

Investigating the impact of health , safety and environment education (HSE)on the performance of students

Sirwan Zardi

MSc student Health, Safety and Environmental
Engineering, Mehr Alborz University
szardi1995z@gmail.com

Leili makhdoom zadeh

MSc student Health, Safety and Environmental
Engineering, Mehr Alborz University

Abstract

In this article, a method based on hierarchical analysis is presented to investigate the impact of health and safety and environment education, HSE on school students in district 5 of Tehran. A multi-stage clustering method was used for sampling. The number of sample members is 30

Introduction

Schools are a safe place for the education of children and students, which have a significant impact on creating a healthy and lively atmosphere for children. In addition to being at a very sensitive age, students; They spend a lot of time in school. This sensitivity needs to be investigated and studied from various aspects of education, safety, health, environment, etc. Trying to maintain the health of students and improving the level of health and safety in schools is an investment for future generations. Any negligence in the education of students and compliance with environmental health and safety issues in schools can pose serious challenges to the health of students. The high density of students in a relatively small space also significantly increases the probability of the spread of infectious diseases (Poursediqian and Arefi, 2020). The academic activities of students in schools are completely affected by the health and safety situation. In such a way that if the drinking water becomes contaminated or any kind of problem occurs in the use of health services and school equipment, it can seriously disrupt the educational efficiency of the students. In addition, factors such as undesirable or late

who were selected from among the students, officials and teachers of the school. A researcher-made questionnaire was used to collect data. Also, in order to prioritize the effects of health and safety and environment education on school students, hierarchical analysis method has been used. Teaching health, safety and environment to students can, in addition to improving health, have effects such as increasing vitality and vitality, academic progress, increasing self-confidence, reducing accidents and their consequences, increasing motivation and improving environmental health. to follow Meanwhile, the obtained results show that improving health and academic progress are the most important effects of teaching safety, health and environment to students.

Key words: school, students, safety, health, environment, hierarchical analysis.

collection of waste and creating problems in the sewage system can also affect the academic performance of students (Moloudi et al., 2022). Teaching safety tips to students by health care workers and health trainers is one of the most important trainings. Health care workers in schools can provide training on safety tips by inviting fire officials or related organizations, and maybe training through the caretakers can be more effective.

Education and upbringing in safe and healthy conditions and having support services is one of the indisputable individual and social rights of children. Therefore, having the health factors of the building such as classroom capacity, light, ventilation, temperature, noise, safety facilities, means of preventing and dealing with possible accidents and incidents, cleaning and cleanliness of the school, garbage collection and disposal system, standard equipment and improvement of health conditions in The educational environment should be prioritized (Colombo et al, 2019).

Teaching HSE tips and skills to students includes many things that are introduced and explained in this section.

1) Teaching safety skills related to crossing the street

- Moving only on the sidewalks
- Getting to know the color of traffic lights
- Crossing the pedestrian lane
- Not leaving parents' hands on the street

2) Teaching safety skills in dealing with strangers

- Failure to communicate verbally with strangers
- Not taking food from strangers
- Rejecting the invitation of strangers to ride in their car

3) Teaching safety skills when getting lost

- No crying and fear
- Lack of trust in strangers and kind people
- Getting help from shopkeepers
- Bringing the contact number of the parents
- Going to the police or traffic officer

4) Teaching safety skills regarding the use of various tools and equipment

- Not bringing a razor to sharpen pencils
- Not bringing dangerous objects and tools such as knives, boxing gloves, matches, needles, etc

5) Teaching safety skills regarding the consumption of edible substances

- Prohibition of buying food items by students from itinerant vendors
- Not drinking water in case of observing any unusual changes in the smell, taste and color of water and notifying the school officials.
- Not using unhealthy foods such as chips and puffs
- Compliance with oral and dental hygiene

- Cutting hair and nails

- Using napkins, masks and disinfectants
- Use of sanitary equipment such as a personal cup
- Washing hands regularly with soap and water

6) Other safety skills training

- Getting to know the basic principles of safety, fire fighting and first aid
- Refrain from playing dangerous pranks with other students
- Using standard bags and shoes

Providing the necessary training regarding the above matters should be done by parents, teachers and other school officials as well as health educators.

Research background

So far, many studies have been conducted in the field of health, safety and environment in schools and teaching students, and the most important ones will be introduced and explained in this section.

Asgari (2019) has compared the health and safety status of non-profit and public elementary schools in Kashmer. This cross-sectional descriptive study was conducted on 31 government schools and 14 non-profit elementary schools in Kashmer city in 2014-2015. The data was collected using the standard checklist approved by the Ministry of Health and through field observation and interview. The collected data were analyzed using Fisher's exact and Chi-square statistical tests using SPSS version 22 and Excel software. According to the results obtained in terms of construction condition, safety condition, buffet condition and environmental health indicators, respectively 51.86, 83.87, 49.7 and 95.16 percent of government schools and 67.77, 68.83 respectively. , 78.58 and 88.57 percent of non-

profit schools were in favorable conditions. Statistical analysis showed that government schools were significantly better than non-profit schools in terms of school area, appropriate building plan. On the other hand, non-profit schools were significantly better than public schools in terms of buffet hygiene. The results showed that privatization does not necessarily improve environmental health indicators in elementary schools. Rather, proper management, increased budget and increased monitoring by health centers are effective in having a safe and healthy school. Also, Gravandi et al. (1400) investigated the health and safety situation of urban and rural schools in Andika city. The research method of this research is a cross-sectional descriptive study that examines the environmental health and safety status of 40 urban and rural schools in Indika city and its compliance with national standards using a checklist prepared based on the environmental health regulations of the Ministry of Health. Is. The collected data was analyzed using Excel software and then SPSS. According to the results, 77.8% of urban schools and 80.6% of rural schools had access to safe drinking water. In 55.6% of urban schools and 22.6% of rural schools, the standard of drinking water was observed. The minimum area required for each student has been observed in 100% of urban schools and 83.9% of rural schools. Green space per capita was observed in 67.7% and 88.9% of rural and urban schools, respectively. In 77.8 percent of urban schools and 35.5 percent of rural schools, the standard of the number of toilets was observed. The standard of the number of toilets was observed in 44.4% of urban schools and 29% of rural schools. In 44.4% of urban schools and 35.5% of rural schools, wastewater disposal method is used based on sanitary standards. The results of the study showed that 44.4% of urban schools and 74.2% of rural schools had health conditions. According to the findings of the study, the environmental health and safety of schools has an effective role in increasing the efficiency and level of education. In addition,

Jabari et al. (1401) investigated the effect of environmental health and safety education on school students. The statistics and figures that are heard about the incidents of "students" in kindergartens, preschools and elementary schools are very important and worthy of consideration. Some parents believe that when children enter the school environment, no problem will threaten them anymore, but the potential of an accident in the school environment due to the lack of space, the density of students and their curiosity is relatively high. Home will be more. Compliance with safety tips in school by administrators and students themselves, teaching safety tips for children, teaching health tips for elementary students and preparing a checklist of safety tips at school and home can prevent many accidents from happening. School is the second home of students and it is the place where children spend most of their time after home. Since there are many risks and accidents in front of the students, it is inevitable to teach safety tips to students in every level of education to deal with and manage natural disasters and prevent dangerous and unexpected events. Teaching safety tips to students as a segment of society who need to be aware and who are responsible for transferring their knowledge and awareness to others will ensure the health of a large part of people. Also, Kihani (2017) investigated the role of education in improving HSE indicators with emphasis on health, safety and environment aspects. In this article, an attempt has been made to answer the question of how to increase the level of HSE in the education system. The existence of health, safety and dangerous aspects as well as environmental consequences that are increasing day by day and governments are looking for solutions and use their facilities to improve the health, safety and environment of communities. they take. The existence of awareness and knowledge of health management in the education system is the most important pillar in promoting and maintaining the health of the school environment and the safety of students. Education and, accordingly, educational

environments have the greatest effect and role on the mentality and civilization of societies. The necessity of reforming the body of education is to create spaces related to students' activities; Spaces that have suitable and favorable conditions for the health, safety and environment of children and teenagers, which can be realized through the design of the details of the spaces according to the behavior patterns of children and teenagers. The purpose of improving health, safety and environment in the education system is to maintain the health of students and society as a whole. The school as an example of a society needs such a system.

Features of safe schools

Electrical safety in schools: A safe school has new and proper electrical meters and all switches and sockets are checked monthly. Also, the power supply network in schools must have a grounding system. Electrical facilities should also be placed in a special and safe box, and their doors should be locked and out of reach of students. **Gas safety in schools:** Gas pipelines must be checked and approved by the gas company. They should also be checked so that if technical defects and gas leaks occur, they can be discovered and fixed. If gas canisters are used in the school, the canisters must be placed in an open space away from sunlight and out of reach of students (Sprague et al, 2021).

1) Safety of school workshops and laboratories

The time of attending the school workshop and laboratory is one of the most enjoyable times of attending schools, because students record new and exciting experiences; But it must be said that this place, while interesting and exciting, can also cause various incidents. Therefore, you should pay special attention to this section in order to create safe conditions in schools. Among the points that must be observed are:

- Teach safety tips to students so they know how to react in any situation.

- Write the necessary explanations on the chemical containers inside the laboratory and workshop.

- Don't make tools that are sharp, fragile, sharp, etc. accessible and consider a special place for them.

- Request students to be disciplined while in the lab and calmly do what you have asked them to do. Also, instruct the students not to open the cans containing the materials and not to reach for any tools without permission (Viitaharju et al, 2021).

2) Safety in schools during extracurricular activities

Many schools also consider extracurricular activities for their students, for example, swimming in school pools, participating in gyms, camps, etc. Now, schools that consider such activities must implement safety conditions well. Therefore, it is very important to participate in the HSE training course for teachers and experts active in the field of extracurricular topics and learning safety tips in visits, camps, etc. In the gym there is also the possibility of an accident, so first of all make the conditions as safe as possible and then talk to the students about safety tips in schools so that they know how to perform in such environments.

3) School staircase safety

One of the most dangerous places in the school is undoubtedly the staircase, and this place becomes one of the busiest places during recess, and this is the reason for various accidents. Therefore, it is recommended to build the stairs of schools with a wide surface and a low height, and make sure to use reliable and high-quality fences so that the fences do not separate easily. Also, the authorities should teach the students to pass the stairs in an orderly manner so that no problems arise (Kim et al, 2019).

4) School yard safety

School yard safety is another aspect of school safety that should be considered. Equipment such as flag poles, volleyball poles, basketball poles, sports equipment, etc. are usually seen in school yards, and students usually play with these equipments when they are in the school yard, and it must be said that this is associated with possible risks. Therefore, the school authorities should pay special attention to the inspection of the devices in the yard and make sure that these devices will not pose any danger to the students. Of course, the students should also be taught the correct way to use the tools and sports equipment so that the possibility of an accident will be as minimal as possible.

5) Safety of safe roof in schools

When implementing safety in schools, it is recommended to completely secure the staircase and the paths leading to the roof and lock the door if necessary, because many students go to the roof for curiosity, which can lead to accidents.

6) Proper heating system

It is recommended that schools do not use oil-burning heaters, because there is a possibility of accidents such as fire, burns and gas poisoning. Check the place where the smoke exits from the chimney, that it does not open completely, and do not use heaters without a chimney. You can replace heaters with updated and safe heating systems to keep your school and students safe.

Research methodology

The method of this research is descriptive-cross-sectional in which all the schools of the 5th district of Tehran are considered as the statistical population. In the meantime, using the multi-stage cluster method, 30 students, school officials and teachers were selected as sample members and the questionnaire was completed by them. This questionnaire contains two main parts. The first section contains general information and the second section contains questions related to the

effects of training on health, safety and environmental conditions. In this regard, the state of drinking fountains and toilets, the state of toilets, the state of buffets, the state of protection and safety, the state of sewage disposal, the state of garbage collection, etc., and the effects of education in each of these areas. will be reviewed on the improvement of HSE status. Also, in order to prioritize the effects of health, safety and environment education to students, the hierarchical analysis method has been used, which is introduced and explained in the following.

) hierarchical analysis method

This method was initially presented for individual decision-making in a turbulent and fuzzy environment and then for group decision-making. Using this method in group decision-making not only preserves the advantages of group decision-making techniques, but also reduces and eliminates its defects such as speed and cost. This method is one of the most famous subsets of multi-criteria decision-making techniques, which was first presented in the 1970s. This method is used when the policy maker or decision maker is faced with several competing options and decision criteria. The basis of this method is based on pairwise comparisons and it starts by providing a decision hierarchy tree (Dos et al, 2019).

The decision hierarchy tree shows the compared factors and competing options in the decision. Then, a series of pairwise comparisons are performed. These comparisons determine the weight of each of the indicators and criteria for competing options. Finally, the AHP logic combines the matrices obtained from pairwise comparisons to obtain the optimal decision.

2) Hierarchical group decision-making process

There may be several decision-makers in a decision-making like one decision-maker, whose opinions must be included in the comparison matrix. In this case, for group decision-making,

the geometric mean can be used for the elements of the comparison matrix, where k represents the number of decision-makers.

(1)

If a decision-maker based on his expertise and experience has more influence on opinions; We can give weight to his opinion. Therefore, the above relationship is modified as follows.

(2)

For this purpose, in this article, a questionnaire was used to collect information. After collecting information from the statistical population including students, officials and teachers of schools, a comparison matrix is extracted from their opinions. Another important point is the number of sample members in this research. The number of sample members in this research is 30 students, officials and teachers of schools, who were selected in a multi-stage cluster.

Generally, in multi-criteria decision-making methods such as hierarchical analysis method with the number of opinions above 5 people, favorable results can be obtained. In addition, unlike inferential statistics, operational research methods have validation marks; That is, if the results are wrong; It is determined. In the hierarchical analysis approach, the validity of the results is the consistency rate.

) calculation of compatibility rate

The importance of the hierarchical analysis method is in addition to combining different levels of the decision hierarchy and considering various factors in calculating the compatibility rate. Compatibility rate is a mechanism that determines the compatibility of comparisons. This mechanism shows how much you can trust the priorities of the combined tables. Experience has shown that if the compatibility rate is less

than or equal to 0.1; In this case, the compatibility rate is acceptable. For example, if CR is equal to zero; In this case, the answers are completely consistent. But if CR is greater than 0.1; The compatibility rate is not acceptable and the answers related to that matrix cannot be a criterion for decision making. In this article, this rate is considered equal to 0.05.

Step 1: perform pairwise comparisons

In this research, the different effects of various educations have been compared two by two as competing options. This comparison is designed using a scale that ranges from equal preference to extreme preference; It is done. Experience has shown that using a scale of 1-9 makes the decision maker make comparisons in a favorable way. When comparing two by two, the priority of each of the effects of education should be determined based on the probability of occurrence in a ranked method. Then, the numerical value corresponding to it is given in the comparison table. Considering that the preference of each option is equal to itself; The diameter of the matrix is equal to 1. The comparative matrix in hierarchical analysis is an inverse matrix. It means that if the preference of option one to two is 3; Therefore, the preference of the two-to-one option is equal to 1.3.

One of the suitable methods for composing a comparative table of group members is to use the geometric mean. The geometric mean helps the decision maker to arrive at the group's judgment about each pairwise comparison while considering the judgment of each member. Since pairwise comparisons will produce data in the form of "ratio", the geometric mean is mathematically the best mean for them. The geometric mean is the most suitable mathematical rule for combining judgments in AHP; Because this average preserves the property of inversion in the pairwise comparison matrix. In this article, geometric mean is used to combine paired comparison matrices (Vaidya and Kumar, 2006).
Step 2: Extracting priorities from group comparison tables

In order to extract the priority, only the group comparison matrix is considered. With the assumption that the concept of normalization and weighted average is used to determine the priority. In the hierarchical analysis method, the following relationship is used to normalize the numbers of the comparative table.

(3)

where , is the normal component.

Step 3: Choose the best option

In order to choose the best option, the values of each row should be added together and divided

by the number of options. This mathematical calculation is the weighted average for each of the different effects of the desired training.

Analysis of results and discussion

In this section, the results of the implementation of the hierarchical analysis method to identify the most important effects of teaching HSE issues to students have been presented and analyzed. The matrix of pairwise comparisons obtained from the questionnaire information is shown in Table (1).

Table (1): matrix of pairwise comparisons resulting from questionnaire information

Improving environmental health	Increase motivation	Reduction of accidents and consequences	increasing the self confidence	Achievement	Increasing freshness and vitality	Improve health
0.5	2	0.333	0.25	0.5	1	Increasing freshness and vitality
0.67	1/67	2/86	6/67	1	2	Achievement
0.67	0.33	0.412	1	0.15	4	increasing the self confidence
2/5	0.4	1	2/4	0.35	3	Reduction of accidents and consequences
1/67	1	2/5	3	0.6	0.5	Increase motivation
1	0.6	0.4	1/5	1/5	2	Improving environmental health

Table (2) shows the integration of the matrix of pairwise comparisons based on the geometric mean

Table (2): Combining the matrix of pairwise comparisons based on the geometric mean

Improving environmental health	Increase motivation	Reduction of accidents and consequences	increasing the self confidence	Achievement	Increasing freshness and vitality	Improve health

0.82	1/15	0.88	1/0.8	1/23	1	Increasing freshness and vitality
0.91	0.85	0.9	1/0.6	1	0.81	Achievement
0.87	0.76	0.8	1	0.94	0.93	increasing the self confidence
1/18	1/0.3	1	1/25	1/11	1/14	Reduction of accidents and consequences
1/0.1	1	0.97	1/32	1/18	0.87	Increase motivation
1	0.99	0.85	1/15	1/1	1/22	Improving environmental health

To calculate the normalized matrix, the sign group matrix presented in table (2) has been used. Table (3) shows the normalized matrix of the group matrix. In order to obtain this matrix, first the data is entered in the Excel software; Then, the resources in the columns (related to

each of the different effects of education) of the group matrix have been collected. In the next step, the amounts of each column are divided by the total of the same column. The results are new levels that form the normalized matrix

Table (3): normalized matrix

Improving environmental health	Increase motivation	Reduction of accidents and consequences	increasing the self confidence	Achievement	Increasing freshness and vitality	Improve health
0/5	2	0/333	0/25	0/5	1	Increasing freshness and vitality
0/67	1/67	2/86	6/67	1	2	Achievement
0/67	0/33	0/412	1	0/15	4	increasing the self confidence
2/5	0/4	1	2/4	0/35	3	Reduction of accidents and consequences
1/67	1	2/5	3	0/6	0/5	Increase motivation
1	0/6	0/4	1/5	1/5	2	Improving environmental health

In order to choose the best option, it is necessary to add the values of each row together and divide by the number of options. This method is the weighted average for each of the different effects of education. These calculations have been made about each of the different effects of education.

To calculate the weight related to each of the training effects by entering the information in Excel software, all the matrices of paired comparisons are entered; Then, using the geometric mean, the weights are calculated as described in table (4).

Table (3): The weight of each of the effects of education

Improving environmental health	Increase motivation	Reduction of accidents and consequences	increasing the self confidence	Achievement	Increasing freshness and vitality	Improve health	Effects of training
0/1	0/08	0/17	0/07	0/21	0/13	0/24	Weight

As can be seen, health improvement and academic progress are among the most important effects of teaching safety, health and environment to students.

conclusion

In this article, a method based on Merlotbi chain analysis was presented to investigate the effect of health and safety and environment education, HSE on school students in district 5 of Tehran. Also, in order to prioritize the effects of health and safety and environment education on school students, hierarchical analysis method has been used. Teaching health, safety and environment to students can, in addition to improving health, have effects such as increasing vitality and vitality, academic progress, increasing self-confidence, reducing accidents and their consequences, increasing motivation and improving environmental health. to follow Meanwhile, the obtained results show that improving health and academic progress are the most important effects of teaching safety, health and environment to students.

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