Awareness Towards Renewable Energy Among Secondary School Students in Malaysia

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Abstract- Renewable energy sources are becoming important alternatives for non-renewable energy sources in Malaysia due to various renewable energy sources are readily available. In order to achieve the renewable energy target in Malaysia, public awareness towards renewable energy is important. Therefore, in this work, awareness towards renewable energy among students from several secondary schools in Petaling Jaya city, Malaysia was assessed through a survey. Petaling Jaya city was chosen because it is one of the most developed cities in Malaysia. The survey results were used to assess the perception of different levels of secondary school students towards renewable energy. The results were also used to identify the variables that created a difference in the perception towards renewable energy among the respondents in terms of basic knowledge, environment, technology and education factors by using t-test, z-test and one-way analysis of variance (ANOVA) test. Based on the survey results, it was found that the year of education, the home type that the respondents are currently residing, the attitude towards monitoring home electricity bill and exposure to renewable energy created a significant difference in the perception towards renewable energy. The results from this survey could be useful in identifying the syllabus of renewable energy in the curriculum at relevant secondary school level to increase the students' perception towards renewable energy.

Keywords Renewable energy, Public awareness, Survey analysis, Statistical test, Secondary schools

1. Introduction

Renewable energy sources can be obtained from natural phenomena such as wind, sunlight, ocean, biomass, geothermal heat and biofuels, which are constantly replenished [1, 2]. They commonly provide energy source for generation of electricity, heating or cooling, transportation and wireless applications [3-5]. Renewable energy sources have become important alternatives for non-renewable energy sources because they are clean, environmentally-friendly and are replenished constantly [6, 7]. They are suitable for rural and remote areas, where conventional energy sources are difficult to be accessed [8-10]. Also, the systems associated to them are becoming more efficient and cheaper, such as photovoltaic panels. Due to these advantages, mitigation of climate change, economic benefit and energy security can be enhanced.

Some countries have established new policies, education and awareness related to renewable energy sources [11-13]. The policies are established in order to obtain the renewable energy sources continuously, reliably, clean, economically and with minimum negative impact to the society and environment. Awareness towards renewable energy at early education stage is important because early exposure could help renewable energy policies to be implemented successfully.

The effort towards renewable energy implementation in Malaysia has started long time ago. In 1981, Malaysia entered the Four-Fuel Diversification Strategy in order to accelerate the transition from oil-dependence as the main

energy source to cleaner and cheaper energy source, natural gas. Malaysia signed the Kyoto Protocol in 1997 and Fifth-Fuel Policy in 1999 [14-16]. At the United Nations Climate Change Conference at Copenhagen in 2009, Malaysia had declared to reduce its carbon emission intensity from its gross domestic products to 40% by 2020. Malaysia has also committed to reduce the emission of greenhouse gas to its gross domestic product by 45% in 2030 compared to 2005 [17-19].

In the 2001-2005 8th Malaysian Plan, Fifth-Fuel Strategy was suggested by the Ministry of Energy, Green Technology and Water of Malaysia (MEGTW) in order to emphasis the usage of renewable energy in Malaysia [20]. It was part of the government's effort in implementing renewable energy usage and introducing energy efficiency for betterment of the environment and preservation of natural resources. In 2006-2010 9th Malaysian Plan, the Fifth-Fuel Strategy became prominent. In 2011, Renewable Energy Act was gazetted and Feed-in Tariffs (FiT) were implemented to speed up the growth of renewable energy implementation in Malaysia.

The government has been targeting to implement at least 20% renewable energy by 2025, 30% renewable energy by 2030 and 50% by 2050. At this moment, Malaysia only achieves 2% renewable energy sources, where most of the sources are from sunlight. However, Malaysia has a huge potential in renewable energy expansion, particularly in solar power, wind power, biogas, biomass and small hydro [21].

In order to achieve the renewable energy target, public awareness towards renewable energy is important. Encouragement among the community towards using renewable energy in daily activities needs to be well-practised. Hence, some surveys on the awareness towards renewable energy among societies have been performed in the past. For examples, in [22], the factors affecting the attitudes towards renewable energy among pre-service and science classroom teachers were identified. It was found that the grade, gender and family income factors are not creating any significant difference of pre-service science teachers' attitude towards renewable energy. For the pre-service classroom teachers, the family income, grade and department are not creating a significant difference towards renewable energy sources

Another survey reported in [23] was related to renewable energy perspective of university students from various disciplines. The relationships between the education, environment, politics and energy factors were assessed. It was reported that a gradually increasing awareness among university students and a more reliable perception in the society were observed. Also, the level and year of education show that the new generations have more knowledge about the renewable energy topics.

Early exposure at school is very important. Considering the importance of early exposure, therefore, in this work, an awareness survey on renewable energy among students from several secondary schools in Petaling Jaya city, Malaysia, was performed. The survey was conducted in Petaling Jaya because it is one of the most developed cities in Malaysia. The survey was used to assess the perception of different levels of secondary school students towards renewable energy. The survey was also used to identify the variables that created a difference in the perception towards renewable energy among the respondents in terms of basic knowledge, environment, technology and education factors.

The results from this awareness survey could be useful in identifying the syllabus of renewable energy contents in school curriculum at relevant students' level. Also, the results could be used to develop renewable energy policies in schools in the future, further enhance the public awareness towards renewable energy and encourage the application of clean energy among the society.

2. Methodology

2.1. Survey sample

In this work, the perception of students on renewable energy was analysed through a survey. The methodology of the survey and analysis was adopted from the previously published works reported in [22, 23]. The respondents consist of students from several secondary schools in Petaling Jaya city, Malaysia. The survey consists of questionnaire on renewable energy awareness that is related to the following factors; environment, technology, basic knowledge and education. The whole survey consists of 30 questions with a five point likert scale. The scales of the survey are as follows: 5 (strongly agree), 4 (agree), 3 (neutral), 2 (disagree) and 1 (strongly disagree). The relationship between each of these factors and the background information of each respondent were analysed.

2.2. Analysis techniques

The feedback obtained from the survey study was analyzed using one-way analysis of variance (ANOVA) to determine if the year of secondary school education and the house type that the students are residing currently created a difference in the perception towards renewable energy. However, t-test and z-test were used to determine if the attitude of monitoring home electricity bill and whether the students have heard about renewable energy or not created a difference in the perception towards renewable energy. A t-test and a z-test determine whether there is a significant difference or not between the means of two groups being compared, which could be related by certain features. A p-value was calculated from each t-test, z-test and ANOVA test. The significance level α was taken as 0.05, which denotes the probability of rejecting the null hypothesis when it is true. The computed p-value was compared with α. If $p<\alpha$, the null hypothesis can be eliminated and it can be considered that there is a statistically significant difference between the groups. Otherwise, if $p>\alpha$, the null hypothesis cannot be eliminated and it can be considered that there is no statistically significant difference between the groups.

The following statistical parameters were used in the analysis of the survey:

1) Mean $\bar{x}$: The average or the central value of a discrete set of numbers, calculated by

$$\bar{x} = \frac{\sum_{i=1}^{N} x_i}{N} \quad (1)$$

2) Standard deviation σ: The amount of dispersion or variability for a set of data from the mean, calculated by

$$\sigma = \sqrt{\frac{\sum_{i=1}^{N} (x_i - \bar{x})^2}{N-1}} \quad (2)$$

3) Standard error of mean $\sigma_{\bar{x}}$: How far the sample mean of the data might be from the true population mean, calculated by

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{N}} \quad (3)$$

3. Survey Results

The survey was circulated between January 2020 and August 2020 among students from several secondary schools in Petaling Jaya city, Malaysia, aged between 13 to 18 years old. A total of 1210 responses out of 1600 students were received and analysed. This is equivalent to 75.6% rate of responses, which is considered reasonable for this survey. This is due to the minimum rate of responses required to obtain a reliable survey for this study is set to 50%. The background information of the respondents obtained from the survey include the age, gender, home city, type of home, year of education and name of the school. From the overall responses, according to the level of education at the secondary schools, the numbers of respondents are as follows: Form 1 (173), Form 2 (173), Form 3 (307), Form 4 (293) and Form 5 (264). A higher Form indicates a higher level of secondary education. In the secondary school system in Malaysia, Form 1 to Form 3 are categorised as lower secondary while Form 4 and Form 5 are categorised as higher secondary.

Figure 1 shows the survey results of the respondent's understanding on renewable energy according to year of education. From the results, more than 50% of the respondents from all years of education answered agree and strongly agree. Around 30% of the respondents answered neutral while less than 5% disagree. This indicates that

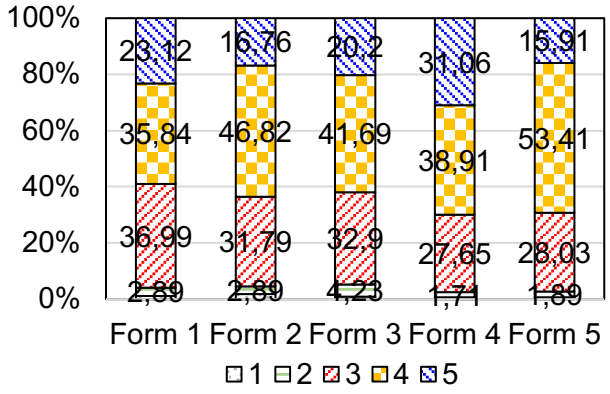

Fig. 1. Survey results of understanding on renewable energy according to year of education

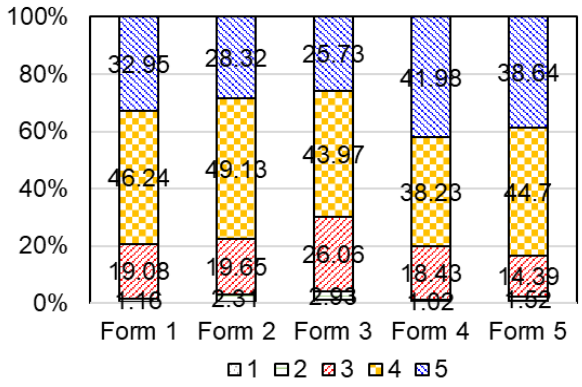

Fig. 2. Survey results of awareness on renewable energy benefits to the environment according to year of education

majority of them understood about renewable energy technologies. Those who responded neutral might seldom use this terminology in their daily conversation. The highest percentage of respondents who answered agree and strongly agree is 69%, which is from Form 4 and Form 5 students while the lowest percentage is 58.96% from Form 1 students.

The survey results of the respondents' awareness on renewable energy benefits to the environment according to year of education are shown in Figure 2. From this figure, majority of the respondents from all years of education, which is between 70% and 80%, are aware of the benefits brought by renewable energy. Less than 30% of them responded neutral while only a small number of them responded disagree. Again, those who responded neutral might not really sure what renewable energy is about but have heard about it before. The highest percentage of respondents who answered agree and strongly agree is 83.34%, which is from Form 5 students while the lowest percentage is 69.7% from Form 3 students.

Figure 3 shows the survey results of the respondents' willingness to invest in renewable energy technology if they own a house, according to year of education. From the results, nearly more than 65% of the respondents from all years of education answered agree and strongly agree. Around 30% of the respondents answered neutral while less

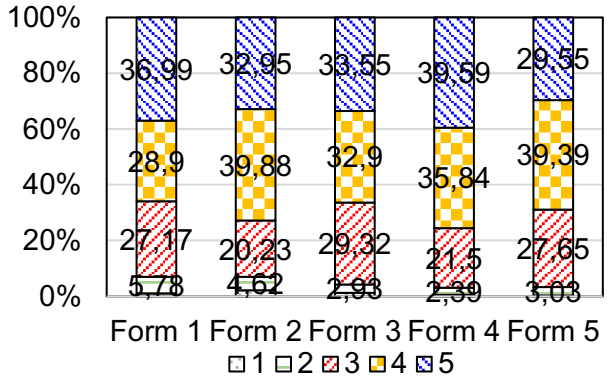

Fig. 3. Survey results of willingness to invest in renewable energy technology according to year of education

than 6% disagree. The highest percentage of respondents who answered agree and strongly agree is 75.43%, which is from Form 4 students while the lowest percentage is 65.89% from Form 1 students. These results are in line with the results from the understanding about renewable energy technologies, as reported in Figure 1. Thus, it can be considered that the willingness to invest in renewable energy technology is related to understanding about renewable energy technologies.

The survey results of the respondents who support renewable energy topic should be retained in the school's syllabus according to year of education are shown in Figure 4. Based on this figure, more than 70% of the total number of respondents from all years of education support renewable energy topic should be retained in the school's syllabus. Less than 26% of the respondents answered neutral while less than 3% of them responded disagree. The highest percentage of respondents who answered agree and strongly agree is 82.95%, which is from Form 5 students while the lowest percentage is 70.52% from Form 2 students.

Figure 5 shows the survey results of the respondents' opinion that renewable energy technology is expensive according to year of education. According to the survey results, more than 50% of the respondents from all years of education answered agree and strongly agree. However, between 24% and 42% of the respondents answered neutral while less than 14% disagree. The highest percentage of respondents who answered agree and strongly agree is 67.81%, which is from Form 5 students while the lowest percentage is 50% from Form 1 and Form 3 students. Again, these results are in line with the results from the understanding about renewable energy technologies, as reported in Figure 1.

The survey results of the respondents' awareness on Malaysian government's incentives for renewable energy technology according to year of education are shown in Figure 6. Referring to this figure, between 53% and 62% of the total number of respondents from all years of education are aware on Malaysian government incentives for renewable energy technology. Between 30% and 38% of the

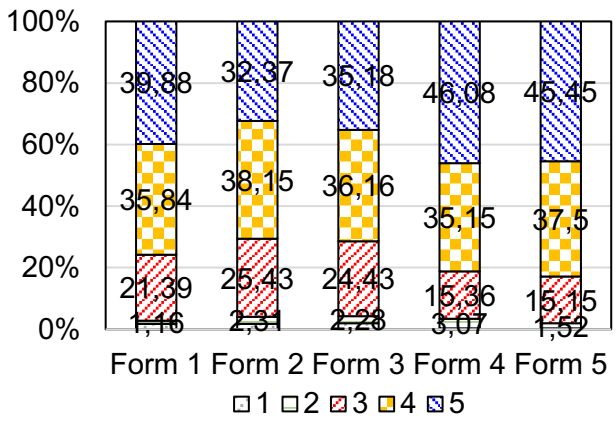

Fig. 4. Survey results of supporting renewable energy topic to be retained in the school's syllabus according to year of education

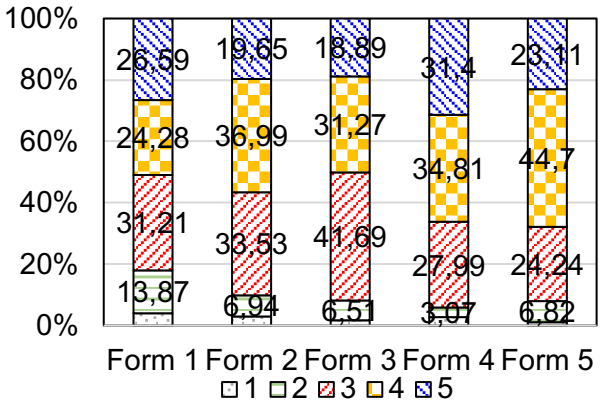

Fig. 5. Survey results of opinion that renewable energy technology is expensive according to year of education

respondents answered neutral while less than 10% of them responded disagree. The percentage of those who responded disagree is slightly higher than the results as reported in Figure 1 to 4. This could be due to lack of publicity about the government's incentives for renewable energy technology among the public. The highest percentage of respondents who answered agree and strongly agree is 62%, which is from Form 2 and Form 4 students while the lowest percentage is 53.76% from Form 1 students.

Figure 7 shows the survey results of the methods to increase the awareness on renewable energy among community in Malaysia according to year of education. From the survey results, majority of the students from Form 1 to Form 5 agree that the most effective method to increase the awareness of renewable energy among the community is via social media. It is followed by mass media and face-to-face awareness campaign. This shows that new generation prefers to utilise information technology rather than conventional face-to-face method. More than 80% of Form 5 students and only 67.1% of Form 3 students agree that social media is the most effective method.

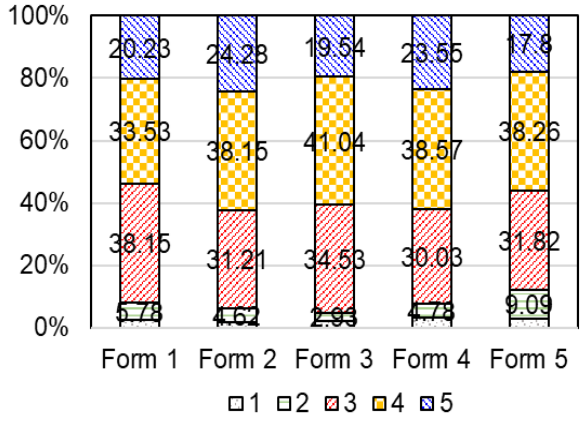

Fig. 6. Survey results of awareness on Malaysian government's incentives for renewable energy technology according to year of education

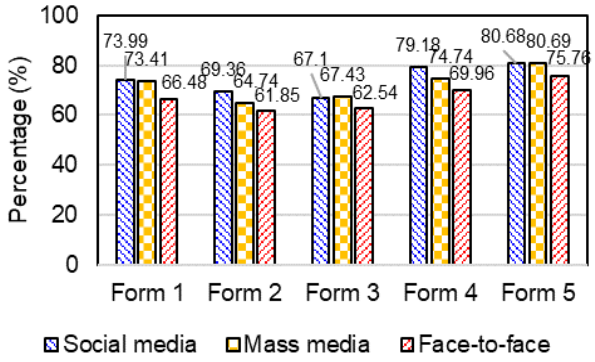

Fig. 7. Survey results of methods to increase awareness on renewable energy among community according to year of education

Based on the survey results as reported in Figures 1 to 6, it can be seen that the highest percentage of respondents' groups that responded agree and strongly agree are from Form 4 and Form 5, which are from higher secondary. The lowest percentage of respondents' groups that responded agree and strongly agree are from Form 1, Form 2 and Form 3, which are from lower secondary. Therefore, it can be considered that when students are at higher level of secondary school, their understanding on renewable energy is better, they are more aware on renewable energy benefits to the environment and Malaysian government's incentives for renewable energy technology, and their willingness to invest in renewable energy technology is higher. More of the students at higher secondary level support renewable energy topic should be retained in the school's syllabus and feel that renewable energy technology is expensive compared to lower secondary level.

4. Statistical tests for between-group difference

The statistical test for between-group differences was evaluated according to year of education, the house type that the students are currently residing, whether they are monitoring their home electricity bill or not and whether they have heard about renewable energy or not. The factors considered on the perception towards renewable energy are basic knowledge, environment, technology and education.

Table 1 shows the statistical test results based on year of

Table 1. Statistical test results based on year of school education using ANOVA test

Factor	Year of education (Form)	Sample, N	Mean, $\bar{x}$	Standard deviation, σ	Mean standard error, $\sigma_{\bar{x}}$	p-value
Basic knowledge	1	173	3.9155	0.9319	0.0709	$1x10^{-7}$
	2	173	3.8656	0.9067	0.0689	
	3	307	3.8811	0.9207	0.0525	
	4	293	4.0648	0.8751	0.0511	
	5	264	3.9777	0.8396	0.0517	
Environment	1	173	4.1864	0.8480	0.0645	$2x10^{-9}$
	2	173	4.0434	0.8681	0.066	
	3	307	4.0147	0.8789	0.0502	
	4	293	4.2287	0.8573	0.0501	
	5	264	4.1657	0.8204	0.0505	
Technology	1	173	3.8497	0.993	0.0755	0.0015
	2	173	3.8333	0.8861	0.0674	
	3	307	3.854	0.8983	0.0513	
	4	293	4.0119	0.9193	0.0537	
	5	264	3.9545	0.8422	0.0518	
Education	1	173	4.0306	0.8897	0.0676	0
	2	173	3.8844	0.8604	0.0654	
	3	307	3.9144	0.9175	0.0524	
	4	293	4.1565	0.8585	0.0502	
	5	264	4.1802	0.8091	0.0498	

Table 2. Statistical test results based on secondary school level using t-test

Factor	Secondary school level	*N*	Mean, $\bar{x}$	Standard deviation, σ	Mean standard error, $\sigma_{\bar{x}}$	*p*-value
Basic knowledge	Lower	653	3.8861	0.9201	0.0360	$4.69\text{x}10^{-14}$
	Higher	557	4.0236	0.8594	0.0364	
Environment	Lower	653	4.0678	0.8706	0.0341	$1.18\text{x}10^{-7}$
	Higher	557	4.1988	0.8404	0.0356	
Technology	Lower	653	3.8474	0.9210	0.0360	$1.17\text{x}10^{-10}$
	Higher	557	3.9847	0.8839	0.0375	
Education	Lower	653	3.9372	0.8970	0.0351	0
	Higher	557	4.1677	0.8354	0.0354	

Table 3. Statistical test results based on students' house type using ANOVA test

Factor	Students' house type	*N*	Mean, $\bar{x}$	Standard deviation, σ	Mean standard error, $\sigma_{\bar{x}}$	*p*-value
Basic knowledge	Flat or Apartment	468	3.8731	0.9099	0.0421	$2.0\text{x}10^{-5}$
	Terraced house	471	3.9687	0.8753	0.0403	
	Condominium	132	4.0256	0.9217	0.0802	
	Semi-detached	89	4.0815	0.8295	0.0879	
	Bungalow	50	4.045	0.9247	0.1308	
Environment	Flat or Apartment	468	4.0144	0.9021	0.0417	$4.5\text{x}10^{-9}$
	Terraced house	471	4.146	0.828	0.0382	
	Condominium	132	4.2898	0.804	0.07	
	Semi-detached	89	4.2725	0.7738	0.082	
	Bungalow	50	4.34	0.8707	0.1231	
Technology	Flat or Apartment	468	3.8743	0.9244	0.0427	0.1567
	Terraced house	471	3.903	0.8864	0.0408	
	Condominium	132	3.9672	0.9252	0.0805	
	Semi-detached	89	4.0243	0.8451	0.0896	
	Bungalow	50	3.97	0.962	0.1361	
Education	Flat or Apartment	468	3.9728	0.8728	0.0403	$1.1\text{x}10^{-8}$
	Terraced house	471	4.0358	0.8642	0.0398	
	Condominium	132	4.2045	0.856	0.0745	
	Semi-detached	89	4.2135	0.8643	0.0916	
	Bungalow	50	4.0457	1.0061	0.1423	

secondary school education according to different factors from the survey questions. To determine whether the year of secondary school education created a difference in the perception towards renewable energy or not, p-values were also calculated for each of the factors using ANOVA test. Referring to Table 1, for basic knowledge, environment,

technology and education factors, the *p*-value for each of the factors is less than α ($p<0.05$). Thus, there is a significant difference between years of education among the students on the perception towards renewable energy with 95% confidence level ($p>0.05$).

Table 2 shows the statistical test results based on secondary school level according to different factors from the survey questions. Lower secondary level consists of students from Form 1 to Form 3 while higher secondary level consists of students from Form 4 and Form 5. Similar to the results as shown in Table 1, there is a significant difference between levels of secondary school among the students on the perception towards renewable energy. Based on the mean of the survey results in Table 2, it can be considered that higher secondary students have a higher perception than lower secondary students towards renewable energy in terms of basic knowledge, environment, technology and education factors.

The statistical test results based on the house type that the students are currently residing are shown in Table 3. To determine whether the house type created a difference in the perception towards renewable energy or not, p-values were also calculated for each of the factors using ANOVA test. The house type was taken as an indicator of the economy condition of the students, where students from low-income family are usually residing at flat or apartment home type while students from high-income family are residing either at terraced house or townhouse, condominium, semi-detached house or bungalow. There is a significant difference between the types of students' house on the perception towards renewable energy in terms of basic knowledge, environment and education factors. However, there is no significant difference in terms of technology factor. Based on the mean of the survey results in Table 3, it can be considered that students who are residing at flat or apartment have the lowest perception on renewable energy in terms of basic knowledge, environment, technology and education factors compared to those who are staying at other house types.

Table 4 shows the statistical test results based on the attitude towards monitoring the home electricity bill. To determine whether the attitude towards monitoring the home electricity bill created a difference in the perception towards renewable energy or not, p-values were also calculated for each of the factors using t-test. Based on Table 4, there is a significant difference between the groups who are

Table 4. Statistical test results based on monitoring home electricity bill using t-test

Factor	Monitoring home electricity bill	*N*	Mean, $\bar{x}$	Standard deviation, σ	Mean standard error, $\sigma_{\bar{x}}$	*p*-value
Basic knowledge	Yes	745	4.0166	0.8899	0.0326	0
	No	465	3.8417	0.8933	0.0414	
Environment	Yes	745	4.1913	0.8454	0.031	0
	No	465	4.0269	0.8717	0.0404	
Technology	Yes	745	3.9803	0.9013	0.033	0
	No	465	3.7989	0.9042	0.0419	
Education	Yes	745	4.1361	0.8441	0.0309	0
	No	465	3.8946	0.907	0.0421	

Table 5. Statistical test results based on exposure to renewable energy using t-test

Factor	Heard about renewable energy before	*N*	Mean, $\bar{x}$	Standard deviation, σ	Mean standard error, $\sigma_{\bar{x}}$	*p*-value
Basic knowledge	Yes	1051	4.0188	0.8708	0.0269	0
	No	159	3.4906	0.9192	0.0729	
Environment	Yes	1051	4.2043	0.8314	0.0256	0
	No	159	3.6242	0.8705	0.0690	
Technology	Yes	1051	3.9551	0.9091	0.0280	0
	No	159	3.6164	0.8332	0.0661	
Education	Yes	1051	4.1215	0.8588	0.0265	0
	No	159	3.5265	0.8166	0.0648	

monitoring and not monitoring their home electricity bill on the perception towards renewable energy in terms of basic knowledge, environment, technology and education factors. From the mean of the survey results as shown in Table 4, it can be considered that students who are monitoring their home electricity bill have higher perception than those who are not monitoring home electricity bill according to basic knowledge, environment, technology and education factors.

Table 5 shows the statistical test results based on the exposure to renewable energy. To determine whether two different groups created a difference in the perception towards renewable energy or not, p-values were also calculated for each of the factors using t-test. Referring to Table 5, there is a significant difference between the groups who have heard and never heard about renewable energy before on the perception towards renewable energy, in terms of basic knowledge, environment, technology and education factors. From the mean of the survey results as shown in Table 5, it can be considered that students who have heard about renewable energy before have higher perception than those who have never heard about renewable energy according to basic knowledge, environment, technology and education factors.

Tables 6 to 8 show the statistical test results based on secondary school level, monitoring home electricity bill and exposure to renewable energy using z-test. Z-test was also used to determine whether the two sets of data compared are significantly different between each other or not. For z-test, the sample size is taken as 50% from the overall number of respondents of each category. Since α is taken as 0.05, this corresponds to 0.025% of the samples in each tail and the critical value of α is 1.96 or -1.96. Referring to Tables 6 to 8, the z-values obtained for all factors are more than -1.96 or less than 1.96, which is below the critical value of α. Hence, it can be considered that there is a statistical significant difference between each of the groups being compared. Again, this is in agreement with the statistical results obtained using t-test.

Table 6. Statistical test results based on secondary school level using z-test

Factor	Secondary school level	Sample size	Sample mean	*z*-value
Basic knowledge	Lower	327	3.9108	0.1668
	Higher	278	4.0440	
Environment	Lower	327	4.1064	0.9679
	Higher	278	4.2038	
Technology	Lower	327	3.8509	0.5877
	Higher	278	3.9707	
Education	Lower	327	3.9615	0.7745
	Higher	278	4.1714	

Table 7. Statistical test results based on monitoring home electricity bill using z-test

Factor	Monitoring home electricity bill	Sample size	Sample mean	*z*-value
Basic know-ledge	Yes	373	4.0121	0.6746
	No	232	3.8194	
Environ-ment	Yes	373	4.1933	0.5038
	No	232	4.0108	
Techno-logy	Yes	373	3.9794	0.6572
	No	232	3.7778	
Education	Yes	373	4.1446	0.4476
	No	232	3.8906	

Table 8. Statistical test results based on exposure to renewable energy using z-test

Factor	Heard about renewable energy before	Sample size	Sample mean	*z*-value
Basic know-ledge	Yes	526	4.0183	0.4476
	No	79	3.4841	
Environ-ment	Yes	526	4.2241	0.0768
	No	79	3.6474	
Techno-logy	Yes	526	3.9692	0.2094
	No	79	3.6301	
Education	Yes	526	4.1270	0.0707
	No	79	3.5421	

5. Conclusions

The awareness towards renewable energy among students from several secondary schools in Petaling Jaya city, Malaysia has been successfully assessed through a survey. Based on the survey results, when students are at higher level of secondary school, their understanding on renewable energy is better, they are more aware on renewable energy benefits to the environment and Malaysian government's incentives for renewable energy technology, and their willingness to invest in renewable energy technology is higher. The percentage of the students who support renewable energy topic should be retained in the school's syllabus and feel that renewable energy technology is expensive, is larger for higher secondary level than lower secondary level. Using t-test, z-test and ANOVA test, it was found that the year of education, the home type that the

respondents are currently residing, the attitude towards monitoring home electricity bill and exposure to renewable energy created a significant difference in the perception towards renewable energy, in terms of basic knowledge, environment, technology and education factors.

Higher secondary students have a higher perception towards renewable energy than lower secondary students on basic knowledge, environment, technology and education factors of renewable energy awareness. Students who are residing at flat or apartment have the lowest perception towards renewable energy on basic knowledge, environment, technology and education factors compared to those who are staying at other house types. Students who are monitoring their home electricity bill and have heard about renewable energy before have higher perception towards renewable energy according to basic knowledge, environment, technology and education factors.

The results from this survey could be useful in identifying the syllabus of renewable energy contents in school curriculum at relevant secondary school level to increase the students' perception towards renewable energy. The suggestions that can be made in the curriculum are explanation on the concept of renewable energy, such as solar energy and wind energy, demonstration on renewable energy generation and hands-on experiments related to renewable energy. The obtained survey results could also be used to develop renewable energy policies in schools in the future, further enhance the public awareness towards renewable energy and encourage the application of clean energy among the society.

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