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Understanding of Traffic Signs by Drivers in the City of Manila, Philippines

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Abstract

Traffic Signs is one of the most reliable control device used to guide the safe and orderly movement of traffic and pedestrians. These are necessary to give information for routes, directions, and warnings for drivers. The traffic signs should be clear and conveys the intended message so that the road users can understand the message and see it visibly. Drivers tend to ignore the road signs while authorities opt not to enforce them. As a result, majority of the Filipino drivers are not disciplined and doesn't give importance to traffic signs. Moreover, a good number of Filipino motorists have not gone proper training resulting to the lack of knowledge regarding the various road signs. Therefore, driver understanding of some selected traffic signs was assessed through a driver survey. The study aims to determine the individual characteristics of drivers in understanding traffic signs. The study of the role of drivers' characteristics in understanding traffic signs in Manila is of great importance to prevent rising accident in the area.

The survey was conducted among 535 Manila city drivers. The results indicated that the drivers had a poor level of understanding of the meaning of traffic signs. The overall understanding of level, measured in terms of percentage correct responses, was 76.25%. The drivers' familiarity to traffic signs mainly depends on its abundance in the location where the respondent usually passes through and the simplicity of its design wherein the road user can easily determine its meaning. The study further establishes that socio-economic background and driving characteristics have a significant influence on driver's understanding of traffic signs such as the educational attainment and mode of driving training.

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Keywords: Level of Understanding; Traffic Signs; Drivers Characteristic; Socio-Economic Background; Traffic Safety

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1. Introduction

The Metropolitan Manila Development Authority (MMDA) is the agency tasked with managing transport and traffic in Metro Manila, they have recorded an average fatal accident rate of 1.13 per day (Aguilar, 2015). Moreover, according to the Philippine National Police, it has been reported that driver errors cause most traffic accidents due to the absence of visible traffic signs.

One of the most reliable traffic control device used to guide the safe and orderly movement of traffic and pedestrians are the traffic signs (Aguilar, 2015) and these should be a common sight when drivers pass around the busy networks and open highways. Traffic signs give information for routes, directions, and warnings for drivers, they are commonly installed at major intersections in cities and towns in the Philippines (Sigua, 2008). The traffic signs should be clear and conveys the intended message so that the road users can understand the message and see it visibly. The non-compliance of these rules and regulations will result in penalties and violations to the driver. Not paying attention and failing to understand instructions can prove to be harmful and even dangerous (Chan, Gonzales, & Perez, 2016).

Drivers tend to ignore the road signs while authorities opt not to enforce them. Very few drivers were unaware of the meaning of road signs and markings, but most of them admitted to breaking regulations in certain instances (Muhlrad, 1993). Majority of the Filipino drivers are not disciplined and doesn't give importance to traffic signs and a good number of Filipino motorists have not gone proper training resulting to the lack of knowledge regarding the various road signs. Thus, road signs became a mere display rather than an informative tool to control traffic flow as well as warn motorists of the hazards ahead. Commonly ignored signs are the “No Parking”, “No Loading/Unloading”, and “No Stopping Anytime.” And the signs “Stop” and “Yield” are mostly misunderstood by drivers. Overall, road signs are designed to guide the safe and orderly movement of traffic by giving directions, instructions, and warnings. Filipino drivers must understand and follow these signs to have safer road environment and to become responsible motorists.

As a reference, there are many studies in various countries that test drivers' comprehension of the (Munawar, Sodikin, & Setiadji, 2016). There is poor study of drivers and commuters' comprehension on traffic signs in the Philippines. Therefore, this study was undertaken to access the drivers' socio-economic and driving background in understanding of traffic signs in Manila, the capital city of the Philippines.

The study aims to determine the individual characteristics of drivers in understanding traffic signs. The study of the role of drivers' characteristics in understanding traffic signs in Manila is of great importance to prevent rising accident in the area. Also, the existing traffic signs could be improved so that majority of road users will be able to comprehend its meaning. Thus, reducing the possibility of road accidents.

2. Methodology

The research used questionnaires to harness the respondent's familiarization of traffic signs present in Manila and to establish prioritization on the cause of road accidents. In all, 535 questionnaires were administered at random public and private vehicle drivers in Malate, Manila during January to March 2018.

The pilot test questionnaire is conducted for 40 respondents to obtain feedback for improvements, such that each questionnaire question can be more clearly understood

The questionnaires are consisted of three sections. The first section assessed the understanding of traffic signs by the drivers. The section had 30 multiple choice questions of different traffic signs which included 15 regulatory signs, 10 warning signs, and 5 informative signs. The second section sought to obtain information about the driver's personal and socio-economic background such as educational attainment, age, monthly income, and gender. The last section was developed to harness information about driver characteristics such as driving frequency, license type, mode of training, years of driving, and vehicle type.

3. Data Analysis

1.1. Socio-Economic Background of Drivers

Table 1 summarizes the personal characteristics of the 535 drivers; most were male with less females. Even though there is no restriction on female driving vehicles, seldom can one see a female driving a commercial vehicle within and outside the city of Manila. The age distribution showed that the drivers were mostly young. 31.21% were between (16-25) years, 18.31% were between (26-35) years, 28.6% were between (36-45) years, and 17.2% were between (46-55) years, with only 4.3% between 56 years and above. The educational background of the drivers shows that 60.93% of the drivers have college diplomas, 21.31% of them with high school diplomas, 2.06% of the drivers possesses elementary diplomas and 15.14% are only students. The division of monthly income of drivers is as follows, a percentage of 19.07% only earns less than P6,000 since these respondents may be students who depends on their monthly source of income to their parents or families. Meanwhile, 38.13% of the respondents have monthly income of P6,000-19,999. Next, 25.79% earns 20,000-59,999, while 12.52% earns P60,000-149,999. Lastly who's range the lowest percentages gathered among all the ranges given are P149,999 above which tabulated 2.06%.

Table 1. Socio-Economic Background of 535 Drivers

	Characteristics	Sample Number	Percentage
Educational Attainment	College Graduate	326	60.93%
	College Student	70	13.08%
	High School Graduate	114	21.31%
	High School Student	11	2.06%
	Elementary Graduate	11	2.06%
	Not Schooled	0	0.00%
	No answer	3	0.56%
Age	16 – 25 yrs. old	167	31.21%
	26 – 35 yrs. old	97	18.13%
	36 – 45 yrs. old	153	28.60%
	46 – 55 yrs. old	92	17.20%
	56 yrs. old and above	23	4.30%
	No answer	3	0.56%
Monthly Income	Php6,000 Below	102	19.07%
	Php6,000 - 19,999	204	38.13%
	Php20,000 - 59,999	138	25.79%
	Php60,000 - 149,999	67	12.52%
	Php149,999 above	11	2.06%
	No answer	13	2.43%
Gender	Female	104	19.44%
	Male	425	79.44%
	No answer	6	1.12%

It can be seen in Table 2 that majority of the respondents of ages 16 – 25 years are private vehicle drivers where it is 159 of 167 drivers under the 16 – 25 age brackets. Meanwhile, most of the jeepney drivers are ranging from 26 – 45 years. Utility vehicle drivers are mostly in the ages of 36 – 45 years and lastly, the age of the bus drivers is diverse from ages 26 above. This shows that proper experience is needed in driving utility vehicles, jeepneys, and buses as compared to private vehicles wherein most drivers are young adults whose 16 – 25 years and middle-aged adults whose 36 – 45 years of age.

Table 2. Age Categorization of 535 Drivers per Vehicle Type

Age (Years)	Private Vehicle	Bus	Jeepney	Utility Vehicles
16 – 25 yrs. old	159	1	4	3
26 – 35 yrs. old	54	8	25	10
36 – 45 yrs. old	88	6	21	38
46 – 55 yrs. old	50	9	10	23
56 yrs. old and above	10	3	4	6
No answer			3	

It can be seen in Table 3, that most of the total number of college graduate consists of private vehicle drivers which is 278 of 361. Utility vehicle drivers also has most of college graduates. In addition to that, most of the total number of high school graduate respondents are mostly jeepney drivers which is 45 of 64. Bus drivers also tallied to have a relatively high number of high school graduates.

Table 3. Educational Attainment Categorization of 535 Drivers per Vehicle Type

Educational Attainment	Private Vehicle	Bus	Jeepney	Utility Vehicles
College Graduate	278	2	6	40
College Student	52	6	3	9
High School Graduate	22	18	45	29
High School Student	9	0	2	0
Elementary Graduate	0	1	8	2
Not Schooled	0	0	0	0
No answer			3	

In the Table 4, private vehicle drivers have diverse ranges of monthly income. Private vehicle drivers possess students, senior citizens, business people, and experts which explains the diversity of the income generated. Meanwhile, most bus drivers have an income range from Php6,000-19,999. In addition to that, almost all jeepney drivers have monthly income whose range is Php6,000-19,999. Lastly, utility vehicle drivers also have low monthly income ranges from Php60,000-59,999. Jeepney drivers are relatively generate the lowest income among the other public vehicle drivers because the fare of one commuter only generates Php8.00 per ride and it lacks the capacity of numerous commuters that buses possess. Even though jeepneys can carry more commuters than utility vehicles, the fare of each has a large difference. The fare of a commuter per ride is twice the amount generated per ride for a jeepney. It is seen that only a few public vehicle drivers generate an income of more than Php59,999. Public vehicle drivers have generally low range of monthly income compared to the private vehicle drivers. Monthly income has the greatest number of respondents that did not answer the question, this can be assumed that answering the monthly income of an individual when asked is too personal and most like the privacy.

Table 4. Monthly Income Categorization of 535 Drivers per Vehicle Type

Monthly Income	Private Vehicle	Bus	Jeepney	Utility Vehicles
Php6,000 Below	92	1	3	6
Php6,000 - 19,999	101	16	55	32
Php20,000 - 59,999	90	10	2	36
Php60,000 - 149,999	61	0	0	6
Php149,999 above	11	0	0	0
No answer			13	

1.2. *Driving Characteristics*

Table 5 represents the driving characteristics of the drivers; the result shows that 35.51% of the drivers drive daily per week, 20.19% drive between 5 days per week, 15.51% drives less than 5 times a week. 5.42% only drives once a week and 11.03% only drive at least once a month. Approximately 44.93% of the drivers have professional license while 44.49% have non-professional license, while 6.17% and 4.86% are student and non-licensed drivers, respectively.

Informal training which includes apprenticeship such learning through a friend or relative, who is experienced enough in driving to pass on the knowledge they possess to another, constituted the majority of about 54.21% of the various modes of driver training. Training of drivers by accredited driving schools, on the other hand, constituted about 26.17%. in addition to that, the researchers included an option for self-taught and “others” where it tallied a 18.69% and 0.37%, respectively. Drivers, nowadays, tend to learn driving by themselves which is highly undependable in road safety. It is believed that, due to high cost in acquiring training from licensed driving schools, most of the drivers (73.83%) obtained driving lessons from outside the traditional driving schools.

Most of the respondents which was 45.42% had approximately 1-5 years of driving experience which shows that they somewhat lack enough maturity in driving. Similarly, 16.07% of the drivers had driving experience of 6-10 years, 22.43% has a driving experience of 11-15 years, 4.49% has a driving experience of 15-20 years, and 11.03% has a driving experience of more than 20 years. There are few drivers, nowadays, that drive for more than 15 years.

Table 5. Driving Characteristics of 535 Drivers

	Characteristics	Sample Number	Percentage
Frequency of Drive	Daily	190	35.51%
	Five times a week	108	20.19%
	Less than Five times a week	83	15.51%
	Once a week	29	5.42%
	At least once a month	59	11.03%
	Others	63	11.78%
	No answer	3	0.56%
License Type	Professional	235	43.93%
	Non- Professional	238	44.49%
	Student	33	6.17%
	Not Licensed	26	4.86%
	No answer	3	0.56%
Mode of Training	Driving School	140	26.17%
	Apprenticeship	290	54.21%
	Self-taught	100	18.69%
	Others	2	0.37%
	No answer	3	0.56%
Years Driving	1 – 5 years	242	45.42%
	6 – 10 years	86	16.07%
	11 – 15 years	120	22.43%
	15 – 20 years	24	4.49%
	20 years above	59	11.03%
	No answer	4	0.56%
Vehicle Type	Personal Vehicle	361	67.29%
	Bus	27	6.17%
	Jeepney	64	11.96%
	UV	80	14.02%
	No answer	3	0.56%

Most of the jeepney and utility vehicle drivers drive daily as their main source of income every day. While, bus drivers mostly drive for five times a week. This can be assumed that less buses are present in Manila during weekends as compared to jeepneys and utility vehicle. In addition to that, private vehicle drivers are diverse in the frequency of drive as seen in Table 5.

Table 5. Frequency of Drive Categorization of 535 Drivers per Vehicle Type

Frequency of Drive	Private Vehicle	Bus	Jeepney	Utility Vehicles
Daily	99	5	40	46
Five times a week	51	17	21	19
Less than Five times a week	68	4	1	10
Once a week	26	0	2	1
At least once a month	57	0	0	2
Others	60	1	0	2
No answer			3	

It is assumed that all public vehicle drivers have obtained a professional license, but it is seen in Table 6 that not all the drivers sampled possess the required license for driving the public vehicles. Majority of the public vehicle driver possess professional license. Professional license is given to drivers who generate income from driving. In addition to that, 222 of 361 private vehicle drivers possess non-professional license. Non-professional license can be given to any Filipino that has passed and undergone the driving and safety test.

Table 6. License Type Categorization of 535 Drivers per Vehicle Type

License Type	Private Vehicle	Bus	Jeepney	Utility Vehicles
Professional	86	33	57	65
Non- Professional	222	0	5	11
Student	32	0	0	1
Not Licensed	21	0	2	3
No answer			3	

Driving school is the most recommended mode of training of driving as compared to the other forms of training. Due to the expensive price of enlisting for a driving school, less and less drivers sign up. From Table 7, it is shown that most of the drivers in both public and private have undergone apprenticeship.

Table 7. Mode of Training Categorization of 535 Drivers per Vehicle Type

Mode of Training	Private Vehicle	Bus	Jeepney	Utility Vehicles
Driving School	127	1	2	10
Apprenticeship	175	21	41	53
Self-taught	57	5	21	17
Others	2	0	0	0
No answer			3	

It can be seen in Table 8, 197 of 242 has been driving for 1 – 5 years. Utility vehicles have mostly drove for 11 – 15 years which is more years than the jeepney drivers of 1 – 5 years. There are few public vehicle drivers, who has been driving for 20 years and above. It can be assumed that as years of driving grow longer, for public and private vehicle drivers, the number of drivers lessen.

Table 8. Driving Years Categorization per Vehicle Type

Years Driving	Private Vehicle	Bus	Jeepney	Utility Vehicles
1 – 5 years	197	5	33	7
6 – 10 years	55	8	8	15
11 – 15 years	52	7	19	42
15 – 20 years	14	3	1	6
20 years above	42	4	3	10
No answer			4	

1.3. *Level of Understanding of Drivers*

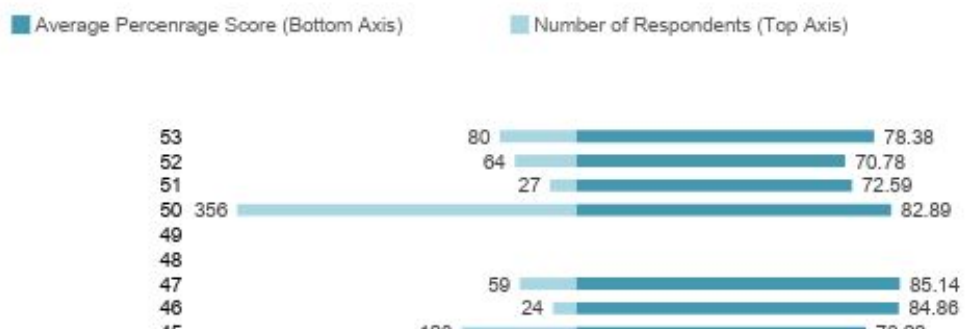
Figure 1 represents the summary of percentage of correct answers vs different factors that affect understanding; the results show that young respondents tend to have better mastery in traffic signs compared to the older ones. People in the ages 16 to 25 years old outscored all other group ages by almost 10% in the average percentage of their scores. From the trend observed in the graphs, the researchers found out that respondents in the middle ages ranging from 26 to 45 years old had the lowest performance score averaging only at 76.97%. The trend of scores for the age group decreases from a young age group going to the middle ages and then increasing again as the age of drivers also increase. The score decreases again when the respondents reaches the age 56 and above (76%) however their scores are still relatively higher than the middle-aged respondents.

After analyzing the data, the percentage of correct answers of drivers are categorized per type of educational attainment is ranked from lowest to highest. From the data collected, high school graduates produced 72% of correct answers, while elementary graduates have a 74%, college graduates generated 82%, college students have an 84%, and lastly, high school students have 85%, respectively. From the results analyzed, respondents who are currently studying or enrolled to an academic institution yielded the highest scores compared to those that are already working and/or not studying anymore.

The researchers established several criteria for monthly income to be able to classify and tabulate the data effectively. The criteria are namely, very low, low, average, high, and very high income. From the results tallied, the ranking for the percentage of correct answers of drivers, from lowest to highest, is as follows: low income (77%), very low income (82%), average income (82.49%), high income (83.23%) and very high income (84.24%). The trend portrays that respondents with lower monthly income tend to have lower scores. As monthly salary increases, the mastery of traffic signs improves. The reason behind this scenario is that respondents that have low income mostly came from public vehicles while respondents with high income are mostly composed of private vehicles. Respondents with higher salary tend to have more access to information regarding traffic signs as compared to those with lower income.

Under the driving frequency category, the survey resulted to 78.72% of correct answers for drivers that drive daily, 77.62% for driving five times a week, 82.29% for driving less than five times a week, 82.26% for driving at least once a week or month, and 85.19% for occasional drivers. The scores for the understanding of traffic sign in relation to driving frequency are close to each other. For respondents that drives frequently, the highest score is observed for those who drives daily as compared to those that drive less than five times a week. This resulted is expected since daily drivers are more exposed to the traffic signs since they drive more frequently than the other categories. Meanwhile, respondents that has a low driving frequency yielded to scores relatively close to each other namely, 85% and 82%. From this data, it is assumed that frequency of drive has a minimal effect on the understanding of traffic signs.

After analyzing the data, the average percentage of correct answers of drivers per license types are ranked from lowest to highest as professional (75.56%), student (80.91%), not licensed (82.18%) and non-professional (84.57%). The non-licensed data is neglected due to a relatively low number of respondents as compared to the other types.



From the analysis, the researchers observed that in this study, non-professional drivers have better knowledge of traffic signs as compared to professional drivers. This trend is expected which is based from the background of the study area wherein most of the professional drivers, those that have driving as their line of work such as jeepneys and buses, have lower educational attainment as compared to non-professional drivers.

Figure 1. Summary of Factors Affecting the Percentage of Correct Answers

The outcome of the study resulted that drivers who received formal education such as driving schools resulted in the highest mastery in traffic signs with 84% followed by those who learned by apprenticeship with 80% then followed by drivers who are self-taught and those who had other modes of training with 75% and 62% respectively. The results clearly portray the effects of having different learning methods with respect to understanding the traffic signs. From the graph presented in Figure 1 it is observed that formal education is the best mode for understanding traffic signs. Mode of training is most critical factor that affect the understanding of traffic signs. From the data analysis, it yielded the highest standard deviation of scores per mode of training with a value of 10%. The results for the percentage of correct answers under the category of years driving is as follows: 80.77% for 1-5 years, 79.84% for 6-10 years, 76.22% for 11-15 years, 84.86% for 15-20 years and 85.14% for 20 years and above. The trend for this category could be easily observed. As the amount of driving experience increases, the knowledge of traffic signs also improves. In this research, drivers who have 20 or more years of experience yielded the highest average of scores among other subgroups. On the other hand, the lowest rank is fell on the 11-15 years of driving experience.

1.4. Drivers' Understanding of Traffic Signs

A total of 15 regulatory signs were evaluated in the study. The results of the different drivers' understanding of the regulatory signs are presented in Table 9. The average percentage of correct answers of private vehicle drivers yielded the top percentage of correct answer among all the drivers which indicates that the understanding was satisfactory. Yield sign, No turns sign, and Don't Block Intersections sign generated the least correct answers among all signs. These low percentages may suggest that the graphics in the sign is misleading and doesn't give the appropriate meaning as what it shows. The signs that were understood well by drivers were No U-Turn signs and Tow-Away Zone sign. These high percentages could be attributed to the self-explanatory graphics in the sign.

Table 9. Percentage of Correct Answers of Regulatory Signs of 535 Drivers

Regulatory Signs	Private	Bus	Jeepney	Utility Vehicle	Total
STOP sign	94.10	81.48	96.88	98.75	92.80
Yield Sign	57.87	44.44	15.63	48.75	41.67
No left turn	95.79	96.30	59.38	97.50	87.24
Speed limit	68.54	18.52	17.19	46.25	37.62
No Parking	96.63	81.48	82.81	88.75	87.42
No Honking	96.63	100.00	65.63	95.00	89.31
No overtaking	94.38	96.30	100.00	95.00	96.42
No U- turn	98.88	100.00	100.00	97.50	99.09
No Entry	88.48	77.78	82.81	78.75	81.96
Load Limit	97.47	88.89	98.44	90.00	93.70
No Right turn	96.63	70.37	65.63	95.00	81.91
No turns	39.33	33.33	64.06	37.50	43.56
Tow away zone	98.60	100.00	98.44	98.75	98.95
Don't Block Intersection	42.70	51.85	17.19	41.25	38.25
No pedestrians	95.22	96.30	93.75	93.75	94.76
Total	84.08	75.80	70.52	80.17	

A total of 10 warning signs were evaluated in this study. The results of drivers' understanding of the warning signs are presented in Table 10. The highest average percentage of correct answer was drivers of private vehicles. The results show somewhat low satisfactory because of the low percentage of correct answers yielded (77.05%). The study stated that the acceptable standard of 70%. The lowest percentage of signs understood was the sharp right

turn ahead sign (24.36%). These signs are mostly seen in provinces and mountains and only a few blind curves present in a busy city like Manila. However, Railroad crossing produced a very satisfactory percentage of correct answer (93.81%). The railroad intersects almost every main road in Manila which suggests that most drivers know what it means.

Table 10. Percentage of Correct Answers of Warning Signs of 535 Drivers

Warning Signs	Private	Bus	Jeepney	Utility Vehicle	Total
Roundabout	71.07	62.96	84.38	58.75	69.29
Four-way Intersection	56.74	51.85	23.44	48.75	45.20
Pedestrian crossing	92.98	81.48	96.88	92.50	90.96
School Crossing	64.04	48.15	34.38	48.75	48.83
Traffic light ahead	92.13	74.07	95.31	92.50	88.51
Merging traffic ahead	69.38	62.96	81.25	73.75	71.84
Speed bump ahead	93.54	66.67	70.31	83.75	78.57
Slippery when wet	90.17	88.89	90.63	91.25	90.23
Sharp right turn ahead	47.47	3.70	12.50	33.75	24.36
Railroad crossing	92.98	92.59	92.19	97.50	93.81
Total	77.05	63.33	68.13	72.13	

A total of 5 informative signs were evaluated in the study. The results are shown in Table 11. The average understanding is the highest among the understanding levels of regulatory and warnings signs. However, most jeepney drivers don't know what the Bicycle lane sign means. It yielded 28.13% of correct answers. The signs maybe misleading and the questionnaire gave confusing choices in the question where most answered Bicycle Parking. Among all informative signs it generated the lowest (61.94%)

Table 11. Percentage of Correct Answers of Informative Signs of 535 Drivers

Informative Signs	Private	Bus	Jeepney	Utility Vehicle	Total
Parking area	96.07	92.59	95.31	97.50	95.37
Jeepney stop	89.61	88.89	96.88	95.00	92.59
Gasoline station	98.03	100.00	98.44	97.50	98.49
Bicycle lane	85.39	59.26	28.13	75.00	61.94
Hospital zone	85.96	66.67	65.63	62.50	70.19
Total	91.01	81.48	76.88	85.50	

1.1. Overall Percentage of Correct and Incorrect Responses per Traffic Sign

In Figure 3, the total percentage of the correct and incorrect answers of the respondents are presented. The Figure includes 15 regulatory signs, 10 warning signs and 5 informative signs. It can be seen in the Figure, for regulatory signs, the traffic sign that gathered the most correct answer are the “no U-turn” and “tow-away zone” sign with 98.69% of the total respondents having the correct answer. Most of the traffic signs asked had a very satisfactory percentage mark with an average of 81.37%. The high percentage of correct answers can be attributed to the abundance of this traffic signs along the roads of Metro Manila. In addition to that, since these traffic signs can be found almost everywhere within the city, the respondents tend to be more familiarized with it as they see it often. The regulatory traffic sign that is most prone to mistake is the “Do not block the intersection” sign with an error of 60.56%. The scenario of this sign having a low score is mainly due to its graphics design which can be misleading to driver who are not well-versed with traffic signs. It is commonly mistaken to be open intersection ahead. As per De La Salle University (DLSU) grading standard, the average acceptable score is 60%. After conducting the survey, there are some noticeable mistaken traffic signs which has a score less than 60%. The noticeable percentage errors are 58.50%, 49.35%, and 43.74%, which are “No Turn sign”, “Yield sign”, and “Speed Limit sign”, respectively.

For warning signs, the sign that got the highest percentage of correct answers is the “railroad crossing” sign with 92.90% of the respondents had a correct answer. The said traffic sign gathered high correct answers mainly due to

its design and location which requires less analysis for the meaning. The result of correct answers for the warning signs is not as satisfactory as compared to the results from the regulatory signs. The percentage of correct answers average with only 74.41%, the lowest among the three classifications of traffic signs. The warning sign that got the most errors is the “sharp right turn” sign with 60.75% errors. This can be attributed to its rarity. This kind of warning sign is usually located in rural areas and highways. This traffic sign is rarely placed in city roads therefore the respondents are least familiar with it. The other noticeable high percentage errors are 48.97% and 42.62%, which are “Four Way Intersection sign” and “School Crossing sign”, respectively.

Lastly, the informative sign that gathered the highest percentage of correct answer is the “gasoline station” sign with a high rating of 98.13% correct answers. “Gasoline station” traffic sign is very common, and its design is standard for almost all areas that refers to gasoline stations therefore respondents have a good familiarization of it. The informative sign that is most mistaken for is the “bicycle lane” traffic sign with 24.11% incorrect answers. Although bicycle lane traffic signs are common in the city, it is not always noticeable for drivers who does not use bicycles. This sign is, at most cases, located in areas specifically where bikers only would notice. Thus, the respondents yielded a low score for this traffic sign. There is no other noticeable high percentage error in the informative signs since most of the drivers are well versed with informative signs averaging with 87.93% correct answers.

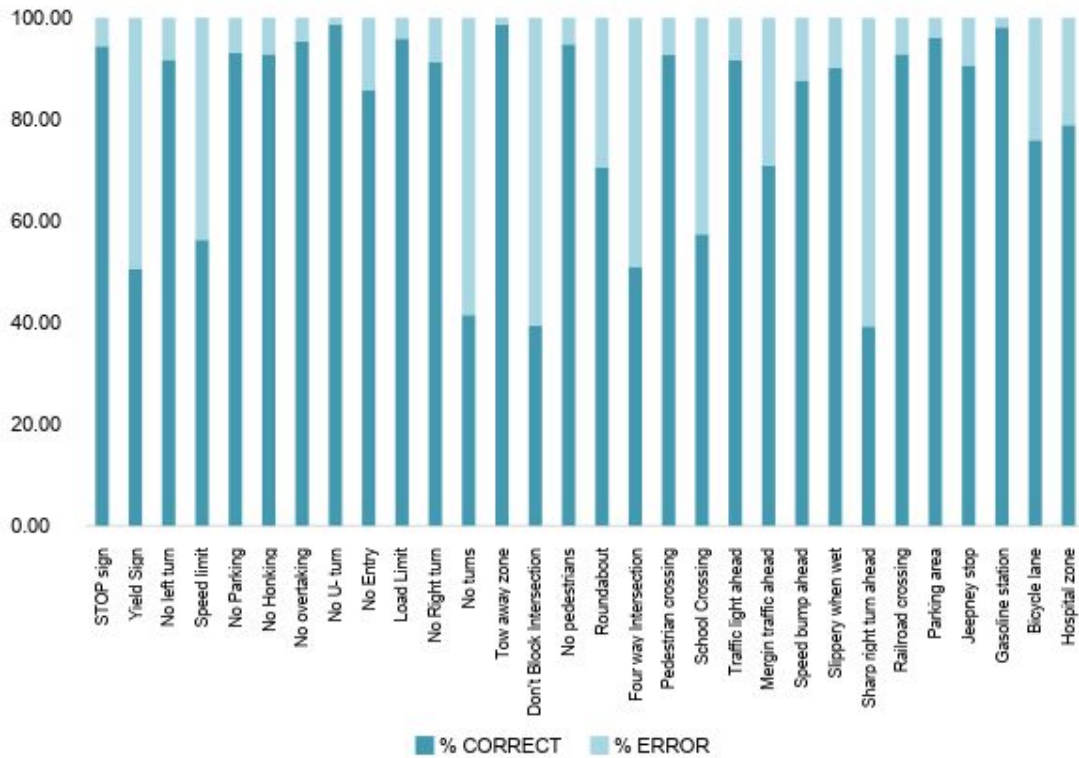


Figure 2. Traffic Sign Average Percentage of Correct and Incorrect Responses of 535 Drivers

1.2. Mastery of Traffic Signs

The respondents were grouped according to their mastery in traffic signs into five categories namely, poor, below average, average, above average and excellent mastery in signs. The criteria for each category is based from the scores of the respondents. Drivers who score 60% and below are considered to have poor mastery, 61-70%, 71-80%, 81-90% and 91-100% are below average, average, above average and excellent mastery, respectively. The categorization of respondents is to determine the difference of prioritization of road accident factors of those who understand traffic signs least to the respondents who understand it better. With the help of categorizing the

respondents, the researchers would be able to show the respondents that understand traffic signs best has more reliable data.

Figure 3 presents the breakdown of the percentage of respondents per category. After tallying all respondents, the outcome resulted to 8% for poor, 11% excellent, 18% below average, 26% average and lastly 37% above average mastery. Majority of the respondents has above average understanding of traffic signs while poor mastery has the least number of respondents.

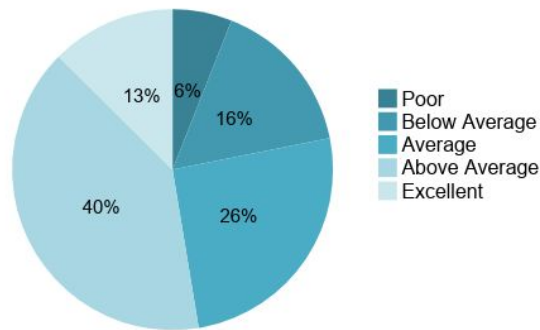


Fig. 3. Percentage of Mastery of Traffic Signs

4. Conclusion

Results show that the main contributing factor affecting the level of understanding of drivers is the mode of training followed by the educational attainment of drivers.

As presented in the demographics, the scores of the respondents with respect to their mode of training is diverse. The research shows that formal education or driving schools are the best way to have an excellent understanding of traffic signs and the level of understanding decreases as the mode of training becomes unreliable such as apprenticeship and being self-taught. The same behavior of scores is observed with respect to educational attainment. The scores vary depending on the drivers’ educational attainment. From the comparison of the scores of drivers that have different educational attainment, the researchers determined that respondents who are currently engaged in their academic studies, such as high school and college students, yielded a higher level of understanding as compared to those who are no longer studying. The researchers concluded that the drivers’ level of understanding is mainly influenced by the reliability of their mode of training and the amount of engagement they have with their academic studies

The average of the total percentage of correct answers of all drivers is 76.25% and the average of the total percentage error per traffic signs is 19.86%. Wherein 24.04 correct answers out of 30 questions is the average score of the respondents. Although the average percentage of correct answers is above 70% grading standards, it is still a small amount of correct answers, considering that every driver who possess a license must undergo the same test and have the proper knowledge when it comes to traffic signs and its meaning.

Lastly, the commonly mistaken traffic signs for private vehicles, buses, jeepneys and utility vehicles are determined. Each vehicle type resulted to different traffic signs that incurred high percentage error. But by observation, the four vehicle types are determined to have common traffic signs that yielded the most errors. The most commonly mistaken traffic signs are the “Do not block the intersection” and “Sharp right turn” traffic signs. From the analysis of the survey results, the researchers determined that the common cause of errors is the presence of sign within the study area and the graphic design of the traffic sign. “Sharp right turn” traffic sign is not abundant

in the city area. It is mostly found in highways and roads towards rural areas therefore it resulted to a high percentage error. Meanwhile, the “Do not block the intersection” traffic sign is determined to have a misleading graphic design which causes the drivers to misinterpret the meaning of the traffic sign. In conclusion, the drivers’ familiarity to traffic signs mainly depends on its abundance in the location where the respondent usually passes through and the simplicity of its design wherein the road user can easily determine its meaning.

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