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Exploring Students' Understanding of Traffic Artworks in Jordan

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Abstract

Driving consequences in Jordan are becoming a major concern for all Jordanians despite of their age; occupation; socio-economic status. Education is as important as engineering and enforcement to maintain safety and efficiency on our streets. Unsatisfactory levels of traffic knowledge and safety culture is spreading among Jordanians. The knowledge base among students in Jordan universities and schools is explored in this research when administering a questionnaire to more than one hundred students. The subject of the questionnaire is the contents of eight artworks developed by school kids expressing their understandings of traffic and traffic safety issues.

The drawings contained more wrong concepts than correct concepts, and less of the interviewed subjects were able to identify the incorrect concepts compared to those who identified correct concepts. University students were more capable to identify incorrect concepts. The topics and the quality of drawings contribute to the variation in responses among students. No clear trend is detected in that regard.

This research is setting the ground for future work to examine the knowledge base of traffic issues among Jordanian. The next step is to examine more artworks with control sets who have been subjected to various orientations prior to examination.

Keywords: traffic safety, traffic artworks, traffic safety knowledge, traffic safety awareness, students' traffic safety.

1. Introduction

Traffic safety in Jordan is becoming a major concern to all Jordanians, whether at the personnel level or at the organizational level. Authorities are acknowledging the crisis and looking to mobilize all possible efforts to control the escalating number of traffic causalities in recent years. The latest report issued by Jordan Traffic Institute (JTI) shows that traffic accidents were abruptly increasing at a higher rate since 2003 (Figure 1). However, fatalities are also maintaining an increase from 2003 to 2007 as shown in Figure 2.

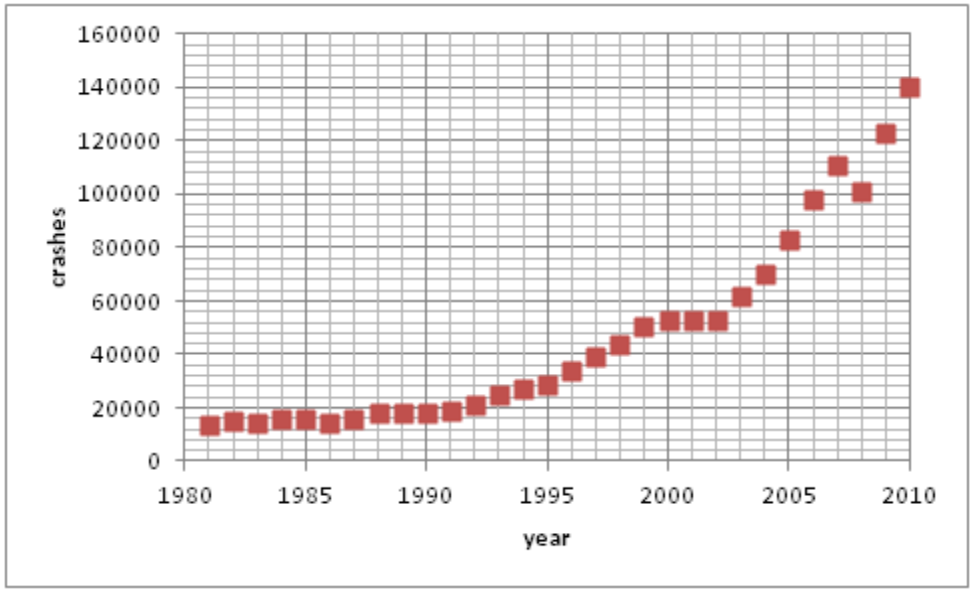

Figure 1: Traffic Accidents in Jordan (Source: Jordan Traffic Institute, 2011)

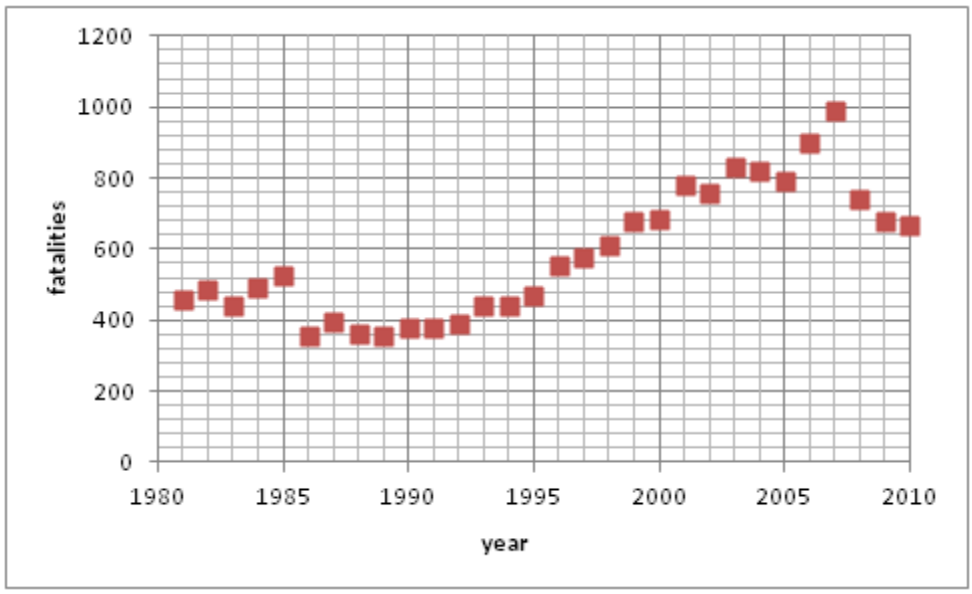

Figure 2: Traffic Fatalities in Jordan (Source: Jordan Traffic Institute, 2011)

Students in Jordan are more than 40% of the total population; similar percentage of fatality is noticed for this age group (38.9%). Figure 3 depicts the percentages of fatalities for different age groups and road users.

Amman the capital of Jordan accounts for 40% of the Kingdom population (Department of Statistics, 2011), while traffic accidents in Amman accounts for about 67% of all traffic accidents in Jordan (JTI, 2011).

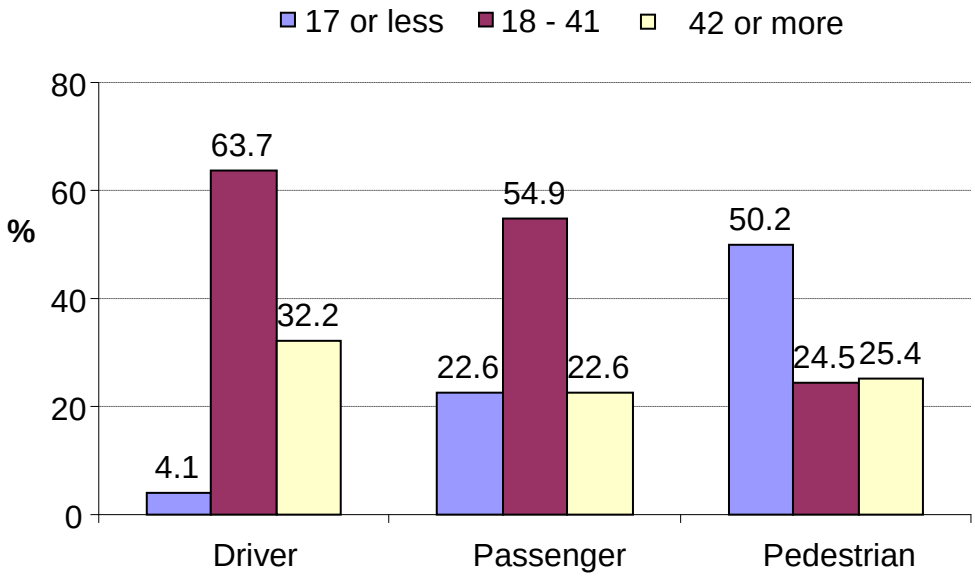

Figure 3: Traffic Fatalities in Jordan by Age Groups and Road User (Source: Jordan Traffic Institute, 2011)

2. Literature review

The educational component of traffic safety was widely and internationally researched with focus on children to investigate their knowledge concerning traffic rules and safety requirements. Rothengatter (1984) found that parents are capable of achieving improvements in the road-crossing behaviour of their children through active training programs (in traffic environments rather than cognitive instructed only). Results indicate that explicit training can improve the essential road-crossing behaviour of young children and that parents are capable of carrying out such training programs successfully.

In another study (Gregersen & Nolén, 1994), researchers focused on the problem of traffic safety among children and the effectiveness of voluntary traffic clubs to investigate the general doubt regarding the effectiveness of traditional strategies of teaching and training children how to act in specific traffic situation. The results revealed that traffic safety club members do not have a lower accident risk than non-members. The use of safety equipment is, however, higher among members.

Schagen & Rothengatter (1997) compared the effectiveness of different approaches of traffic safety training for school children (roadside behavioural training; classroom instruction; and a combination of the two approaches). Results showed the superiority of behavioural training approach.

A study (Zeedyk et al., 2001) investigated the effectiveness of designed programs to teach children about road safety (either an increase in knowledge or an improvement in behavior). The study used two different techniques. The first technique utilized commercially marketed products (a three-dimensional model of the traffic environment; a road safety board game; and illustrated posters and flip-chart materials). While the second technique investigated the transfer of knowledge to children's behavior in a real-life traffic environment. Results showed the effectiveness of the first technique in increasing children's knowledge about safe and dangerous locations at which to cross street, however, the second technique showed that increased knowledge did not result in improved traffic behavior. Findings highlight the need to distinguish between knowledge and behavior in traffic safety.

Shortages in local research related to road safety knowledge among children and students in Jordan urged for such a research paper.

3. Motivation and research objectives

The three E's concept is poorly understood and ineffectively implemented in Jordan. Engineering; Enforcement;

and Education are supposed to be advancing in parallel to each others in order to capitalize the sincere efforts and improve traffic safety in Jordan. While the engineering and enforcement are advancing fairly well in Jordan, less emphasis on education and on building a comparable healthy traffic environment.

Statistics showed that students are the most exposed age group to traffic accidents in Jordan, especially pedestrians and passengers (Figure 3). Therefore, the targeted groups in this research are school students and university students.

Traffic artworks are one way to promote traffic knowledge and traffic safety in the society and among youngsters. The goal of this research is to explore students' understanding of traffic artworks in Jordan. The artworks are compiled from previous kids' participation in the activities of the Annual International Traffic Day. This particular activity is an open contest held annually by Jordan Traffic Institute where many kids from different schools submit their artwork for possible winning.

Specific objectives are to examine if age groups and artwork subject are contributing to the knowledge base related to traffic. The two groups of students selected as subjects to administer the questionnaire are school students and university students.

4. Methodology

In order to accomplish the research goal and objectives, the following methodology is adopted:

- Collecting artworks done by school students who previously participated and win in galleries held annually in Jordan by Jordan Traffic Institute
- Scanning the artworks to select a manageable number of artworks to present in front of selected subjects of students.
- Developing questionnaire that include questions of interest to meet the goal and objectives of this research. The questions are concerning the topics and contents of the artworks.
- Randomly select the subjects of the study from school and university students.
- Administer the questionnaire to the selected subjects.
- Manage the gathered data from the questionnaires using statistical software packages.
- Conduct statistical analysis and report results.
- Draw conclusions and recommendations.

5. Procedures

The procedure of conducting this research is as follows:

5.1First: 42 artworks are initially reviewed and scanned for final selection. The selection criteria were uniqueness; clarity; substance; and timing of the topic. The final set of school artworks includes 8 artworks (Figure 4). The contents of the artworks are summarized in Table 1.

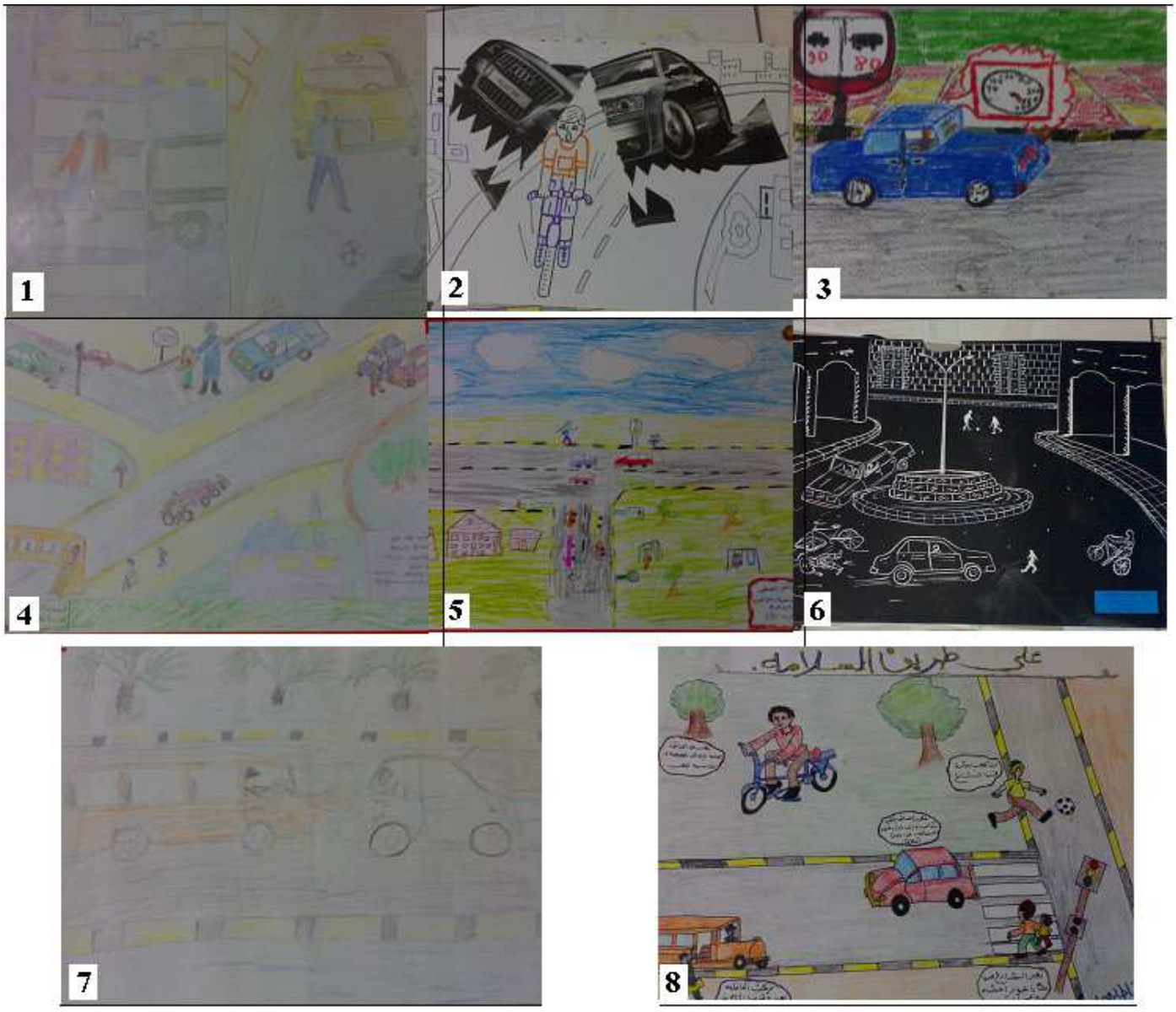

Figure 4: Artworks by School Students

Table 1 Artworks Contents

Drawing Theme	Child Age	Main Message	Wrong/Incorrect Concepts	Correct Concepts	Traffic elements in the drawing
1. Playing in street is wrong	10	• It is wrong to play in the middle of the street. • It is important to use pedestrian facility.	• Do not play in front of parked vehicles and in the middle of street.	• Sidewalk with no obstacles. • Be careful when cross the street.	• taxi, road, sidewalk, pedestrian crossing, and traffic signal.
2. Bicycle and Car	13	• Why not use bicycle instead of cars • Or children ride bicycle but thing of driving a car	• The car in the drawing is known to have high speed, trees are very close to the roadway. • The child is cycling in the middle of street. • Narrow sidewalk. • Not using helmet.	• Road making is shown	• road, bicycle, passenger car, sidewalk, road marking, and trees.
3. Speed limit by Vehicle type	11	• Trucks should have lower speed. • Driving in high speed dangerous	• Passenger car speed 90 km/h in urban area is very risky • Driver desire for doing high speed in urban area	• High speed marked red indicating how risky it is.	• passenger car, traffic sign, speed sign varies according to vehicle type, road and sidewalk.
4. Safe use of roads and sidewalk and police role	7	• Use sidewalk • Cross at pedestrian facilities • Take care of elderly and give them priority	• Wrong roadway marking • School is very close to the intersection • Sidewalks are not continuous • Median concept is not clear • Crossing in other places that is not designated for pedestrian is wrong	• Use of sidewalk • Use of foot bridge • Cross only at pedestrian facilities • Give priority for elderly • Be careful while crossing	• foot bridge, sidewalk, roadway, vehicles, traffic signal, police man, school, bicycle, elderly, children, and children stroller.
5. Crossing at junction	KG	• Cross at pedestrian crossings and respect traffic signs and signals	• Playground is close to the street • Sidewalk in busy road is available only on one side • Wrong road marking *	• Crossing at zebra crossing that is signed or at traffic light signals.	• road, sidewalk, vehicle, traffic light signal, pedestrian signs, roadway marking.
6. Use of roundabout	14	• Do not play in the middle of the street • Be careful when driving at roundabout • Road users badly interact at roundabout	• The roundabout and obstacle are poorly designed • No enough sight distance the roundabout exit or entrance. • No marking • Narrow sidewalk compared to roadway	• Playing and not paying attention will cause death.	• vehicle, sidewalk, road, roundabout, cyclists, lighting
7. Crashes are deadly	8	• Crashes will cause injuries and bleeding. • If safety belt in use there will be no blood and it will be safe.	• No marking, driving in the middle of the street cause crashes. • Those who are not using safety belt will be subjected to high risk.	• Safety belt give you the opportunity to survive crashes	• Vehicle, roads, sidewalk, trees, and safety belt
8. Play in play ground and not in the street	6	• Do not play in the street. • Respect traffic rules. • Cross at pedestrian facilities. • Board the bus from the front door and queue. • Use play ground for playing.	• It is wrong to play in the street. • There is no road marking. • Sidewalk is available on one side only.	• Crossing at pedestrian facilities. • Respect traffic rules will save lives. • Board the bus after it comes to complete stop. • Sidewalk should be free from obstacles. • Play ground is the place for playing.	• Play ground, Sidewalk, pedestrian crossing • Traffic signal, roadway, bus, bicycles.

5.2 Second: The questionnaire development matches the goal and objectives of this research. The contents of each form include 56 questions (7 questions for each piece of artwork) in addition to age; gender; and education level. Table 2 lists the questions being asked for each piece of artwork.

Table 2: Artwork Questions

NO.	Question	Answer type
1	What do you think the kid is trying to say in this artwork?	Text
2	What is the age of the kid?	Three age categories
3	Did the kid receive external support to draw this artwork?	(yes; no, not sure)
4	Do you think that this drawing reflects the child age group knowledge and concerns?	(yes; no, not sure)
5	Does the artwork contain wrong Concepts?	(yes; no, not sure)
6	Does the artwork contain right concepts?	(yes; no, not sure)
7	What are the elements of transportation system that you see in this artwork?	Listing (text)

5.3 Third: The questionnaire is administered to 101 subjects selected randomly from school students and university students. The characteristics of the subjects are summarized in Table 3.

Table 3: Subjects Characteristics

Category		Frequency	Percent	Cumulative Percent
Age groups	8-15	53	52	52
	16-24	43	43	95
	25-45	5	5	100
	Total	101	100	
Gender	Male	60	59	59
	Female	41	41	100
	Total	101	100	100
Education level	Elementary	5	5	5
	Primary	46	46	50
	Secondary	8	8	60
	University	42	42	100
	Total	101	100	

6. Results and findings

Concepts introduced in children drawings were analysed and were grouped into five categories (Table 4). In total there were 25 concepts included in the drawings; terms related to behavior were the most frequent used.

Table 4 Concepts Introduced in Children Drawings

Category	Concepts and terms
Behavior	Play, driving, speed, high speed, give priority, traffic rules, queue, play -ground and risky interaction
Consequences	Dangerous, injuries, bleeding, safety belt and injury prevention
Infrastructure	Street, roundabout, pedestrian facilities and sidewalk
Mode of Transport	Bicycle, car, truck, bus and mode of transport
Road user	road users: kids and elderly, pedestrians and drivers

Terms used in the drawings were cross examined with the age group of the child. Figure 1 shows that as students age increases the diversity of concepts used in the drawing increase. Figure 1 shows that at younger age traffic is visualized mainly by behavior and infrastructure. As age increase new concept is introduced such as

consequences and mode of transports.

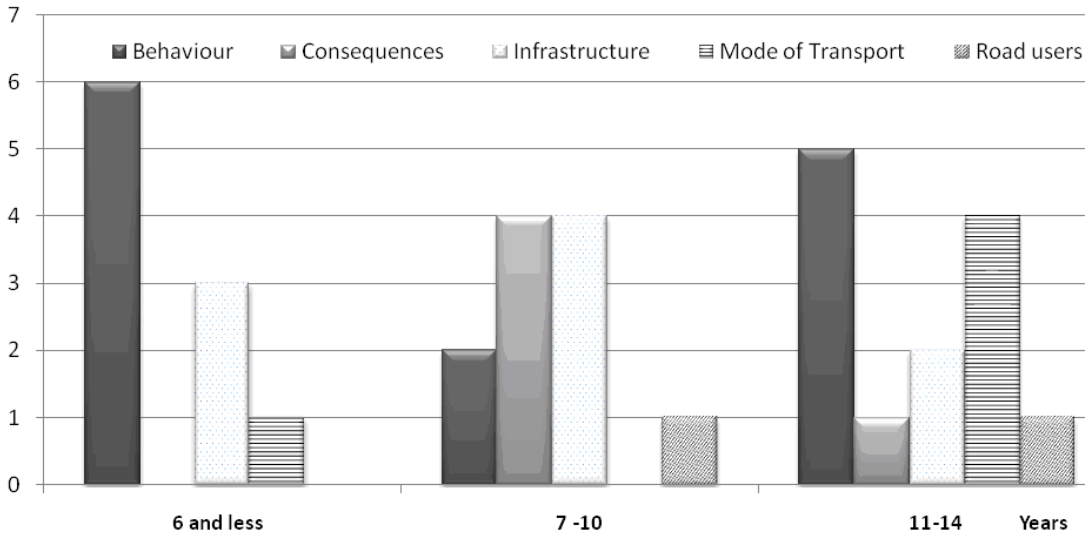

Figure 1 Categories describe Children Perception of Traffic introduced by Age Group

The responses to each of questions 2 through 6 (Table 2) are summarized next and discussion of each question will follow.

Question 2: What is the age of the kid?

Guessing the age of the child based on his/her work is not an easy attempt (Table 5), more than half of the subjects were successfully being able to identify the age group of the child based on his/her drawing in five of the drawings (1; 3; 5; 6; and 7), while failed to do the same for the other three drawings (2; 4; and 8). It tends to over-estimate the age of the child rather than under estimating his/her age. Most of right guessing was for the middle age group (8 – 12) years.

Table 5 Response to Question 2: How old is the child who draws this drawing?

Drawing	Response	Less than 8 years	8 – 12 years	More than 12 years	Total	Missing	All
(1) Play Ground	Number	18	**77**	3	98	3	101
	%	18.4	**78.6**	3.1	100		
(2) Bicycle +car	Number	13	56	**31**	100	1	101
	%	13	56	**31**	100		
(3) Speed Limit	Number	14	**68**	19	101	0	101
	%	13.9	**67.3**	18.8	100		
(4) Police Control	Number	**23**	48	28	99	2	101
	%	**23.2**	48.5	28.3	100		
(5) T-Intersection	Number	**74**	23	3	100	1	101
	%	**74**	23	3	100		
(6) Roundabout	Number	8	31	**59**	98	3	101
	%	8.2	31.6	**60.2**	100		
(7) Car Crash + Safety Belt	Number	22	**55**	11	88	13	101
	%	25	**62.5**	12.5	100		
(8) Safe ways	Number	**31**	33	36	100	1	101
	%	**31**	33	36	100		

Bold face underlined is the correct age group

When examining whether there are agreement between the correct age and the estimated age, Table 6 summarizes the results of paired t-test for all eight artworks. At 95% confidence level, the age is incorrectly identified for six drawings. The age is correctly identified for only two drawings (3 and 7).

Table 6 Correlation between the correct age and the estimated age

Paired Samples Test	Paired Differences Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
(1) Play Ground	-0.15	0.439	0.044	-0.24	-0.07	-3.45	97	**0.000**
(2) Bicycle +car	-0.82	0.642	0.064	-0.95	-0.69	-12.78	99	**0.000**
(3) Speed Limit	0.05	0.572	0.057	-0.06	0.16	0.87	100	0.387
(4) Police Control	1.06	0.740	0.074	0.91	1.21	14.26	98	**0.000**
(5) T-Intersection	0.29	0.518	0.052	0.19	0.39	5.60	99	**0.000**
(6) Roundabout	-0.48	0.646	0.065	-0.61	-0.35	-7.35	97	**0.000**
(7) Car Crash + Safety Belt	-0.13	0.603	0.064	-0.25	0.00	-1.94	87	0.055
(8) Safe ways	1.05	0.821	0.082	0.89	1.21	12.79	99	**0.000**

Question 3: Did the kid receive external support to draw this artwork?

Good agreement between the responses of the university students and the school students to question 3 (Did the kid receive external support to draw this artwork?) as indicated by chi-square test results (Table 7). Five of the eight drawings (2; 4; 5; 6; and 8) are considered receiving external support. Only one drawing (7) is assumed to be purely done by the child, while the other two drawings (1 and 3) are not subjected to common agreement.

Table 7 Response to Question 3: Did the kid receive external support to draw this artwork?

Drawing	Group	University Student						School Student						
	Response	Yes	No	Not Sure	Total	Missing	All	Yes	No	Not Sure	Total	Missing	All	Chi-Square Test
(1) Play Ground	Number	17	11	11	39	2	41	24	22	13	59	0	59	χ^2=0.99 p=0.60
	%	**43.**	28.	28.	100			**40.**	37.	22	100			
(2) Bicycle + car	Number	23	12	4	39	2	41	39	10	10	59	0	59	χ^2=2.92 p=0.23
	%	**59**	31	10	100			**66.**	16.	16.	100			
(3) Speed Limit	Number	19	17	4	40	1	41	27	24	6	57	2	59	χ^2=0.01 p=0.99
	%	**47.**	42.	10	100			**47.**	42.	10.	100			
(4) Police Control	Number	24	14	2	40	1	41	45	10	3	58	1	59	χ^2=4.09 p=0.12
	%	**60**	35	5	100			**77.**	17.	5.2	100			
(5) T-Intersection	Number	22	15	4	41	0	41	29	24	5	58	1	59	χ^2=0.24 p=0.88
	%	**53.**	36.	9.8	100			**50**	41.	8.6	100			
(6) Roundabout	Number	23	13	5	41	0	41	25	24	7	56	3	59	χ^2=1.4 p=0.497
	%	**56.**	31.	12.	100			**44.**	42.	12.	100			
(7) Car Crash + Safety Belt	Number	10	18	2	30	11	41	22	33	4	59	0	59	χ^2=0.14 p=0.93
	%	33.	**60**	6.7	100			37.	**55.**	6.8	100			
(8) Safe ways	Number	27	11	3	41	0	41	44	9	3	56	3	59	χ^2=2 p=0.368
	%	**65.**	26.	7.3	100			**78.**	16.	5.4	100			

Bold face underlined is the majority of responses

Question 4: Do you think that this drawing reflects the child age group knowledge and concerns?

The subjects were asked if the drawing reflects the child age group knowledge and concerns, which is a question that seems to be very difficult to answer. This is normal in the sense that one needs to be in the other person place. It looks that university students are more confident to answer when compared to school students. Although differences exist, a common agreement is still holding between the two groups as given by chi-square test results (Table 8). Nevertheless, drawings 3 received disagreement between the two groups (χ2=10, p=0.0067).

Drawings 1 (play-ground); 4 (police control); and 8 (safe-ways) look more reflecting the age of the child compared to the other drawings, which include concepts that is perceived by the participants subject reflect children experience in traffic.

Table 8 Response to Question 4: Do you think that this drawing reflects the child age group knowledge and concerns?

Drawing	Group	University Student						School Student						
	Response	Yes	No	Not Sure	Total	Missing	All	Yes	No	Not Sure	Total	Missing	All	Chi-Square Test
(1) Play Ground	Number	22	16	1	39	2	41	31	24	4	59			χ^2=0.88 p=0.644
	%	**56.4**	41	2.6	100			**52.5**	40.7	6.8	100			
(2) Bicycle +car	Number	20	17	4	41	0	41	28	24	6	58	1	59	χ^2=0.01 p=0.995
	%	48.8	41.5	9.8	100			48.3	41.4	10.3	100			
(3) Speed Limit	Number	10	31	0	41	0	41	24	28	7	59	10		χ^2=10 p=0.0067
	%	24.4	**75.6**	0	100	0	100	40.7	**47.5**	11.9	100			
(4) Police Control	Number	24	12	4	40	1	41	24	27	7	58	1	59	χ^2=3.4 p=0.1827
	%	**60**	30	10	100		100	**41.4**	46.6	12.1	100			
(5) T-Intersection	Number	19	18	4	41	0	41	32	20	6	58	1	59	χ^2=0.93 p=0.6281
	%	**46.3**	43.9	9.8	100	0	100	**55.2**	34.5	10.3	100			
(6) Roundabout	Number	20	18	3	41	0	41	30	21	7	58	1	59	χ^2=0.94 p=0.725
	%	**48.8**	43.9	7.3	100	0	100	**51.7**	36.2	12.1	100			
(7) Car Crash + Safety Belt	Number	11	18	1	30	11	41	24	27	7	58	1	59	χ^2=2.47 p=0.2908
	%	36.7	**60**	3.3	100			41.4	**46.6**	12.1	100			
(8) Safe ways	Number	21	16	3	40	1	41	36	17	4	57	2	59	χ^2=1.18 p=0.5543
	%	**52.5**	40	7.5	100			**63.2**	29.8	7	100			

Bold face underlined is the majority of responses

Question 5: Does the artwork contain wrong Concepts?

The subjects were asked if the drawing contains wrong concepts, the results showed that university students are more capable of identifying wrong concepts when compared to school students. There is significant difference in the reported response (see Table 9 –chi square tests). All drawings, but one (4), are identified by university students to have wrong concepts. School students failed to depict wrong concepts in the drawings.

Table 9 Response to Question 5: Do you think that the drawing contains wrong concept?

Drawing	Group	University Student						School Student						
	Response	Yes	No	Not Sure	Total	Missing	All	Yes	No	Not Sure	Total	Missing	All	Chi-Square Test
(1) Play Ground	Number	30	3	6	39	2	42	19	29	8	56	3	59	χ^2=21.53 p<0.0001
	%	**76.9**	7.7	15.4	100			33.9	**51.8**	14.3	100			
(2) Bicycle +car	Number	24	5	12	41	1	42	22	29	7	58	1	59	χ^2=15.89 p=0.0004
	%	**58.5**	12.2	29.3	100		100	37.9	**50**	12.1	100			
(3) Speed Limit	Number	29	4	8	41	1	42	18	34	7	59			χ^2=23.86 p<0.0001
	%	**70.7**	9.8	19.5	100		100	30.5	**57.6**	11.9	100			
(4) Police Control	Number	4	31	5	40	1	41	22	28	9	59	0	59	χ^2=10.5 P=0.0052
	%	10	**78**	13	100			37	**47**	15	100			
(5) T-Intersection	Number	25	8	8	41	1	42	19	32	7	58	1	59	χ^2=12.74 p=0.0017
	%	**61**	19.5	19.5	100		100	32.8	**55.2**	12.1	100			
(6) Roundabout	Number	29	5	7	41	1	42	20	29	9	58	1	59	χ^2=16.41 p=0.0003
	%	**70.7**	12.2	17.1	100		100	34.5	**50**	15.5	100			
(7) Car Crash + Safety Belt	Number	22	4	6	32	10	42	20	30	8	58	1	59	χ^2=13.91 p=0.001
	%	**68.8**	12.5	18.8	100			34.5	**51.7**	13.8	100			
(8) Safe ways	Number	27	5	9	41	1	42	20	31	7	58	1	59	χ^2=17.67 p=0.0001
	%	**65.9**	12.2	22	100		100	34.5	**53.4**	12.1	100			

Bold face underlined is the majority of responses

Question 6: Does the artwork contain right concepts?

When asking about right concepts in the drawings, school students are less conservative and less reluctant to speak out loud compared to the previous question when asking about wrong concepts. The percentages of positive responses from the two groups of students are similar with less variation compared to the previous question as indicated by chi-square test values ($p>0.025$) as given in Table 10.

Table 10 Response to Question 6: Do you think that the drawing contains right concept?

Drawing	Group	University Student						School Student						
	Response	Yes	No	Not Sure	Total	Missing	All	Yes	No	Not Sure	Total	Missing	All	Chi-Square Test
(1) Play Ground	Number	30	3	6	39	3	42	45	2	12	59	0	59	χ^2=1.17 p=0.55
	%	**76.**	7.7	15.	100			**76.**	3.4	20.	100			
(2) Bicycle +car	Number	24	6	10	40	2	42	32	9	17	58	1	59	χ^2=0.26 p=0.87
	%	**60**	15	25	100			**55.**	15.	29.	100			
(3) Speed Limit	Number	29	1	11	41	1	42	31	10	16	57	2	59	χ^2=5.9 p=0.05
	%	**70.**	2.4	26.	100		10	**54.**	17.	28.	100			
(4) Police Control	Number	23	2	15	40	2	42	39	3	14	56	3	59	χ^2=0.92
	%	**57.**	5	37.	100			**69.**	5.4	25	100			
(5) T-Intersection	Number	22	8	11	41	1	42	35	9	14	58	1	59	χ^2=0.48 p=0.78
	%	**53.**	19.	26.	100		10	**60.**	15.	24.	100			
(6) Roundabout	Number	26	4	11	41	1	42	32	12	14	58	1	59	χ^2=2.12 p=0.34
	%	**63.**	9.8	26.	100		10	**55.**	20.	24.	100			
(7) Car Crash + Safety Belt	Number	21	8	3	32	10	42	37	11	11	59	0	59	χ^2=1.59 p=0.45
	%	**65.**	25	9.4	100			**62.**	18.	18.	100			
(8) Safe ways	Number	28	3	10	41	1	42	43	3	11	57	2	59	χ^2=0.62 p=0.73
	%	**68.**	7.3	24.	100		10	**75.**	5.3	19.	100			

Bold face underlined is the majority of responses

7. Conclusions and Recommendations

The research is the first attempt of its kind to be conducted in Jordan trying to quantify the knowledge base of students (the most subjected age group to traffic accidents in Jordan). The two folds of benefits achieved by using the artworks is to characterize the ability of school students to present their views related to traffic and safety issues, and to assess the ability of other students (school or university) to understand such artworks.

The eight drawings contained wide spectrum of traffic topics done by kids with age less than 14 years old. The drawings contained more wrong concepts than correct concepts, even though most of the drawings received external support. When asking the subjects to identify correct and incorrect concepts, only marginal percentage was able to do that. Less were able to identify incorrect concepts compared to correct concepts. University students were more capable to identify incorrect concepts compared to school kids.

The topics and the quality of drawings contribute to the variation in responses among students. No clear trend is detected in that regard.

This research is setting the ground for future work to examine the knowledge base of traffic issues among Jordanian. The next step is to examine more artworks with control sets who have been subjected to various orientations prior to examination.

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