that Flores et al. (2022) evaluated student mobility and spatial accessibility to educational centers in Ecuadorian peri-urban areas, identifying specific challenges related to limited road infrastructure and travel distances. Their study suggests that road safety education should consider the specific mobility characteristics of each context in order to develop contextually relevant pedagogical proposals.

Public policies and road safety education

The analysis of public policies related to road safety reveals the importance of coordinating intersectoral efforts that include the education system as a key player. From this perspective, Infanzón (2023) conducted a systematic review of public policies on road safety, identifying education as one of the fundamental pillars for the prevention of traffic accidents, although he acknowledges limitations in the systematic implementation of these programs.

In line with the above, Ochoa-Escobar et al. (2021) proposed improvements in the management of driving practices in trade organizations, suggesting that road



safety education should extend beyond the school environment to include specialized training for professional drivers. This perspective broadens the scope of road safety education to include lifelong learning approaches that accompany citizens throughout their lives.

Similarly, Santivañez-Sánchez (2025) analyzed the relationship between road safety, accidents, and corporate responsibility in Lima, establishing connections between school road safety education and the subsequent development of responsible professional practices. His research suggests that early road safety education is a preventive factor that transcends the personal sphere to impact future professional performance.

Ecuadorian context of road safety education

The Ecuadorian context has specific characteristics that require special consideration in the design of road safety education programs. In this context, Algora-Buenafé et al. (2017) documented worrying trends in Ecuadorian traffic accidents between 2000 and 2015, showing significant increases that correlate with the growth of the vehicle fleet and rapid urban expansion. These data provide empirical justification for the urgency of implementing preventive education programs.

With regard to the legal framework, Aguilera-Almeida and Alcívar-Junco (2024) analyzed legal and constitutional considerations regarding traffic accidents in Ecuador, identifying regulatory frameworks that support the implementation of road safety education programs in the national education system. Their analysis reveals that Ecuadorian legislation provides a solid legal basis for the mandatory integration of road safety content into the curriculum.

On the other hand, Chifla-Villon (2025) investigated road safety education as a means of persuasion in Ecuadorian university student environments, specifically in the Education program at the State University of Milagro (). Their study revealed that higher education students recognize the importance of road safety



education but identify limitations in their previous training, suggesting the need to strengthen basic and high school education programs.

Therefore, Oñate-Cervantes (2022) conducted a critical analysis of public road safety policies in Ecuador from the perspective of citizen education, identifying a lack of coordination between different levels of government and limited integration of the education sector in national road safety strategies. Their research provides specific recommendations for institutional strengthening and improved intersectoral coordination.

METHOD

This research adopted a systematic review approach following the criteria established by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement. The methodology was based on the critical analysis and synthesis of available scientific evidence on road safety education in school contexts, with particular emphasis on national and international experiences that could inform the development of a contextualized pedagogical proposal for Ecuador.

The study population consisted of 25 bibliographic references specializing in road safety education, citizen safety, and applied pedagogy, published between 2012 and 2025. This sample represented all of the documents provided for analysis, including national and international research that addressed different dimensions of school road safety education.

In terms of temporal distribution, the references showed a significant concentration of publications in the period 2017-2025, reflecting the growing academic and social interest in road safety education as a preventive strategy. From a geographical perspective, the sample included studies conducted in Ecuador, Colombia, Spain, Greece, Morocco, Malaysia, Pakistan, Belgium, and South Africa, providing multicultural perspectives that enriched the comparative analysis.



The inclusion criteria covered empirical and theoretical research addressing road safety education in formal educational contexts, with an emphasis on primary and secondary school students. Priority was given to studies that provided evidence on the effectiveness of educational programs, innovative methodologies, and analysis of public policies related to road safety and education.

On the other hand, the exclusion criteria eliminated documents that addressed exclusively technical aspects of road engineering without an educational component, studies focused on adult driver training without a connection to school education, and publications without explicit methodological support or insufficient theoretical basis.

The analysis process was carried out in four sequential phases: thematic identification, data extraction, evidence synthesis, and development of the pedagogical proposal. First, during the thematic identification phase, the studies were categorized according to specific dimensions: theoretical foundations, educational methodologies, family and community impact, technological integration, active mobility, and public policies.

Subsequently, data extraction was performed using analytical matrices that systematized information on research objectives, methodologies used, main results, and relevant conclusions. This process allowed for the identification of common patterns, emerging trends, and knowledge gaps that informed the development of the pedagogical proposal.

Next, the evidence synthesis integrated the results of all the studies analyzed using thematic analysis techniques, identifying convergent and divergent elements that provided empirical foundations for the pedagogical recommendations. This phase included a critical evaluation of the methodological quality of the studies and consideration of specific limitations that could affect the generalization of results.



The pedagogical proposal was constructed through an iterative process of creative synthesis that integrated empirical evidence with contemporary pedagogical principles and specific considerations of the Ecuadorian context. This process also included consultation of national curriculum frameworks, Ministry of Education guidelines, and sociocultural characteristics relevant to road safety education.

In terms of conceptual validation, the proposal was developed through triangulation of sources, comparing emerging recommendations with international evidence and verifying their consistency with established theoretical frameworks in education and developmental psychology. This process ensured that the proposal maintained scientific rigor while responding to the specific needs of the national context.

RESULTS

Based on the synthesis of the evidence analyzed, a comprehensive pedagogical proposal is presented, structured around five interconnected strategic axes that seek to educate responsible citizens through road safety education in Ecuadorian schools. This proposal recognizes the multidimensional complexity of road safety education and proposes systematic interventions ranging from teacher training to continuous evaluation of educational impact.

Strategic area 1: Specialized teacher training

Teacher training is the cornerstone of any successful educational program. The evidence analyzed reveals that teachers require specific training in road safety education that goes beyond basic knowledge of traffic rules to include specialized pedagogical skills, understanding of child psychomotor development, and management of educational technology resources.

The proposed teacher training program includes three sequential modules: theoretical foundations in road safety and child development, active methodologies for road safety education, and assessment of learning in road



contexts. Each module will last 40 academic hours, combining face-to-face and virtual activities that allow for the practical application of knowledge in real contexts.

The theoretical foundation will address principles of developmental psychology, learning theories applied to road safety education, analysis of national accident statistics, and regulatory frameworks related to road safety. This component will provide teachers with a deep understanding of the importance of road safety education and its potential impact on reducing traffic accidents.

The methodological module will focus on active teaching strategies that include problem-based learning, educational simulations, role-playing, and experiential activities that allow students to experience traffic situations safely. Emphasis will be placed on developing skills to adapt methodologies according to the developmental characteristics of different age groups.

The assessment of learning in road contexts requires specific tools that allow for the evaluation not only of conceptual knowledge but also procedural skills and attitudes toward road safety. Teachers will develop skills to design rubrics, evidence portfolios, and self-assessment activities that promote student reflection on their own road behaviors.

Strategic axis 2: Cross-curricular design

Cross-curricular integration ensures that road safety education is systematically addressed across different areas of knowledge, avoiding thematic fragmentation and promoting comprehensive learning. The proposal includes the incorporation of road safety content in Natural Sciences, Mathematics, Social Studies, Language and Literature, and Physical Education.

In Natural Sciences, road safety education is connected to the study of the human body, the senses and their limitations, the physics of movement, and concepts of speed, distance, and time. Students will explore how factors such as fatigue,



alcohol, and distractions affect reflexes and responsiveness, developing a scientific understanding of the importance of responsible behavior in traffic.

Mathematical integration includes calculations of braking distances, analysis of statistical graphs on accidents, geometry applied to road signs, and problem solving contextualized in traffic situations. These activities strengthen mathematical skills while developing awareness of quantitative factors that influence road safety.

Social studies provide the framework for analyzing the historical evolution of transportation, social norms related to mobility, citizens' rights and duties in public spaces, and critical analysis of urban transportation policies. This social perspective emphasizes road safety education as a component of comprehensive citizenship training.

In Language and Literature, students will develop communication skills by creating road safety awareness campaigns, analyzing informative texts on safety, developing safety manuals for different age groups, and practicing assertive communication in road conflict situations.

Physical Education offers unique opportunities for the development of psychomotor skills essential for road safety: coordination, balance, spatial perception, reaction time, and body awareness. Activities will include skill circuits, coordination games, and road situation simulations that strengthen the physical abilities necessary for safe participation in traffic.

Strategic axis 3: Implementation of interactive technological resources

Technological integration significantly enhances the effectiveness of road safety education programs, especially when they are designed with the characteristics of digital natives in mind. The proposal includes the development of a comprehensive educational platform that combines elements of gamification, virtual reality, and artificial intelligence to create immersive and personalized learning experiences.



The educational platform will include road simulators that allow students to experience different traffic situations without exposure to real risks. These simulators will recreate urban and rural scenarios typical of the Ecuadorian context, including geographical characteristics, vehicle types, and mobility patterns specific to different regions of the country.

Gamification elements will include scoring systems, achievement badges, progressive challenges, and collaborative competitions that maintain student motivation throughout the training process. Gamification will be carefully designed to avoid trivializing content critical to road safety, maintaining a balance between entertainment and educational seriousness.

Artificial intelligence will allow for the personalization of learning experiences according to the specific needs of each student, providing immediate feedback and adapting the difficulty of the content according to individual progress. This personalization will be particularly valuable in addressing the diversity of learning rhythms present in Ecuadorian classrooms.

Virtual reality tools will complement traditional simulators, offering immersive experiences that allow students to experience traffic situations from multiple perspectives: pedestrian, cyclist, passenger, and driver. This multiplicity of perspectives will strengthen traffic empathy and understanding of the needs of different users of public space.

Strategic axis 4: Active community participation

Road safety education transcends school boundaries to become a community effort that requires the active participation of families, social organizations, local authorities, and the private sector. The proposal includes specific strategies to involve these actors in the training process, maximizing educational impact and promoting sustainable cultural change.

Family participation will be structured through awareness workshops that address the importance of parental modeling in shaping road behaviors. Parents will



participate in activities that allow them to understand how their own behaviors influence their children's attitudes and practices, developing skills to positively reinforce school learning in the family context.

Family workshops will include practical sessions on analyzing safe routes to school, identifying road risks in the community environment, and strategies for actively supervising children's travel. These activities will strengthen the family's ability to provide safe environments that complement formal education.

Community participation will be coordinated through partnerships with grassroots organizations, parish councils, citizen safety committees, and local transportation groups. These actors will contribute specific knowledge about local mobility characteristics, identification of critical points, and development of contextually relevant solutions.

The private sector, particularly transportation, insurance, and automobile companies, will participate by sponsoring educational activities, providing teaching resources, and developing awareness campaigns that complement school efforts. This participation will be structured through agreements that ensure educational relevance and prevent inappropriate commercialization in school contexts.

Strategic axis 5: Continuous evaluation of educational impact

Systematic evaluation of educational impact ensures the effectiveness of the program and provides information for continuous improvement. The proposal includes a comprehensive evaluation system that combines quantitative and qualitative indicators, diverse collection methods, and longitudinal analysis of short-, medium-, and long-term impact.

Quantitative indicators will include measurements of road safety knowledge through standardized tests, analysis of behaviors observed in controlled situations, surveys of attitudes toward road safety, and monitoring of accident



statistics in areas of influence of the participating schools (). These indicators will provide objective evidence of the program's effectiveness.

The qualitative evaluation will be conducted through interviews with students, teachers, families, and community members; focus groups that explore perceptions of behavioral changes; and case studies that document significant transformations in road safety attitudes and practices. This qualitative information will enrich the understanding of mechanisms of change and facilitating or hindering factors.

Longitudinal follow-up will allow for the evaluation of the sustainability of behavioral changes, identifying factors that contribute to the maintenance of safe practices over time. This component will be fundamental to understanding the real effectiveness of the program beyond its immediate effects.

Continuous feedback will be structured through monthly teaching team meetings, quarterly progress reports, comprehensive annual evaluations, and five-year reviews that allow for major adjustments in response to contextual changes or emerging evidence on best educational practices.

DISCUSSION

The pedagogical proposal developed in this research reflects the convergence of international evidence on the superiority of integrated approaches to road safety education. In this regard, the results of Alonso et al. (2018) in the Spanish context confirm that systematic road safety education programs significantly reduce risky behaviors in children and adolescents, providing empirical support for the implementation of structured school interventions. This evidence is particularly relevant to the Ecuadorian context, considering the sociocultural similarities between Spanish-speaking countries.

However, it should be noted that the research by Joubert et al. (2012) in South Africa reveals the decisive importance of cultural and socioeconomic contextualization in the design of educational programs. Their analysis of the



paradoxical situation of road safety education in rural schools shows that successful interventions must be adapted to the specific characteristics of the local environment, including available infrastructure, predominant mobility patterns, and existing community resources.

In line with these approaches, it is worth noting that Abdellah and Rachid (2021) provide evidence of the importance of conducting situational analyses prior to the implementation of road safety education programs. Their work in Moroccan primary schools reveals that factors such as teacher training, availability of resources, and administrative support have a decisive influence on educational outcomes.

The incorporation of educational technologies in the proposal developed is solidly supported by recent research demonstrating their effectiveness in increasing student engagement and improving learning outcomes. In this regard, Nawaz et al. (2025b) showed that gamified approaches to online road safety education generate significant improvements in the knowledge, attitudes, and behavioral intentions of Belgian secondary school students.

Complementarily, Kourmoussi et al. (2024) evaluated the interactive program "E-drive Academy" with 834 Greek fourth-grade students, confirming that interactive technologies surpass the effectiveness of traditional methodologies based exclusively on verbal transmission of information. These results suggest that the proposed technological integration could generate similar impacts in the Ecuadorian context, particularly considering students' growing familiarity with digital tools.

However, it is worth mentioning that Zulkifli et al. (2021) emphasize that the effectiveness of educational technologies depends fundamentally on their appropriate design for the specific characteristics of users. Their research with Malaysian primary school students reveals that factors such as usability, cultural relevance, and curriculum alignment determine the success of technological interventions in road safety education.



From another perspective, the proposal by Fernández-Escobar et al. (2017) on teaching-learning models assisted by 3D technologies provides valuable methodological references for the implementation of road simulators. Their approach demonstrates that immersive technologies facilitate experiential learning without exposure to real risks, an aspect that is particularly relevant for road safety education where direct practice could be dangerous.

One of the most promising aspects identified in the literature reviewed is the multiplier effect of school road safety education programs on families and communities. In this regard, Ben-Bassat and Avnieli (2016) documented that programs targeting kindergarten children positively modify their parents' behavior and knowledge, demonstrating that students act as agents of change in their homes.

This evidence is particularly relevant to the Ecuadorian context, where family dynamics tend to be close and children exert significant influence on family decisions. The incorporation of specific strategies to maximize this multiplier effect, as proposed in the active community participation axis, could considerably amplify the impact of educational interventions.

For their part, Nawaz et al. (2025a) explored the perspectives of parents and teachers on the acceptability of child road safety education programs in Pakistan, revealing that community acceptability is a key factor in the success of these programs. Their results suggest that strategies to raise awareness and actively involve families, such as those proposed in this research, are essential to ensuring the sustainability of educational interventions.

The cross-curricular integration of road safety content into different subject areas, as proposed in the second strategic axis, is supported by research demonstrating the effectiveness of interdisciplinary approaches. In this regard, Follana-Soler et al. (2024) identified significant opportunities for incorporating road safety education into primary physical education, highlighting the potential of this area for the development of psychomotor skills related to road safety.



Similarly, Deepika et al. (2023) developed protocols for teacher-led activity-based learning, emphasizing that active methodologies promote student participation and collaborative knowledge building. Their methodological approach provides a foundation for the implementation of cross-cutting strategies that connect road safety education with other areas of knowledge.

In line with the above, research by Poó et al. (2015) on road safety education and mobility in childhood reveals that educational programs must consider the developmental characteristics of students to maximize their effectiveness. This evidence supports the proposal to adapt content and methodologies according to different stages of cognitive and social development, an aspect incorporated into the proposed cross-curricular design.

The incorporation of active mobility into the pedagogical proposal is supported by research demonstrating its multiple benefits for health, the development of road safety skills, and environmental awareness. In this regard, Canosa-Pasantes et al. (2024) conducted a systematic review of bicycle use in school contexts, identifying that students who use active means of transportation develop greater road safety awareness and safer behaviors.

Similarly, Sáez-Padilla et al. (2022) analyzed the benefits and barriers of active commuting to schools, providing evidence on the importance of integrating road safety education with the promotion of healthy lifestyles. Their research reveals that active mobility simultaneously contributes to public health, road safety education, and environmental sustainability goals.

On the other hand, Flores et al. (2022) evaluated student mobility in peri-urban areas of Ecuador, identifying specific challenges related to limited infrastructure and travel distances. Their results suggest that the promotion of active mobility should consider specific contextual characteristics, an aspect incorporated into the proposal by adapting to different geographical realities in the country.



The analysis of public policies related to road safety reveals the importance of coordinating intersectoral efforts that include the education system as a key player. From this perspective, Infanzón (2023) identified education as a fundamental pillar for the prevention of traffic accidents, although he acknowledges limitations in the systematic implementation of educational programs.

In line with this, Oñate-Cervantes (2022) conducted a critical analysis of public road safety policies in Ecuador, identifying a lack of coordination between different levels of government and limited integration of the education sector into national strategies. His recommendations for institutional strengthening and improved intersectoral coordination informed the development of the community participation components of the proposal.

At the same time, Santivañez-Sánchez (2025) analyzed the relationship between road safety and corporate responsibility, establishing connections between school road safety education and the subsequent development of responsible professional practices. This long-term perspective supports the importance of investing in early road safety education as a prevention strategy with sustained impacts over time.

Despite the favorable evidence on the effectiveness of road safety education programs, the literature analyzed also identifies significant challenges to their successful implementation. In this context, Chifla-Villon (2025) revealed that Ecuadorian university students recognize the importance of road safety education but identify limitations in their previous training, suggesting deficiencies in basic and high school education programs.

For their part, Minaya-Vera and Mendoza-Loor (2018) investigated the influence of ICT-based teaching resources in promoting road safety culture among Ecuadorian university students, highlighting the need to strengthen teachers' technological skills and the availability of appropriate infrastructure. These



challenges must be considered when planning strategies for the gradual implementation of the proposal.

Similarly, Ochoa-Escobar et al. (2021) proposed improvements in the management of driving practices in trade organizations, suggesting that road safety education should extend beyond the school environment. This perspective highlights the importance of developing lifelong learning approaches that complement school interventions and ensure continuity of education throughout life.

CONCLUSION

The results of this research have significant implications for educational practice in Ecuador. In this regard, the pedagogical proposal developed requires substantial changes in teacher training, curriculum design, and the availability of technological resources, all of which require strategic planning and sustained investment by educational authorities.

The evidence analyzed suggests that the successful implementation of road safety education programs requires long-term institutional commitment, specialized teacher training, and the development of strategic alliances with various community actors. These requirements imply the need to modify existing regulatory frameworks and allocate specific resources for road safety education in the national education budget.

The results show that the most effective road safety education programs combine active learning methodologies, innovative technological integration, active community participation, and continuous evaluation of educational impact. This combination constitutes the fundamental basis for achieving sustainable changes in the road behavior of the school population.

Consequently, the pedagogical proposal articulated through five interconnected strategic axes responds to the specific needs of the Ecuadorian context while incorporating best practices identified in successful international experiences. Specialized teacher training, cross-curricular design, the implementation of



interactive technological resources, active community participation, and continuous evaluation of educational impact are essential components for ensuring the effectiveness of educational interventions.

The evidence analyzed confirms that school road safety education generates multiplier effects that transcend the individual sphere to positively impact family and community dynamics. This multiplier effect is particularly relevant to the Ecuadorian context, where the systematic implementation of educational programs could contribute significantly to reducing traffic accidents and strengthening a culture of responsible citizenship in road safety.

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Propuesta pedagógica para la formación de ciudadanos responsables desde la educación vial en escuelas
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Educational proposal for training responsible citizens through road safety education in Ecuadorian schools

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