Environmental Awareness and Attitudes Towards Solid Waste Management Among TVET Students in Malaysia

Rodzidah Mohd Rodzi, Zulkifli Mohd Nopiah, Noor Ezlin Ahmad Basri

Abstract*: The issue of environmental protection has gained significant global importance in this era but practices in basic concepts of waste disposal are often neglected. People around the globe are aware of the impact of improper waste disposal practices, but the negative attitude towards implementation gives rise to disorganised situations. This paper presents an overview of the awareness and attitudes of the public towards environmental issues using a 20 question survey. The objective of this research was to measure the level of environmental awareness and attitudes towards solid waste management among 248 respondents from TVET Institute, Kuala Lumpur. The results show that the percentage of pro-environmental awareness was 92.1% and was 56.4% for attitudes towards solid waste commitment. The relationship between awareness and attitude was weak at Spearman's rho [r_s = - 0.067, sig = 0.000, p > 0.05]. Students with high awareness of pro-environmental issues did not necessarily have a positive attitude. This research recommended that environmental education be considered as an independent subject in the Malaysia education system to inculcate a proper environmental culture in students. The syllabus should be more "hands-on" to promote a more consistent attitude towards protecting the environment

***Index Terms*: Solid Waste Management, Awareness, Attitude, TVET, Malaysia.**

I. INTRODUCTION

Waste is the result of human activities and everyone needs to have a proper understanding of waste management issues, without which the success of even the best conceived waste management plan becomes uncertain. A 2012 report from the World Bank's Urban Development Department estimates that the worlds' cities generated 1.3 billion tons of solid waste per year, amounting to a footprint of 1.2 kilograms per person per day. With rapid population growth and urbanization, municipal waste generation is expected to rise to 2.2 billion tonnes by 2025 [3]. The Malaysian government through the National Department of Solid Waste (JPSPN) is targeting to achieve the national recycling rate of 22% by 2020. Currently, the recycling rate is estimated at approximately 10.5% [7]. It is estimated that about 23,000 tons of wastes are generated per day in Malaysia which is expected to increase at the rate of 2% every year [5]. Beside the increase of environmental concern, the ecological crisis dramatically continues to highlight influential factors on environmental protection such as environmental behaviour, awareness, knowledge and attitude [10]. Several universities in their effort to gain sustainable campus have embarked on projects leading to their desired goals, for example Sydney university asset procurement, management, maintenance and disposal which is accompanied with procedures and guidelines that ensure better management system [2]. Although environmental awareness is being promoted in Malaysia, rapid economic growth and industrialization requires the nation to address the urgent task of ensuring long-term sustainability to establish a clean Malaysia [1]. It is education which makes human beings knowledgeable of the environment and problems related to it. Students must have awareness about environmental issues so that they can play an effective role in proper waste management (Tartiu, 2011) [6]. Hence, this study explores the extent to which Technical and Vocational Education and Training (TVET) students as members of the public are aware of and practice proper waste management.

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II. OBJECTIVE

The topic of environmental protection has attained highest importance in this era globally but the practices of basic concepts of waste disposal are often neglected. People around the globe are aware of the impact of improper waste disposal practices, but the negative attitude of implementation gives rise to chaotic situations. Lack of adequate environmental education among students can affects all stages involved in protecting the environment. As such, this research seeks to measure the level of environmental awareness and attitudes towards solid waste management among TVET students using questionnaire tools.

III. METHODOLOGY

A. Research background

A *limitation* of

this research was that students' responses could be based on the guidelines of the waste management protocol at the TVET Institute rather than what they actually practised. The assumptions in this research were students's active participation in environmental activities and that a strong basis of knowledge and understanding fostered among them. Also the responses were genuine and not just for securing better grades. The research focused on TVET students because their industrial skills training workshops produced not only MSW but also hazardous wastes (HW) as well. Thus, as the future generation, their awareness and attitudes towards the environment is essential for quality sustainable development. The total number of students for 2017 was 546 comprising of 479 male and 67 female. Male students dominated in TVET courses. Moreover, the ITI KL offers 12 courses of which only 3 have female students in Computer, Graphics and Industrial Electronics. Others courses involve dangerous and heavy machining tasks, Electrical, Automotive, Arc & Gas Welding, Production, CNC Machining, Quality Assurance, Refrigeration & Air Conditioning, Industrial Mechanic and Printing [8]

B. Research Location

Kuala Lumpur (KL) is the national capital of Malaysia as well as its largest city. It covers an area of 243 km^2 (94 sq mi) and had an estimated population of 1.73 million as of 2016 [9]. The area for this study is KL suburb town of Kuchai Lama (Figure 1) and was selected since it is among the oldest towns in Malaysia. It is located at coordinates 3.0839° N, 101.6883° E. The *Department of Statistics Malaysia (*DOSM) reported that Kuchai Lama's estimated population in 2011 was 315,943 and covered an area of 16.25 km^2 (6.18 sq mi) [4].

Fig. 1 : Kuchai Lama high density residential

C. Participants

This research focused on students of the Industrial Training Institute Kuala Lumpur (ITI KL). ITI KL is a government institute under the Manpower Department of the Ministry of Human Resources Malaysia. Its mission is to provide skills training programmes for the nation to meet the demands for a skilled labour workforce. ITI KL was established in 1964 and the students undergo TVET training for 2 years. Hostel accommodation, facilities and food are fully subsidized by the government. The students are of Malaysian nationality, multi-racial and multi-religion. Research participants were fresh school leavers ranging from 18 to 22 years of age of which 183 were male and 65 female.

D. Instrument

The research was carried out using questionnaires as a data collection instrument. It was included series of 20 closed-ended questions covering various aspects of current environmental issues at global and local levels. The questions were designed to address local authority concerns over environmental issues. The instrument constructed in this study consisted of 2 sections: "Awareness" and "Attitude". The "Awareness" section included 10 questions gauging aspects such as perception, influence and concern for the environment. It used a 5 point Likert type response scale with an agree/disagree response section. The "Attitude" section comprised 10 questions to assess respondents' pro-environmentalist behaviours (PEBs) and their social responsibilities towards minimizing solid waste disposal. The scale of attitude questions consisted of two Yes/No assessments. The questions were designed to be respondent-friendly, succinct and direct without any complex technical jargon.

E. Sampling

A total of 270 questionnaires were distributed among the students. The response return rate was 93.3% with 252 questionnaires returned. However 4 spoilt questionnaires were rejected and considered invalid. Spoilt responses consist of checking more than one option, blank returns and being scribbled on. The sample size was n=248 as expressed in (1) (Krejcie & Morgan, 1970). The Krejcie and Morgan's sample size calculation is based on p = 0.05 where the probability of committing a type I error is less than 5% or p<0.05.

$$S = X^2NP(1-P)\pm d^2(N—])+X^2P(1—P) \quad (1)$$

Where,

S = required sample size.

X^2 = the table value of chi-square for 1 df at the desired confidence level (0.05 = 3.841).

N = the population size.

P = the population proportion

d = the degree of accuracy expressed as proportion (0.05).

F. Scoring/Coding of Responses

The research instrument consisted of a 2 section parts on "Awareness" and "Attitude". The first included 10 questions addressing 3 sub matters of awareness including perception, influence and concern. Each question had a rating type response with a score associated to each answer. The "Awareness" section employed a Likert bipolar scale of 5 rates, 5(Strongly Agree), 4(Agree), 3(Neutral), 2(Disagree) and 1(Strongly Disagree). The next batch "Attitude" part included 10 dichotomous questions using a two-point scale rating "Yes/No".

IV. RESULTS AND DISCUSSION

The quantitative data were analyzed by IBM SPSS® (Statistical Package for Social Sciences) software

for Windows version 19.0. The statistical key featured analysis which was applied for this survey including Cronbach's Alpha reliability test, descriptive, frequency, graph, Chi-square socio-demographic characteristics, Pearson's correlation and Spearman's rho bivariate correlation. Through Chi–square analysis, the significant differences between socio demographic factors, gender and age were determined. The significant level used is the confidence level of P≤0.05.

The result of questionnaires reliability analysis is consistency with Cronbach's alpha: α=0.85, N=10 for "Awareness" and α=0.95, N=10 for "Attitude" resulting in good reliability. Results of the stability test-retest were: Pearson's rank correlation coefficient 0.7 to 0.8. Before the final form of the questionnaire survey was distributed, a pilot study as a research instrument pre-test was conducted to determine if the questions would yield the kind of information needed. Eight participants enrolled in the pilot study from ITI KL Top Management comprising, one Director, three Deputy Directors and four Heads of Department. The demographics of respondents were 183(73.79%) male and 65(26.21%) female, while the respondent's age frequency stood at 30(12.10%) for age 18, 145(58.47%) for age 19, 56(22.58%) for age 20, 15(6.05%) for age 21 and 2(0.81%) for age 22. The histogram and descriptive frequency are shown in Figure 2(a) and Figure 2(b).

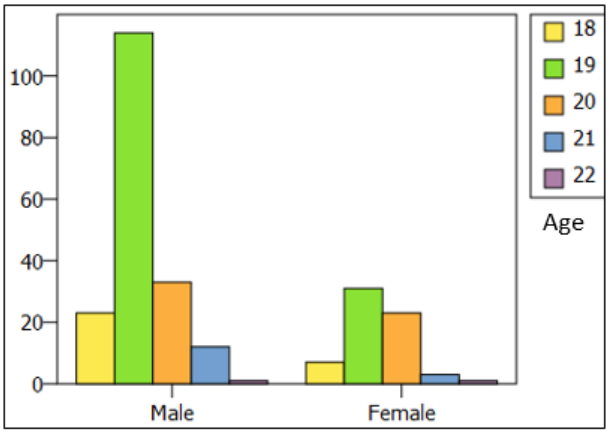


Fig. 2(a) : Survey respondents by age and gender

Gender

Value Label	Value	Frequency	Percent
Male	1	183	73.79
Female	2	65	26.21
	Total	248	100.0

Age

Value Label	Value	Frequency	Percent
18	1	30	12.10
19	2	145	58.47
20	3	56	22.58
21	4	15	6.05
22	5	2	.81
	Total	248	100.0

Fig. 2(b) : Survey respondents by age and gender

A. Awareness

Awareness included 3 dimensions of perception, influence and concern for the environment. From the analysis, most of the respondents showed a high awareness of environmental conservation. The Pearson's test showed men and women had strong perception on issues related to saving the environment (men: p<0.050, women: p<0.057) and agreeing to participate in community campaign. Nearly all respondents (*n*=248) were willing to engage in activities involving preserving environmental quality, community action and government rules. The Awareness survey included ten questions (N=10), with questions 1-3 on aspects of perception, 4-6 on influence and 7-10 on concern. The research findings indicate a High Level of perception among the TVET students with the frequency descriptive statistic resulting in mean=4.46 and standard deviation=0.78. Following are the mean and standard deviation (sd) formula.

Mean : $M = (\Sigma(X))/N$ (2)

Where,

Σ = Sum of

X = Individual data points

N = Sample size (number of data points)

SD : $S^2 = (\sum(X-M)^2)/(n-1)$ (3)

Where,

Σ = Sum of

X = Individual score

M = Mean of all scores

n = Sample size (number of scores)

A high percentage of students had better levels of perception at Strongly Agree (58.07%) and Agree (34.80%) while a low percentage of students had low environmental perception at Neutral (2.83%). Moreover, less than 4% of the students had negative perceptions of awareness about environmental conservation with Disagree at (3.23%) and Strongly Disagree at (1.07%) as shown in Figure 3. The Chi-square test was performed to observed "goodness of fit" statistic on gender and age socio-demographic factors. The results generated showed that the socio-demographic factor for gender ($x^2 = 15.29$, df = 4, p>0.05) and age ($x^2 = 76.41$, df=16, p<0.05) was both 2-tailed. There was significant difference for the gender factor and none for age. The gender factor didn't affect TVET students' perception on environmental issues but age did.

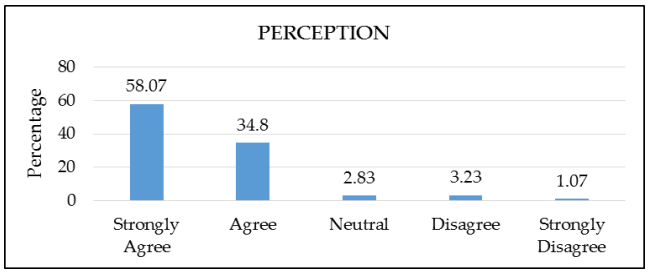


Fig. 3 : Respondents "Awareness" Perception (Q1-Q3)

Questions 4-6 indicated the influence dimension among TVET ITI KL

students. The analysis of frequency descriptive statistic resulted in a mean=4.41 and sd=0.87. In regard to the results on the influence questions, the majority of respondents were positively influenced by environmental awareness subject with Strongly Agree and Agree at 57.53% and 33.47% respectively. Of the respondents, 4.30% showed Neutral influence on environmental issues, Disagree stood at (2.15%) and Strongly Disagree at (2.55%) as in Figure 4. A Chi-square test of influence was performed to examine the relationship between gender and age socio-demographic factor. The chi-square showed that significant 2-tailed relation between these variables were gender ($x^2 = 12.72$, df = 4, p<0.05) and age ($x^2 = 73.57$, df=16, p<0.05). The results show that gender and age factors affect respondent's influence responses.

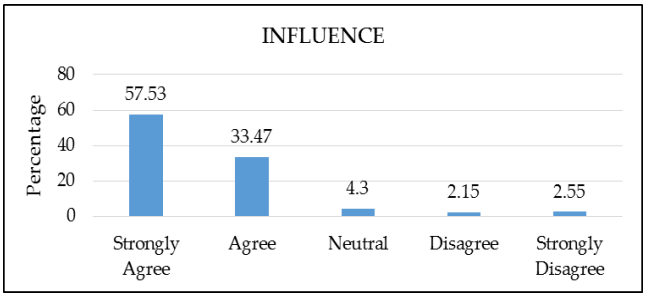


Fig. 4 : Respondents "Awareness" Influence (Q4-Q6)

Questions 7 to 10 related to the concern subscale. The result of the frequency descriptive statistics analysis by SPSS showed mean=4.47 while sd=0.80. As Figure 5 shows, more than half respondents indicated that they were very concerned about environment with Strongly Agree at 59.78% and Agree at 32.66%. Only 3.73% showed Neutral concerned. On the other hand, the statistical results show that Disagree stands at 2.42% and Strongly Disagree at 1.41% in regard to concerns over saving the environment and conservation. Chi-squared significant two tailed test was performed and the results were that the factors were gender ($x^2 = 8.37$, df=4, p>0.05) and age ($x^2 = 67.98$, df=16, p<0.05). The gender factor didn't affect respondents's positiveness concern but the age factor did.

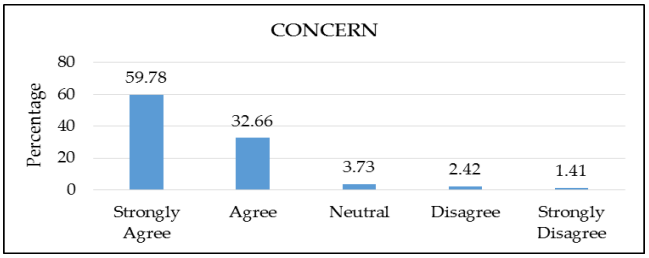


Fig. 5 : Respondents "Awareness" Concern (Q7-Q10)

The overall results of the "Awareness" aspect indicates that, among TVET students it was almost at the good level as most respondents were influenced about saving and conserving environmental issues. They had better perceptions and concerns towards environmental protection. The impact of gender and age on perception, influence and concern was observed through Chi-square tests with 2-tailed significant level P ≥ 0.05. Research on environmental issues has consistently found that women have moderately stronger pro-environmental values, beliefs and attitudes than men.

B. Attitude

In this study, attitude was investigated among respondents with 10 'Yes' or 'No' questions on the commitment towards solid waste management and disposal in saving the environment. Results were generated through the Frequency Descriptive Statistics Analyzer. Figure 6 illustrates the output feedback from respondents for questions 1 to 10.

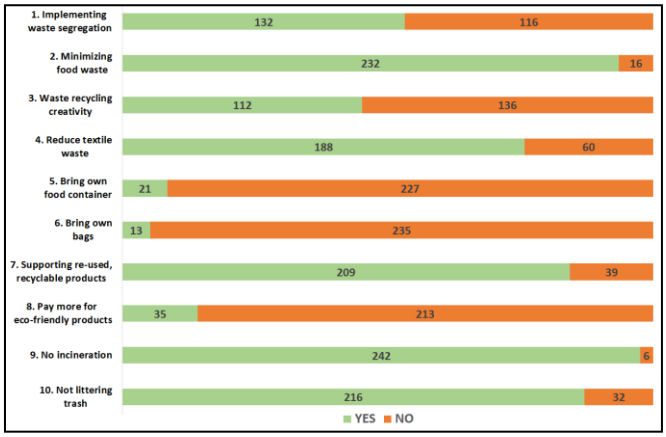


Fig. 6 : "Attitude" responses for Question 1 to 10

Q1 was about practicing waste segregation. Respondent's feedback showed higher percentage of 'Yes' responses 132 (53.23%) in this area while the rest (116 or 46.77%) responded negatively with a statistic frequency descriptive mean=1.53, sd=0.50. For Q2 on minimizing food waste, the majority (232 or 93.55%) had a positive responses and 16(6.45%) had a 'No' response giving a mean=1.94 and sd=0.25. On Q3 respondent's creativity in practicing waste recycling, the responses showed a lower percentage practicing recycling with 'Yes' at 112 (45.16%) and 'No' at 136 (54.84%) giving a mean=1.45 and sd=0.50. Q4 related to reducing textile waste and whether respondents resort to donations or altering instead of trashing materials. Feedback stood at 188 (75.81%) 'Yes' and 60 (24.19%) 'No' providing a mean=1.76 and sd=0.43. Q5 and Q6 were about Plastic-free life as part of Bring Your Own (BYO) campaign. Q5 questioned initiatives on bring their own food containers. The results show a higher percentage of negative responses with 'Yes' 21(8.47%), 'No' 227(91.53%), mean=1.08 and sd=0.28. Q6 on action of reducing plastic waste by bring their own reusable bags showed only a few respondents answering 'Yes' at 13(5.24%) and 'No' responses stood at 235(94.76%) leaving a mean=1.05 and sd=0.22. Q7 and Q8 related to supporting re-used and recyclable products. Q7 assessed the supportiveness of respondents in using re-used and recyclable products in their households. The responses showed majority supporting positively with 209(84.27%) 'Yes', 39(15.73%) 'No', mean=1.84 and sd=0.36. Q8

on the willingness of spending extra for eco-friendly products. The results showed that a very low percentage of respondents (35 or 14.11%) willing to pay more for eco-friendly products while 213 (85.89%) had 'No' responses giving a mean=1.14 and sd=0.35. Q9 and Q10 referred to solid waste disposal methods. Q9 inquired about whether the respondents practiced incineration in their daily life. The feedback showed that a very high number 242 or 97.58% having a 'Yes' response while 6 (2.42%) a 'No' response giving a mean=1.98 and sd=0.15. The final question on solid waste disposal and if respondents did not litter trash or garbage waste. There were more positive responses with majority practicing proper solid waste disposal management by responding 'Yes' 216(87.10%), 'No' 32(12.90%), mean=1.87 and sd=0.34.

The results of the "Attitude" questionnaire showed that most respondents practiced proper solid waste disposal methods. The main constraints were, when personal budgets were involved in which case, only a few agreed to be fully committed. The scatter-plot and trend line in Figure 7 displays the comparison between numeric value in the between "Attitude" mean versus age data. The interpretation of the scatter-plot data shows an upward pattern from left to right indicating a positive (+ve) correlation between age and mean. The trend line of the graph was linear and the strength of the dots was weak.

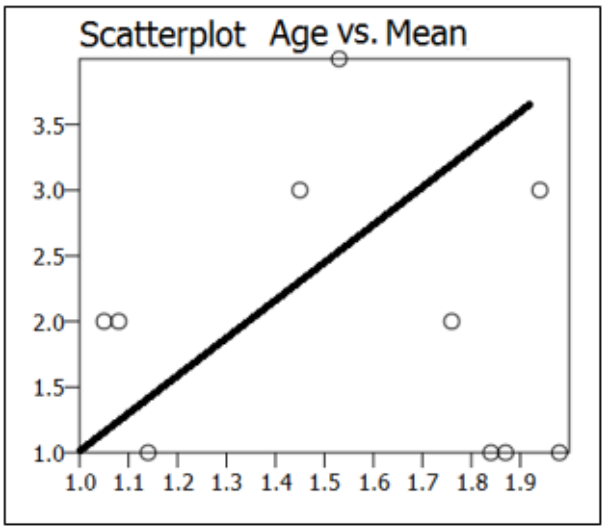


Fig. : Scatter-plot of "Attitude" age and mean

The results of the Pearson's correlation coefficient test showed that there was a significant association between mean and age as the value of r=0.11. The Pearson's correlation coefficient formula r is as below:

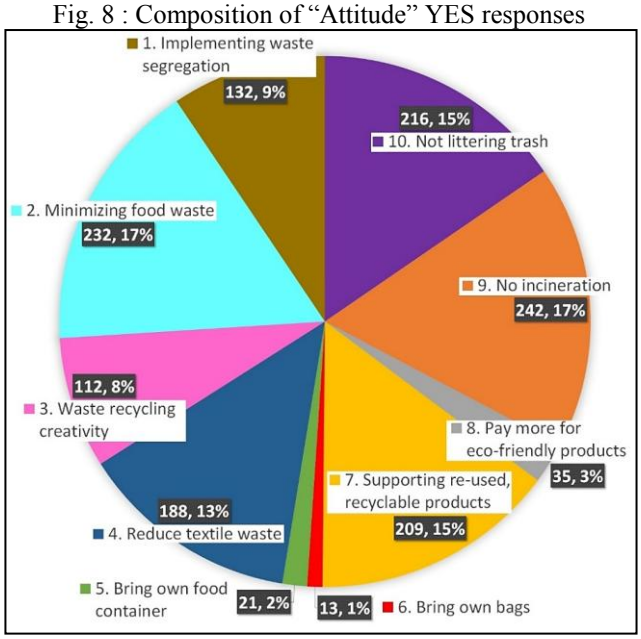
$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}} \quad (4)$$

Where,

r = Pearson's correlation coefficient rank
N = number of pairs of scores
$\sum xy$ = sum of the products of paired scores
$\sum x$ = sum of x scores
$\sum y$ = sum of y scores
$\sum x^2$ = sum of squared x scores
$\sum y^2$ = sum of squared y scores

The "Attitude" questionnaire as summarized in Figure 8, depicts the overall percentage values and labels of TVET students' 'Yes' responses as grouped by item Q1-Q10. The pie chart shows that the biggest pie slice was orange coded Q9 (17%) on commitment to not practicing incineration in solid waste disposal, followed by the item coloured blue for Q2 (17%) on minimizing food waste. The third biggest wedge was the item depicted by the purple slice for Q10 (15%) involving not littering trash, followed by the fourth on supporting re-used and recyclable products. Several students were supportive in item Q4 (13%), Q1 (8%) and Q3 (8%) colour coded dark blue, brown and pink. They were well into practicing reducing textile waste, implementing waste segregation and innovating waste recycling creativity. The grey wedge Q8 shows 3% being less supportive of the willingness to pay more for eco-friendly products. The smallest slice represents the commitment to Plastic-free and Bring Your Own (BYO) campaigns for item Q5 (2%) and Q6 (1%) respectively. Students found it difficult to bring their own food container and bags. In conclusion, a moderate level (56.4%) of the respondents had a positive attitude towards solid waste disposal management as a means to saving and conserving the environment.

Fig. 8 : Composition of "Attitude" YES responses



C. Awareness and Attitude relationship

The relationship between level of "Awareness" and "Attitude" among TVET students towards environmental issues and solid waste management was generated by statistical software, SPSS. The bivariate Spearman's rho test was used to test the correlation between two ordinal variables. This test investigated the strength of a relationship and also whether there was a significant relationship or not between level of awareness and attitude of the TVET Institute students. Inference correlation analysis showed a negligible relationship between awareness and attitude among TVET students ranking [r_s= - 0.067, sig=0.000, p>0.05] 2-tailed.

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This value indicates a weak relationship strength and no statistically significant bivariate association. The significant level used was the confidence level of P≤0.05.

V. CONCLUSION

This research provides information on public environmental awareness and solid waste management attitudes in Kuchai Lama, Kuala Lumpur, Malaysia. The samples were TVET Institution students ranging in age from 18 to 22 years and comprising 183 men and 65 women. The findings indicated that students had a high level of awareness (92.1%) although attitude was at a moderate 56.4%. Students were pro-environmental in terms of participating in campus 'green' activities and supporting solid waste disposal campaign. As consumers, students were strictly not willing to pay extra for ecological products. A plastic-free culture hasn't been cultivated among them as shown by the very low percentages of those bringing their own bags (5.24%) and food containers (8.47%). This research recommends that environmental education be included as an independent subject in Malaysia's education syllabus begin from as early as kindergarten level to tertiary stages and not as a extra curriculum subject. This would significantly contribute to inculcating a proper environmental culture among students. The syllabus should stress on a "hands-on" approach to facilitate a more consistent attitude towards protecting the environment.

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REFERENCES

1. Desa, N.B.A. Kadir and F. Yusooff, "Waste education and awareness strategy: towards solid waste management (SWM) program at UKM", Procedia - Social and Behavioral Sciences 59, 2012, pp. 47 – 50. doi: 10.1016/j.sbspro.2012.09.244
2. B.C. John, S. Chamhuri, A.B Rawshan, A.F Mohamed, "The Challenges of E-waste Management Among Institutions: A Case Study of UKM", Procedia – Social and Behavioral Sciences, 2012, vol. 59, pp. 644-649. doi: 10.1016/j.sbspro.2012.09.325
3. *Bh*ada-Tata, Perinaz; Hoornweg, Daniel A., "What a Waste? : A Global Review of Solid Waste Management", in The World Bank Documents & Reports, Urban development series knowledge papers, no. 15. Washington, DC: World Bank Group, 2018. Available FTP: http://www.worldbank.org/en/topic/urbandevelopment/brief/solid-waste-management
4. Department of Statistics, Malaysia, "Federal Territory of Kuala Lumpur", in Statistic Report: Jabatan Perangkaan Malaysia, Archived from the original on June 23, 2016.
5. I.A.Jereme, C. Siwar, R.A. Begum, B.A. Talib, and M.M. Alam, "Assessing Problems and Prospects of Solid Waste Management in Malaysia", e-Bangi UKM, 2015, vol. 10(2), pp. 70-87. Available at SSRN: https://ssrn.com/abstract=2942939
6. N. Bronte and P. Ruan, "Final Report: Community Education and Awareness Strategy for Waste Management", in Environment Protection Authority (EPA), URS Australia Pty Limited (URS), Hackney South Australia 5069 Australia, 2013.
7. N.E.A. Basri, M.A. Zawawi, S.M. Zain, W.N.A.W. Mohamad, A. Kasa, "Effects of an Awareness Programme on the Perception of Engineering Students at the Universiti Kebangsaan Malaysia Towards Solid Waste Recycling Practices", Pertanika Journal of Social Science and Humanities, 2016, vol. 24, ISSN: 0128-7702.
8. Official Website of Industrial Training Institute, Kuala Lumpur (ITI KL) "Institut Latihan Perindustrian, ILP KL", 2018. Available FTP: http://www.ilpkl.gov.my
9. Time Out Kuala Lumpur. KL Attractions, Activities & What's On in KL – Time Out Kuala Lumpur. Timeoutkl.com. 2018. Available FTP: https://www.timeout.com/kuala-lumpur
10. Z. Aminrad, S.Z. Sayed Zakariya, A.S. Hadi and M. Sakari, "Relationship Between Awareness, Knowledge and Attitudes Towards Environmental Education Among Secondary School Students in Malaysia", UKM, 2013, World Applied Sciences Journal 22 (9), pp. 1326-1333, ISSN 1818-4952. doi: 10.5829/idosi.wasj.2013.22.09.275

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