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ORIGINAL ARTICLE

Investigating the Effect of Traffic Culture Education on the Law-Abiding & Citizenship Behavior (Case Study: Middle School Students in District 12 of Tehran)

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ABSTRACT

The main purpose of this study is to investigate the effect of traffic culture education on the law-abiding and citizenship behavior of middle school students in District 12 of Tehran. The research method is quasi-experimental with pre-test and post-test design and is applied in terms of purpose. In terms of data type, this research is quantitative, and in terms of time, it is a cross-sectional research. The statistical population was 4756 high school students in District 12 of Tehran in the academic year 2020-2021, which was selected by random cluster sampling of 40 seventh-grade students in two groups of 20 (experimental group and control group). The research tools of the educational package included pedestrians, vehicle occupants, urban cycling, public transportation, rights and duties of citizenship in traffic, and a researcher-made questionnaire that its content validity was determined by the Lavshe index (0.62) and formal validity by the opinion of elites and reliability was calculated by Cronbach's alpha test (0.80). Descriptive statistics (central and dispersion indices), inferential statistics (Kolmogorov-Smirnov tests, independent t-test, and paired t-test), and SPSS₁₆ software were used to analyze the data. The results showed that traffic education had a significant positive and direct effect on the law-abiding and citizenship behavior of students.

KEYWORDS

Traffic Culture Training, Law-abiding, Citizenship Behavior.

نشریه علمی

آموزش محیط زیست و توسعه پایدار

«مقاله پژوهشی»

بررسی تاثیر آموزش فرهنگ ترافیک بر قانون پذیری و رفتار شهروندی (مورد مطالعه: دانش آموزان متوسطه اول منطقه ۱۲ شهر تهران)

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چکیده

هدف اصلی این پژوهش بررسی تاثیر آموزش فرهنگ ترافیک بر قانون پذیری و رفتار شهروندی دانش آموزان متوسطه منطقه ۱۲ شهر تهران است. روش پژوهش شبه تجربی با طرح پیش آزمون و پس آزمون است و از نظر هدف کاربردی است. از نظر نوع داده ها این پژوهش کمی بوده و از نظر زمانی نیز پژوهشی مقطعی به شمار می آید. جامعه آماری ۴۷۵۶ نفر دانش آموزان دوره متوسطه منطقه ۱۲ تهران در سال تحصیلی ۱۳۹۹-۱۴۰۰ بوده که با روش نمونه گیری خوشه ای تصادفی تعداد ۴۰ نفر از دانش آموزان پایه هفتم در دو گروه ۲۰ نفره (گروه آزمایش و گروه کنترل) انتخاب شدند. ابزار پژوهش بسته آموزشی شامل عابر پیاده، سرنشین وسیله نقلیه، دوچرخه سواری شهری، حمل و نقل عمومی، حقوق و تکالیف شهروندی در ترافیک و پرسشنامه محقق ساخته بوده که روایی محتوایی آن با شاخص لاوشه (۰/۶۲) و روایی صوری بوسیله نظر نخبگان و پایایی آن بوسیله آزمون آلفای کرونباخ (۰/۸۰) محاسبه گردید. برای تجزیه و تحلیل داده ها از آمار توصیفی (شاخصهای مرکزی و پراکندگی)، استنباطی (آزمونهای کولموگروف اسمیرنوف، تی مستقل و تی زوجی) و نرم افزار SPSS۱۶ استفاده شده است. نتایج نشان داد که آموزشهای ترافیک بر قانون پذیری و رفتار شهروندی دانش آموزان به صورت معناداری اثر مثبت و مستقیم داشته است.

واژه های کلیدی

آموزش فرهنگ ترافیک، قانون پذیری، رفتار شهروندی.

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Introduction

The unrestrained growth of industry and technology, along with the unchecked urbanization in developing countries, disregarding environmental and public health concerns, has resulted in numerous problems that pose a threat to life on Earth. The expansion of the industry has caused climate change, depletion of the ozone layer, rising surface temperatures, and increased sea levels (Bazazan & Khosravani, 2017). Additionally, the continuous expansion of cities and the influx of migrants due to industrial growth have led to a rise in car usage and dependency on transportation within urban areas. Following this problem, numerous issues occurred as a result of the heightened volume of traffic in urban regions, with air pollution being a significant concern. The pollution caused by vehicle transportation takes the form of emissions, airborne particles, and noise. This kind of pollution can be reduced by implementing effective planning, utilizing suitable vehicles and fuels, and adopting pollution control technology (Taheriyani, 2013). Traffic culture encompasses regulations, driving rules, and the conduct of traffic participants, all of which are influenced by the values, traditions, and overall customs of a society. Currently, multiple entities contribute to the promotion of traffic awareness and education, such as society, schools, families, traffic police, mass media, local government, non-governmental organizations (NGOs), and the police. The educational system is a crucial and influential societal institution that plays a major role in educating and training individuals, fostering their intellectual abilities and skills. This institution significantly contributes to raising people's awareness, promoting cultural excellence, and shaping and rectifying their unconventional cultural, social, and behavioral patterns. Hence, the educational system and schools are regarded as significant

foundations for traffic education, as stated (Nikkhah et al., 2017). In response to the rise in global traffic accidents and incidents, the United Nations General Assembly designated 2011-2020 as the Decade of Action for Road Safety in 2010. It called upon all member nations to decrease traffic-related accidents and injuries by implementing preventive measures. According to a 2013 report from the World Health Organization, in middle and low-income countries, the age group of young people (15-30 years old) has the highest number of deaths caused by traffic accidents. More than 30% of traffic accident-related deaths in these countries occur within this age group (Moradi et al., 2017). The incidence of traffic accidents in Iran is significant, resulting in substantial economic and national resource losses. An Iranian loses their life every half an hour as a result of traffic accidents. This statistic indicates 44 daily fatalities on the country's roads and streets. Furthermore, approximately 7% of the country's gross national product is squandered in these incidents. In Iran, the annual economic loss due to traffic accidents, both directly and indirectly, amounts to \$39 billion (Foroughi, 2018). The rise of gasoline-powered vehicles and the growing demand for cars due to people's increasing reliance on them has led to environmental pollution becoming a significant issue caused by transportation systems. Today, a substantial portion of climate change is attributed to pollutants emitted by vehicles (Rohani, 2009). Pollution resulting from the transportation industry can be categorized into three main sectors:

A: Air pollution

Transportation, as the main consumer of petroleum products, plays an essential role in the emission of greenhouse gases and pollutants. Table 1 illustrates the upward trend of pollutant emissions in the transportation industry in recent times.

Table 1. Emission Limits for Vehicles (Carburetor or Injection) and Motorcycles (Karimi et al., 2014)

Vehicle emission limits			
(Ppm)HC	CO Cumulative percentage	Type	Pollutant type
400>HC	4>CO	carburetor	Light
250>HC	2.5>CO	Injector	
600>HC	6>CO	-	motorcycle

B: Noise pollution

Noise pollution is an additional form of environmental contamination. People are influenced by the noises produced by vehicles, planes, trains, ships, factories, construction sites, and public areas, which have negative consequences on their health. Reduced hearing ability, disrupted sleep, mental and emotional effects, stress, headaches, high blood pressure, and fatigue are the physical and psychological outcomes of noise pollution. The level of noise

pollution from road transport is influenced by factors such as the volume of traffic, car and motorcycle speeds, and the presence of heavy vehicles (Miransari et al., 2021). Table 2 presents the noise standards in Iran, whereas Table 3 provides information on the loudness of vehicle-generated noise. By comparing these two tables, it becomes apparent that there is an imbalance in the noises produced by vehicles in urban areas, which is currently unsatisfactory.

Table 2. Sound Standard in Iran According to the Type of Region during the Day and Night

10 pm to 7 am	7 am to 10 pm	Type of region
45	55	Residential
50	60	Commercial- Residential
55	65	Commercial
60	70	Residential- Industrial
65	75	Industrial

Table 3. Noise Generated by Public Transport (Gorgani & Ghasempour, 2011)

Loudness of produced sound (dB)	Vehicle
92-85	Diesel bus
83-75	Electric bus
86-80	Light rail (on the ground)
97-90	Subway
90	Crowded street
100	Car horn

C: Visual pollution

According to popular belief, certain types of pollution are displeasing to people and can negatively affect their mental well-being. One aspect that often goes overlooked is the problem of visual pollution associated with transportation. This includes issues like heavy traffic congestion, car emissions, the introduction of air transport systems such as monorails in certain locations, and visibility obstructions caused by bridges and overpasses.

It is important to note that visual pollution is subjective and context-dependent. For instance, in tourist areas, the use of a monorail may be deemed necessary and justified. However, in certain cases, the construction of a monorail can lead to significant visual pollution (Miransari et al., 2021).

Many developed countries are currently undertaking a significant project by implementing public education through schools. The aim is to reduce various forms of

damage, particularly those related to life and finances. In numerous advanced societies, miniature traffic signs and traffic lights are placed within schools during recreational, sports, and even social education activities. This allows students to become familiar with traffic regulations (Nikkhah et al., 2017).

Education and cultural development play a crucial role in preventing traffic problems. To enhance traffic safety, it is important to provide training for different age groups. It is suitable to educate all segments of society about safety principles, traffic laws, and regulations to reduce casualties and the negative impact of accidents. Moreover, society will improve if this education is accompanied by the establishment of solid knowledge across various educational domains, continuous learning, and the transfer of knowledge to future generations. Mistakes arise from people's lack of knowledge, but by educating informed individuals, the issues faced by future

generations will be minimized. In addition, early education shapes cultural norms and becomes ingrained in children's minds. Hence, the aim is to create a society in the future that possesses a strong awareness of laws through the implementation of inclusive educational initiatives and collaboration with relevant institutions and groups. However, within Iran's centralized education system, where educational programs, textbooks, informational materials, teachers, and trainers play pivotal roles in the process of education and learning, there is a regrettable lack of emphasis on topics about traffic education. This deficiency becomes more pronounced as students transition from primary to secondary education stages (Abdol Homayoni, 2015). Researchers evaluating the books and lessons of the first secondary school have found that there is a significant lack of focus on traffic education. This deficiency persists throughout the students' time in secondary school, although they are gradually approaching the age when they will become eligible for a driver's license and assume their responsibilities as drivers in traffic. Unfortunately, each passing year distances them further from receiving proper traffic education. By the final year of high school, these subjects are entirely absent from the curriculum, indicating a failure to maintain continuity in teaching traffic culture. In the researcher's documentary studies, there has been a greater emphasis on preschool children and elementary school students, while secondary school students have been overlooked. This research aims to address this gap by examining the impact of traffic culture education on promoting law-abiding behavior and citizenship among Middle School Students. It takes into account the reduced emphasis on traffic lessons in secondary school compared to primary school, as well as the significant costs associated with accidents in the country.

Focusing on education as a vital component of traffic management not only enhances road traffic but also fosters a positive traffic culture, ultimately reducing the financial and non-financial costs associated with accidents annually. Education plays a crucial role in promoting the proper use of vehicles, traffic infrastructure, road signs, and pathways within society (MousaviPanah et al., 2020). Moreover, training responsible individuals is a key priority

for education systems worldwide. The research carried out in numerous developed and developing nations indicates that education authorities in these countries prioritize the training of responsible citizens. They demonstrate a strong commitment by implementing various educational programs. It should be noted that becoming a good citizen is an ongoing journey, and individuals require continuous citizenship education throughout their lives (Naghizadeh & Omid, 2018). Describing an individual's membership in a society, the term "citizen" denotes their connection to that community. In social life, citizenship is closely connected to human rights. It entails assigning duties and responsibilities to society members and enables individuals to engage in social interactions. Citizenship can be seen as a social contract aimed at promoting well-being and security within the community. It inherently addresses the expected behavior of people to attain this objective (Doagoyan et al., 2017). However, social rules serve as the foundation for maintaining order in every society. When social laws are not followed, or there is law evasion, it becomes the root cause of various issues in different areas, such as urban and road traffic. Disregarding social rules or engaging in lawlessness exists to some degree in all societies, but there are times when this behavior escalates into a significant social problem. One specific form of law evasion that can be referred to as "soft law evasion" is reckless driving. Soft law evasion refers to any behavior that disregards the established laws of a society but lacks violence. It is often met with lenient punishments, which can lead to significant harm to the society affected. This form of law evasion has become increasingly prevalent due to its widespread occurrence and relative ease of engagement. Instances of soft lawlessness include breaking traffic regulations, evading taxes or duties, and utilizing unauthorized reproductions. Statistics indicate a rising global trend in reckless driving (Firoozjaeian & Tavakoli, 2016).

The 2014 promotion document on traffic culture provides descriptions of the various elements that constitute traffic culture:

Attitudes: It concerns an individual's mindset towards different aspects of traffic, encompassing laws, police, and vehicles.

Behavior: It relates to the actions exhibited by an individual in various traffic situations, such as driving conduct, navigating roads, and utilizing vehicles. Overall, it includes the utilization of urban traffic facilities like bridges, as well as law-abiding or law-evasion in practice.

Traffic management: How much emphasis does traffic management place on promoting a culture of responsible traffic behavior? If the management does not provide support, there will be no meaningful alteration in traffic culture reform.

Traffic education: Public education and raising awareness are crucial aspects of reforming traffic culture.

Social institutions: Schools, mass media, religious institutions, and families have a vital role in promoting and reforming culture.

Table 4. Material and Spiritual Culture in Traffic

Consequences	Driving culture		
	Vehicle	Road	Material culture
Traffic safety		Driving rules and regulations	Spiritual culture
	Man		

Developing traffic culture is a gradual process, and any alterations in the behavior of road users necessitate a significant amount of time and effort. The second aspect of driving culture emphasizes the importance of gaining a profound understanding of culture and its systems to correctly comprehend traffic culture. Indeed, the culture surrounding traffic is closely linked to the overall culture of society and individuals' attitudes and behavior towards cars and travel. The third aspect of traffic culture relates to how drivers perceive themselves and their vehicles, as well as their interactions with institutions and organizations. The fourth aspect of traffic culture involves the potential for modifying and transforming it to promote traffic safety and responsible driving. However, implementing any program or policy aimed at changing traffic culture requires efficient utilization of time, technology, and collaborative efforts from various organizations (Doagoyan et al., 2017 & Robati, 2020). Some solutions to enhance the prevailing cultural

norms related to people's preferences, modes of transportation, and communication systems include:

Promoting the traffic culture of citizens

Properly educating all segments of society on traffic etiquette and instilling in them a genuine interest in adhering to these principles can significantly enhance the traffic situation while mitigating associated issues and problems. Education in this regard should be ongoing and comprehensive. One crucial aspect that needs improvement through enhancing social awareness is the usage of private vehicles. Private vehicles hold a dominant role in urban transportation, and the current urban infrastructure and land utilization prioritize vehicular convenience and speedy movement, thereby magnifying their significance (Fallah Manshadi et al., 2012). One reason for the increased use of private cars by citizens is their disregard for the common good, whereas the development and improvement of collective interests contribute to the advancement of individual interests. However, it is important to note that inadequate infrastructure and transportation facilities significantly influence people's preference for personal benefits over societal benefits. To address this issue and promote a better traffic culture, it is essential, to begin with fundamental changes. Given that schools play a crucial role in shaping individuals' early experiences, special emphasis should be placed on educating students about traffic-related matters within the country's educational system (Miransari et al., 2020).

Using the subway

This device was developed in response to the pressing demands of residents in large cities. Research conducted on urban transportation systems has revealed that cities with a rail system tend to have higher efficiency compared to those without. In major cities like Moscow, Paris, and Milan, over 60% of the total public transportation is carried out through rail networks (Abbaszadegan et al., 2011).

Promoting walking:

It is crucial to emphasize the importance of promoting walking as the most effective means

of transportation, given its numerous benefits. It is imperative to develop strategies that enhance the appeal of walking. The goal of implementing such policies is to improve the overall environmental conditions of pedestrian-friendly streets, wherein pedestrians are prioritized. These approaches are as follows:

- Increasing the density and incorporating diverse purposes to establish shorter distances between starting points and destinations;
- Considering maintaining a consistent flow, ensuring the presence of shaded areas, and providing adequate lighting;
- Developing designs that prioritize pedestrians over motor vehicles, encouraging people to walk instead of relying on cars (Miransari et al., 2021);
- Establishing pedestrian pathways alongside street networks;
- Building natural pathways within parks;
- Designing pedestrian paths with multiple directional changes or an alternating and interrupted layout rather than a straight path to enhance the appeal.
- To enhance the aesthetic and functional aspects of walkways, it is important to implement a dynamic and engaging design with proper flooring choices (Fallah Manshadi et al., 2012).
- Walking is dependable and enables people to arrive at work punctually.
- Walking promotes individuals' health and vigor.
- It brings energy and activity to urban areas (Feizi & Rajabi, 2012).

Using hybrid vehicle:

Currently, automobile factories have taken significant measures to address the issue of pollution caused by cars and the constraints of fossil fuels. One notable solution is the production of hybrid vehicles, which operate on both fossil and electric fuels. These vehicles utilize lithium batteries that are charged while driving, and the gasoline engine is utilized for high-power movement. To promote and enhance the adoption of hybrid cars, the following policies are recommended:

- The necessary support infrastructure needs to be developed.
- Incentive plans should be implemented to

encourage the purchase of electric cars, such as granting "special bus route permits" to owners of these vehicles.

- Hybrid vehicles should follow the traffic plan's restrictions, which may include even and odd license plate-based regulations (Miransari et al., 2021).

Cycling

A bicycle is a quiet and environmentally-friendly mode of transportation that offers a significant benefit over public transportation by not altering the structure of communities and using less energy. The necessary amenities to promote cycling include:

- Establishing cycling pathways that prioritize cyclists and implementing separate networks for cycling.
- Considering the potential for expanding the bicycle network in future developments.
- Ensuring bicycle security by providing appropriate measures (Fallah Manshadi et al., 2012).

Developing public transportation

Public transportation possesses the capacity to swiftly and effortlessly transport millions of passengers. Some of the benefits associated with public transportation include its quick speed, enhanced efficiency, heightened security, reduced negative impact on the environment, rapid implementation, stability in land value and usage, decreased traffic congestion, substantial volume of passenger transportation, and lower costs related to fuel consumption and vehicle depreciation. Regarding the advancement of public transportation, several strategies encompass the following:

- Ensuring that residents and workers in each region have the best possible public transportation options, with ample coverage and accessibility.
- Developing a coordinated and integrated system of public transportation services that prioritize hierarchy.
- Emphasizing the establishment of reliable public transport functions as a top priority for providing dependable service.
- Enhancing both the quality (improving comfort, safety, and punctuality) and

quantity (increasing frequency, expanding geographic coverage, and ensuring easy access for all) of public transportation services.

- The coordination of public transportation stations and the provision of essential information like schedules and fares.
- Forecasting affordable public transportation choices for low-income groups in terms of cost (Feizi & Rajabi, 2012).

Using an intelligent transportation system method

Generally, the intelligent transportation system represents the coming together of advanced computer techniques, information technology, and long-distance communication within the field of transportation. Consequently, the intelligent transportation system refers to employing information and communication technology to actively oversee vehicle movement as well as the transportation networks for people and goods in real-time. Some uses of intelligent transportation systems are as follows:

- Paying tolls electronically.
- Streamlining public transportation as a unified system to adhere to schedules, minimize congestion's impact on performance, and optimize the allocation of staff, resources, and equipment.
- Using electronic payments for vehicle rentals.
- Establishing a comprehensive parking management system that displays available parking spaces.
- Developing an online system and software to provide real-time updates to passengers on the current location and estimated arrival time of public transportation at stations.
- Upgrading the city's traffic lights to an interconnected intelligent system coordinated with the traffic control center (Naderan, 2011).

Agarou et al. (2019, cited from Safaei Fakhri et al., 2021) at the London Institute of Economics and Political Sciences, conducted a study on children who are victims of traffic accidents. They examined accident statistics of

children from various countries worldwide and highlighted the significance of education in fostering the development of healthy individuals and safe communities. Consequently, they advocated for the inclusion of traffic safety education in schools, as well as incorporating it into driver training programs and safety campaigns. The authors proposed that education could be effectively implemented through campaigns aimed at enforcing road safety laws or through comprehensive social programs targeting children. Educating students offers both immediate and long-term benefits. The objective of providing road safety education in schools is to encourage comprehension of traffic rules and regulations. Therefore, road safety courses should be incorporated into the curricula of both private and public schools, aiming at children aged four to five years and continuing throughout primary and secondary school. Research has demonstrated that road safety education at school has a positive impact on children's attitudes towards street safety, enhancing their awareness of personal safety as well as the safety of others.

In 2019, Chu referenced a study conducted by Robati in 2020 that aimed to examine how traffic climate and driver behavior are related to traffic incidents and accidents in China. The analysis results revealed a negative association between traffic climate and unethical behaviors while also indicating that people's behavior has a positive and direct impact on the occurrence of traffic accidents. Another study conducted by Biying in 2018 explored the correlation between personality traits and traffic behavior in a sample from China. The findings indicate that there is a significant relationship between the personalities of neurotic and anxious drivers and their behavior on the road. A study conducted by Zhang (2018) titled "Observing Traffic Behavior and Conflict Intensity in Nigeria Using the Traffic Interference Technique" examined the impact of various factors on conflict intensity in street and road traffic. The study revealed that factors such as traffic direction, time, age, gender, and speed play pivotal roles in determining the level of conflict. To effectively prevent pedestrian injuries in low- and middle-income countries

with inadequate traffic conditions, behavioral approaches, and traffic safety education can be implemented without making changes to the traffic environment. When designing road safety educational interventions, it is crucial to consider emotional and motivational mechanisms, including attitudes and perceptions. Uzundu (2018) cited a study titled "Motorcycle Characteristics and Urban Traffic Behavior in Northern Ghana: The Consequences of Road Accidents," conducted by Robati in 2020. This study investigated the impact of motorcycle characteristics on road traffic behavior and the resulting consequences in terms of road accidents in Ghana. The study's findings, based on data collected from various sources, including random questionnaires for motorcyclists and interviews with officials from traffic and safety institutions, indicate that age, occupation, and motorcycle ownership are significantly correlated with helmet usage. Additionally, age was found to have a significant relationship with alcohol consumption among motorcyclists. The number of road accidents and fatalities is closely linked to the traffic behavior of motorcycles.

Mohammadi et al. (2019) conducted a study in Mashhad City, focusing on the epidemiological investigation of deaths and injuries resulting from traffic accidents in children and adolescents under the age of 15. The objective of their research was to examine the causes of accidents involving children and adolescents under 15 years old, as well as their traffic behaviors. The study findings revealed that out of the total number of children who died as a result of traffic accidents (72), 45 (62.5%) were boys and 27 (37.5%) were girls. The overall number of children who were injured was 4,298. Among them, 2,814 (65%) were boys, and 1,484 (35%) were girls. Safaei Fakhri et al. (2020) conducted a study to examine the impact of informal education on the acquisition of traffic concepts among sixth-grade elementary school students. The results demonstrated that informal education influenced overall learning, understanding of traffic rules, knowledge of driving violations, and familiarity with associated penalties. Furthermore, a notable gender difference was observed, with boys achieving higher average scores and rankings compared to girls. Based

on these findings, the researchers concluded that informal education could be utilized to enhance students' awareness, thinking abilities, and attitudes in the domain of transportation and traffic concepts. In a study conducted by Ebrahimi Qavam et al. (2017), the effectiveness of traffic behavior package training on the learning of safe traffic behaviors was investigated for boys and girls in the first grade of elementary school. These results suggest that education plays a crucial role in the social progress of individuals. Meanwhile, children, as members of the society who have different roles in traffic, always face many dangers in the field of traffic. In a research conducted by Kashfi et al. (2017), the impact of training police assistants in Tehran on traffic regulations was investigated. The results showed that the content, practical and theoretical aspects, as well as the location and timing of the training, all influenced the efficiency of police assistants. Therefore, the researchers suggested that a dedicated and separate course should be introduced for teaching traffic lessons. Bani Asadi (2016) investigated the impact of citizenship skills training in enhancing children and adolescents' understanding of their rights as citizens and their collective behavior. Citizenship education is closely tied to promoting a culture of citizenship. This aspect significantly influences citizens' behavior and their active participation in societal matters, which are essential for building social capital and measuring cultural development. Citizenship education aims to instill a sense of belonging and purpose in individuals, encouraging their involvement in activities relevant to their social environment. From the very beginning, effective citizenship education instills in citizens, particularly children, a sense of self-assurance and responsible conduct from both a social and moral standpoint. This serves as a means of imparting knowledge, skills, and values to citizens, including children. These teachings contribute to the strengthening of social ethics and the promotion of social cohesion within a society. The dissemination of such teachings is highly significant in terms of fostering altruism and garnering public acceptance. According to Rouhi and Ebrahimi Qavam (2016), training individuals on traffic culture (traffic rules) has proven effective in enhancing awareness of various traffic risks

among pedestrians, cyclists, vehicle occupants, and road users. Most of the traffic culture training programs in Tehran primarily target primary school students, and there is less willingness among secondary schools to provide traffic culture training. After completing elementary school, secondary school students are no longer included in traffic culture education, and there is no provision for cultural education specific to them. However, once they reach the age of 18, they can apply for a driver's license and play a significant role in traffic as vehicle drivers. Also, as a result of their upbringing and parental guidance, they autonomously participate in the traffic environment and are recognized as pedestrians, motorcyclists, or cyclists in urban traffic. Furthermore, previous articles have primarily focused on educating preschool and elementary school students, while neglecting the middle school period. Therefore, this research aimed to examine the impact of traffic culture education on the law-abiding and citizenship behaviors of Middle School Students in the 12th district of Tehran.

Research Methodology

Based on the information provided, it appears that the current research is an applied research study. The nature and method of the research can be classified as quasi-experimental,

specifically utilizing a pre-test and post-test design with control and experimental groups. In terms of data, the research is quantitative, meaning that it primarily deals with numerical data and statistical analysis. As for the time aspect, the research is described as cross-sectional, which suggests that data were collected at a specific point in time. The statistical population for this study consists of all 4756 students of the first secondary level in the 12th district of Tehran who were studying during the academic years 2020-2021. From this population, a sample was selected using multi-stage cluster random sampling. The sample included 40 first-grade middle school students from 8th Shahrivar High School, divided into two classes of 20 individuals each: the experimental group and the control group. The research tool is an educational package that includes pedestrians, vehicle occupants, urban cycling, public transportation, rights and duties of citizenship in traffic, and researcher-made questionnaires. These questionnaires consist of 14 questions related to law-abiding and 12 questions related to citizenship behavior, focusing on pedestrians, vehicle occupants, cyclists, and public transportation. The content validity of the questionnaires was checked using the Lawshe index (0.62), and the face validity was evaluated based on expert opinions as per Table 5.

Table 5. CVR Coefficients

CVR	Question number	CVR	Question number
0.71	15	0.65	1
0.73	16	0.70	2
0.65	17	0.68	3
0.67	18	0.64	4
0.66	19	0.69	5
0.68	20	0.67	6
0.64	21	0.64	7
0.68	22	0.66	8
0.72	23	0.67	9
0.65	24	0.70	10
0.66	25	0.63	11
0.69	26	0.67	12
0.72	27	0.69	13
0.69	28	0.64	14

The reliability of the law-abiding questionnaire was calculated to be 0.80, and the

reliability of the citizenship behavior questionnaire was 0.82, both assessed through

Cronbach's alpha test. Descriptive statistics, such as central and dispersion indices, as well as inferential statistics including Kolmogorov-Smirnov, independent t-tests, and paired t-tests, were used to analyze the data. The SPSS 16 software was employed for data analysis.

Research Findings

A: Descriptive findings

Table 6 and Figure 1 display the descriptive statistics indicators for the experimental group. In the pre-test and post-test, the mean values obtained for the law-abiding variable are 54.3 and 15.4, respectively. Similarly, the mean values for the variable of citizenship behavior in the pre-test and post-test are 2.32 and 2.87, respectively. The observed standard deviation for law-abiding and citizenship behavior in the

pre-test is greater compared to their values in the post-test of the experimental group. This indicates that the dispersion of the answers was higher in the pre-test. Figure 2 displays the descriptive findings of the mean pre-test and post-test results concerning law-abiding and citizenship behavior in the control group. In the control group, the mean scores for the rule acceptance variable in the pre-test and post-test are 42.3 and 49.3, respectively. Similarly, the mean scores for the citizenship behavior variable in the pre-test and post-test are 43.2 and 54.2, respectively. The observed standard deviation for law-abiding and citizenship behavior in the pre-test is higher than their respective values in the post-test of the control group, indicating that there was more variation in the responses during the pre-test.

Table 6. Descriptive Findings of Research Variables

Standard deviation	Average	Samples	Variables	Stage	Group
0.4694	3.42	20	students' law-abiding behavior	pre-test	Control
0.6700	2.43	20	citizenship behavior of students		
0.5277	3.54	20	students' law-abiding behavior	pre-test	experiments
0.6131	2.32	20	citizenship behavior of students		
0.2048	3.49	20	students' law-abiding behavior	Post- test	Control
0.2545	2.54	20	citizenship behavior of students		
0.2166	4.15	20	students' law-abiding behavior	Post- test	experiments
0.1721	2.87	20	citizenship behavior of students		

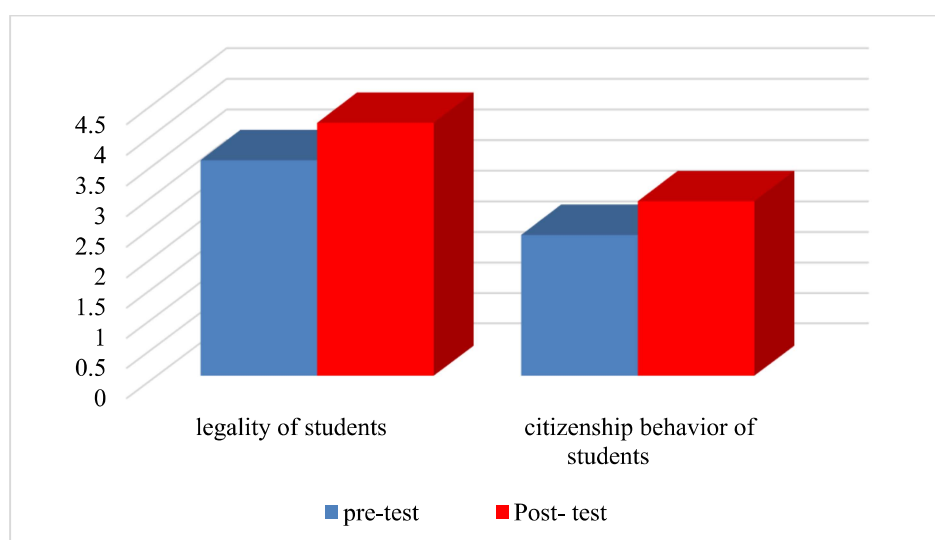


Figure 1. The Mean of Pre-test and Post-test Citizenship Behavior and Law-abiding in the Experimental Group

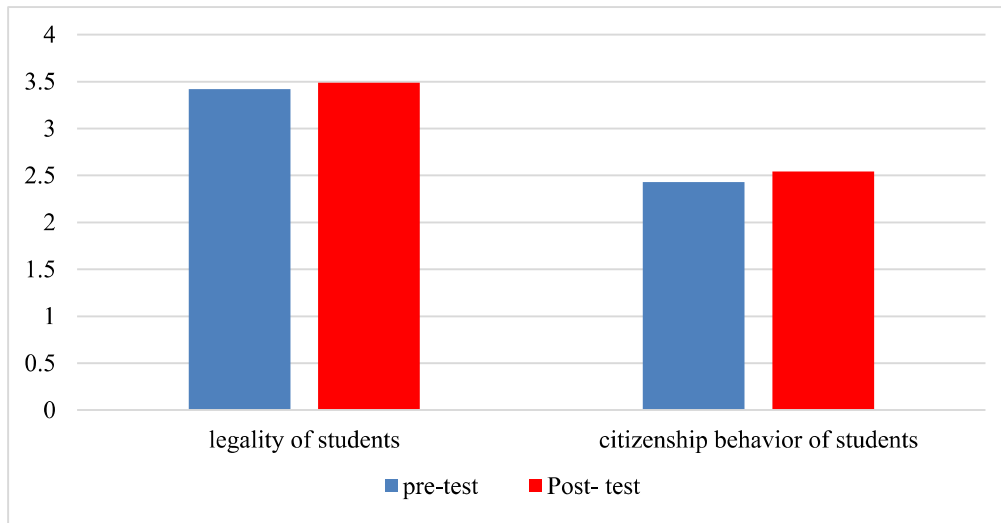


Figure 2. The Mean of Pre-test and Post-test of Citizenship Behavior and Law-abiding in the Control Group

B: Inferential findings

Kolmogorov-Smirnov test

Before conducting inferential statistical tests, it is important to ascertain the nature of the data distribution. In this particular research, the Kolmogorov-Smirnov test was utilized for this purpose. In this test, if the obtained significance level (Sig) is greater than 0.05, the null

hypothesis of the test is not rejected, indicating that the data distribution can be considered normal. Conversely, if the significance level is less than or equal to 0.05, the null hypothesis is rejected, suggesting that the data do not follow a normal distribution.

The results of this test for all the variables in this research are documented in Table 7.

Table 7. Kolmogorov-Smirnov Test Results

Sig	Kolmogorov-Smirnov Z	Variables	Group
0.200	0.099	students' law-abiding behavior	Control
0.187	0.161	citizenship behavior of students	
0.200	0.156	students' law-abiding behavior	experiments
0.127	0.229	citizenship behavior of students	

Based on the information presented in Table 8, it is evident that the calculated significance level (Sig) for the research variables (law-abiding and citizenship behavior of students) in both the experimental and control groups surpasses the error value ($\alpha=0.05$).

Consequently, the null hypothesis (H_0) is confirmed, indicating that the data follows a normal distribution. Therefore, a parametric statistical test, specifically an independent t-test, is utilized to examine the research hypotheses.

Table 8. Kolmogorov-Smirnov Test Results and Significance Level

Sig	Kolmogorov-Smirnov Z	Variables	Stage	Group
0.200	0.123	students' law-abiding behavior	pre-test	Control
0.076	0.194	citizenship behavior of students		
0.051	0.220	students' law-abiding behavior	pre-test	experiments
0.051	0.217	citizenship behavior of students		

Sig	Kolmogorov-Smirnov Z	Variables	Stage	Group
0.200	0.099	students' law-abiding behavior	Post- test	Control
0.187	0.161	citizenship behavior of students		
0.200	0.156	students' law-abiding behavior	Post- test	experiments
0.127	0.229	citizenship behavior of students		

Testing research hypotheses

Hypothesis 1: Teaching traffic education directly impacts the adherence to traffic laws among 12th district students in Tehran's first secondary schools.

To test the hypothesis, the paired t-test was used, which compares the mean of two dependent groups. The results of this test are presented in Table 9.

Table 9. The Results of the Paired t-test for the First Hypothesis

Sig	Degree of freedom	T statistic	Average difference	Average		Variable
				Post- test	pre-test	
**000/0	19	-6.132	-0.604	4.15	3.54	law-abiding

Looking at Table 9, it can be observed that the significance level observed in this test is zero, which is smaller than the alpha error level of 0.05. Additionally, the obtained t-statistic (-6.132) falls outside the range of 1.96 and -1.96. Therefore, the assumption that the pre-test and post-test averages are equal for law-abiding behavior is rejected. Therefore, the observed difference between them (0.604) is statistically significant. Given that the mean scores achieved in the post-test are higher than the mean scores of the pre-test, it can be confirmed that the experiment is effective. As a result, the initial hypothesis of the research is accepted, and it is concluded that traffic culture education has a positive and direct impact on the students of the first secondary school in the 12th district of Tehran, fostering compliance with traffic laws.

Test of the second hypothesis

Teaching traffic culture has a positive and direct effect on the citizenship behavior of first-

secondary school students in District 12 of Tehran.

To test the hypothesis, a paired t-test was conducted. This test compares the means of two related groups. The results of the test can be found in Table 10. It is important to note that the significance level observed in this test is zero, which is smaller than the alpha error level of 0.05. Additionally, the obtained t-statistic (-5.875) falls outside the range of 1.96 and -1.96. As a result, the assumption of equality between the mean scores of the pre-test and post-test for citizenship behavior is rejected. Therefore, the observed difference between them (0.535) is statistically significant. Furthermore, considering that the mean scores obtained in the post-test are higher than those of the pre-test, the effectiveness of the experiment is confirmed. As a result, the second hypothesis of the research has been accepted, and it can be concluded that traffic culture education has a positive and direct impact.

Table 10. The Results of the Paired t-test for the Second Hypothesis

Sig	Degrees of freedom	T-statistic	Average difference	Average		Variable
				Post-test	pre-test	
**000/0	19	-5.875	-0.535	2.87	2.32	Citizenshipbehavior

An independent t-test was employed to compare the variables of the research (law-abiding and citizenship behavior) between the

experimental and control groups. Initially, an independent t-test was used to compare the law-abiding status between the experimental and

control groups. Before conducting the independent t-test, it is necessary to examine the assumption of equal or unequal variances. To fulfill this purpose, Levin's test was utilized, and the results are presented in Table 11.

Table 11. The Results of Levin's Test

Sig	Degrees of freedom	F-tatistic
0.581	38	0.309

The results from Table 11 show that the obtained level of significance is 0.581, which is greater than the alpha error value of 0.05. Hence, the assumption of equality of variances is rejected. Consequently, an independent t-test is conducted, assuming unequal variances for

the law-abiding variable. Considering Table 12, the significance level obtained is less than 0.05, and additionally, the observed t-statistic (9.757) falls outside the range of 1.96 and -1.96. Consequently, the null hypothesis of the test is rejected, and the alternative hypothesis that there exists a significant difference between the mean scores of the two experimental and control groups concerning the law-abiding variable is confirmed. Given that the mean law-abiding score for the experimental group (4.150) is higher than the mean score obtained for the control group (3.499), it can be concluded that the students who received traffic culture education are more law-abiding compared to those who did not receive this education.

Table 12. Independent T-test Results for Students' Law-abiding Behavior

Result	Sig	Tstatistic	Average difference	Experiments Group		Control Group		Variable
				Average	Samples	Average	Samples	
Confirm the hypothesis	**000/0	9.757	-.650	4.150	20	3.499	20	law-abiding

Before conducting an independent t-test to compare the citizenship behavior status between the experimental and control groups, it is necessary to examine the assumption of equal or unequal variances. To accomplish this, Levin's test was employed, and the results are displayed in Table 13.

Table 13. The Results of Levin's Test

Sig	Degrees of freedom	F statistic
0.018	38	6.162

As shown in Table 13, the obtained level of significance is 0.018, which is lower than the alpha error value of 0.05. Hence, the assumption of equal variances is rejected, and

the independent t-test for analyzing citizenship behavior while assuming unequal variances is confirmed. In Table 14, the significance level is found to be less than 0.05, and the observed t-statistic (4.745) falls outside the range of -1.96 to 1.96. Consequently, the null hypothesis is rejected, and the alternative hypothesis that there is a significant difference between the mean scores of the two experimental and control groups in terms of the citizenship behavior variable is confirmed. Given that the mean citizenship behavior of the experimental group (2.86) is higher than the mean observed in the control group (2.54), it can be inferred that students who have undergone traffic culture training exhibit greater citizenship behavior compared to those who have not received such training.

Table 14. Independent T-test Results for Students' Citizenship Behavior

Result	Sig	Tstatistic	Average difference	experiments Group		Control Group		Variable
				Average	Samples	Average	Samples	
Confirm the hypothesis	**000/0	4.745	-.326	2.86	20	2.54	20	citizenship behavior

Conclusion

This research investigates the impact of traffic culture education on law-abiding and citizenship behavior among high school students in District 12 of Tehran city. The significance of considering environmental factors, such as traffic culture, is highlighted by Naghizadeh and Omidi (2018), as human exposure to noise pollution has detrimental effects on individuals' well-being. The educational institution encourages student participation in environmental protection and social responsibilities by implementing both official and hidden curricula. It aims to create a platform for raising awareness. This study examines the impact of traffic culture education on the law-abiding and citizenship behavior of first-secondary school students in District 12 of Tehran city. The research findings indicate that traffic culture training significantly influenced the experimental group's law-abidingness and sense of civic responsibility. The results and studies indicate that traffic culture education is effective not only with elementary school children (as previously proven) but also with Middle School Students. Traffic accidents are the leading cause of death and severe injuries in numerous developing countries, and they tragically contribute significantly to the deaths of young individuals. Unfortunately, Iran is one of the countries experiencing high human casualties due to traffic accidents. As previously mentioned, the involvement of humans in accidents is a major factor. By modifying and improving the knowledge and behavior of traffic participants, there is potential to decrease injuries in the future. Since human error contributes significantly to accidents and traffic problems, it would be beneficial to invest in educating people about traffic culture to increase awareness and improve their behavior on the road. Unfortunately, traffic education in Tehran primarily focuses on elementary-level students and tends to diminish or be neglected as they progress to secondary school. The test of the first hypothesis in the research explains that traffic culture factors contribute to an increase in traffic literacy. To put it simply, as stated by Taherian (2013), when traffic culture factors increase, citizens' traffic literacy also increases.

The higher the level of traffic literacy, the greater the citizens' involvement in managing traffic, and vice versa. Moreover, there exists a moderate to strong correlation between traffic literacy and citizens' engagement. As citizens' participation in traffic management increases, the level of traffic will decrease proportionally. Additionally, directing attention towards human behavior and implementing strategies to enhance it are significant factors in improving societal performance and diminishing motor vehicle accidents. The establishment and incorporation of behavioral guidelines related to road travel and vehicle usage can be accomplished through various approaches and facilitated by diverse institutions. This aims to ensure secure, convenient, prompt, and cost-effective transportation of goods and passengers. The most extensive authority in this matter is "education," which encompasses various aspects such as establishing educational systems and advocating and institutionalizing core principles of human conduct in traffic, family, school, university, and workplace settings. It also involves utilizing media, organizations, and responsible entities, as well as employing direct approaches like conferences and seminars. The objective of education is to introduce new beliefs and perspectives, rectify existing beliefs, and dispel false notions. Since a person's voluntary actions stem from intellectual and religious sources, the primary and ultimate aim of education is to bring about behavioral transformation. Humans acquire and absorb traffic norms and rules by learning them accurately and correctly. Through repetition, these learned behaviors become ingrained habits. The more effectively people are socialized and trained in traffic norms, the more likely they are to internalize and obey those norms, leading to an improvement in the overall level of traffic discipline within society. The hypothesis findings of Kashfi et al. (2017) align with the research results of Agarou et al. (2019) and Biying (2018). When explaining the test of the second research hypothesis, it can be concluded that traffic education should be planned to progress gradually from simple to complex levels and from concrete to abstract concepts. Education can be effectively carried out through campaigns that enforce road safety

laws or through broader social programs that specifically cater to children. The education of students brings both immediate and long-lasting advantages. The goal of incorporating road safety education into school programs is to enhance comprehension of traffic laws and regulations. Consequently, road safety classes should be integrated into the curricula of both private and public schools, focusing on children aged four to five years old and continuing throughout primary and secondary education. Research has demonstrated that introducing road safety education in schools has a beneficial impact on children's perceptions of street safety. It enhances their understanding of personal safety and consideration for others' well-being. In addition, instructing students about traffic regulations positively influences their consciousness of various aspects like pedestrians, cyclists, vehicle occupants, and traffic signs. This knowledge aids in developing their attitudes and behaviors to mitigate potential traffic risks effectively. Formal education in schools and implementing the four rules of slips, intentional violations, unintentional violations, and reducing driving errors demonstrate the cultural approach to training and minimizing driving mistakes. Cultural methods such as formal education, social programs, and involving young people as traffic police assistants have proven effective in addressing intentional and unintentional violations (Dagaoyian, 2017). To decrease risky behaviors in traffic, it is important for institutions working with youth to enhance their

sense of social belonging through cultural, educational, and entertainment programs. In addition, schools and universities should promote awareness about laws related to traffic safety. This viewpoint is supported by the studies conducted by Firouzaian and Tavakoli (2016), Ruhi and Ebrahimi Qawam (2016), Robati (2017), Safai Fakhri (2019), and Bani Asadi (2016).

Based on the research findings, it is recommended to broaden the educational subjects of traffic education in kindergartens and develop specialized textbooks for high school students to promote traffic culture. This can be achieved by drawing from the expertise and practices of leading countries in this field. Given the limited capacity of traffic education schools to accommodate all students in person and the extensive curriculum, it is necessary to incorporate various methods such as face-to-face training, textbooks, audio-visual media, educational packages, special programs, and year-round events. Additionally, the development of mobile phone programs and diverse software should be considered to ensure widespread accessibility of traffic culture education to the general public. Students should participate in educational workshops that focus on citizenship behavior and social responsibilities within the realm of traffic culture. It is feasible to organize social and educational events within schools, emphasizing the teaching of traffic culture as a practical exercise for students.

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