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Effects of an Awareness Programme on the Perception of Engineering Students at the Universiti Kebangsaan Malaysia Towards Solid Waste Recycling Practices

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ABSTRACT

The Malaysian government through the National Department of Solid Waste (JPSPN) is targeting to achieve the national recycling rate of 22% by the year 2020. Currently, the recycling rate is estimated at approximately 10.5%. One of the key strategies in solid-waste management is to change the perception and attitude of the Malaysian public in order to encourage receptivity towards the practice of recycling. The objective of this study was mainly to investigate effects of an awareness programme on the perception of engineering students at the Universiti Kebangsaan Malaysia (the National University of Malaysia, UKM) towards the recycling of solid waste. This study provides an answer to one of the questions as to why students do not practice recycling even though recycling facilities are provided by the university. In this study, survey forms were distributed to Bachelor of Civil Engineering students, UKM regarding their perception towards recycling practices, awareness of the issues regarding solid waste generation and management in Malaysia as well as knowledge of recycling facilities provided at the university. From the results of this study, it can be concluded that the students are aware of the importance of recycling and individual responsibility to protect and conserve the environment. However, there are some conflicting attitudes towards practicing recycling even though the students are informed on the availability of recycling facilities at the university.

Keywords: Perception, recycling, solid waste management

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INTRODUCTION

Increasing population and urbanisation have become a significant contributing factor in the problem of the increasing volume of solid waste generation in developing countries (Troschinetz & Michelcic, 2009). The issue of unsustainable disposal of municipal solid waste has continuously been one of the major environmental challenges posed by modern society that is being faced by municipalities around the world (Omran et al., 2010). Total domestic waste is expected to increase to 30,000 tons/day by 2020 (Yazid, 2010). Recycling as a solution offered by environmental innovation in overcoming solid waste disposal issues has been an approach used by the Malaysian government since 1993 (Sakawi, 2011). The recent recycling rate in Malaysia is estimated at 10.5% (Hakimi, 2014). In order to achieve a recycling rate of 22% by the year 2020, one of the key strategies of solid-waste management is to change the perceptions and attitude of Malaysians in order to encourage receptivity towards the practice of recycling. Recycling can reduce the amount of solid waste disposed because most of the components in Malaysian solid waste consist of materials that can be recycled such as paper, plastic and glass (Jabatan Pengurusan Sisa Pepejal Negara, 2012).

According to Hassan et al. (2001), household participation is an important driver in recycling activities; however, participation in recycling programmes can be hampered in various ways. One major obstacle would be the lack of clear guidelines for local households regarding recycling programmes. Thus, improved education and better recycling facilities are required to promote positive attitudes towards recycling. Another study conducted by Mongholnchaiarunya (2005) in Yala, Thailand, recommended that recycling be practised in order to reduce congestion at waste disposal sites through effective campaigns such as the 'waste for egg programme', which was a strong motivation for local residents, especially the poor, to practise recycling. The campaign rewarded residents who brought recyclable items with eggs, and this was highly appreciated by the low-income group. As a result, waste sent to landfills was reduced; prior to the campaign, the recycling rate was found to have doubled. Public adoption of recycling also requires active involvement of households. Omran's (2008) research in Alor Setar, Kedah on household attitude towards recycling indicated that participation in recycling of household waste relied on level of awareness, understanding of recycling tasks and accessibility of recycling facilities.

The purpose of this study was to obtain initial perception of engineering students towards solid waste management issues and to identify the status of the level of awareness of recycling practices among engineering students. According to Wang et al. (1997), if the public's initial perception towards a recycling programme is negative, their future involvement will also be

negative. Participation is closely related to the individual's knowledge of the recycling rate in Malaysia i.e. the individual must awaken to his or her personal contribution towards achieving a higher recycling rate for Malaysia. Various initiatives have been implemented to increase the recycling rate in Malaysia such as improving recycling facilities and enhancing the awareness campaigns.

METHODOLOGY

The Department of Civil and Structural Engineering at the Universiti Kebangsaan Malaysia (UKM) organised an environmental awareness programme in November 2014 titled *'Mengasihi Alam, Mengasihi Allah*' (MAMA). The content of this programme contained both technical and non-physical aspects including issues on adverse impact on public health and the environment arising from improper solid-waste management and integrated solid-waste management such as recycling and composting. The non-physical aspect included topics on the creation of the universe, the earth, the environment and ecosystem, the creation of human beings and the responsibility of human beings towards their Creator.

The participants numbered 26 and were second-year students from the Bachelor in Civil Engineering Degree programme, with 13 students registered in the Civil and Environmental Engineering programme and the other 13 registered in the Civil and Structural Engineering programme. The awareness programme was designed to create an understanding among the participants regarding the importance of and their responsibility towards environmental conservation. Twenty-six questionnaires were distributed to the participants during the programme. The questionnaire referred to the perception of the students; this was divided into six parts consisting of knowledge about UKM's Recycling Centre (PKSUKM), the importance of recycling, the actual condition of the recyclable items, individual recycling rate, issues on solid-waste management and individual responsibility towards recycling waste.

The objective of the first part was to find out whether the students had prior knowledge of the existence of the UKM recycling centre. The objective of the second was to determine whether the students understood the important function of recycling activities, which was considered part of the environmental conservation initiative. The third part was designed towards identifying whether the students were willing to recycle solid waste if they knew the actual condition of the recyclable items. The objective of the next part was to find out whether the students knew how much recyclable material they could recycle daily. Next was to have the students' perception towards current solid-waste management issues in Malaysia identified. The last part intended to find out whether the students had prior knowledge of their individual responsibility towards environmental conservation through the practice of recycling solid waste.

RESULTS AND DISCUSSION

All the participants of the MAMA programme were female students. No specific reasons were given by male students from both Civil Engineering programmes for choosing not to participate in the MAMA programme. All the respondents were aged between 20 and 23 years. Figure 1 shows the percentage of participants by age group, with the majority of the participants being 20 years old. Background information provided by the students indicated that most of them had completed their studies at Matriculation level for a one-year programme. The students aged 21 years had completed a two-year programme for Matriculation level, while those aged 23 had completed a diploma-level programme before entering the university.

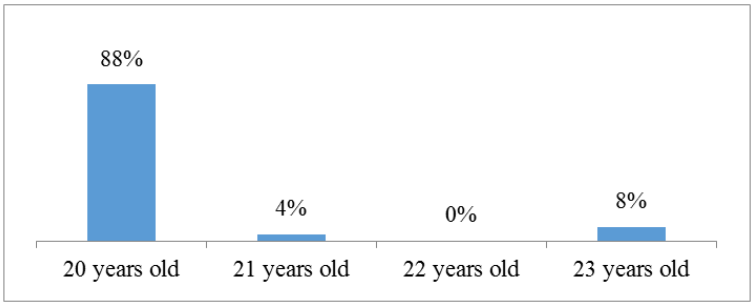

Figure 1. The percentage of participants according to age.

Students' Perception on the Knowledge of the UKM Recycling Centre (PKSUKM)

PKSUKM is a recycling centre on the UKM Bangi campus that was constructed for the purpose of facilitating on-campus recycling activities and the nearby community of Bandar Baru Bangi. It is located near the campus' main entrance and two residential colleges (Kolej Tun Hussein Onn and Kolej Dato' Onn). With the existence of PKSUKM and also the provision of recycling bins in various strategic locations on campus, it was expected that students would participate actively in recycling activities.

Figure 2(a) shows that a high percentage of the students in this research i.e. 96% were aware of the existence of the recycling centre on campus. Figure 2(b) shows that 77% of the students knew the actual functional use of PKSUKM. The results obtained from Figure 2(a) and Figure 2(b) led to the conclusion that most of the students had knowledge of the existence of the recycling centre and its actual functional use. Therefore, the recycling centre was a positive asset of the university in encouraging students to participate actively in recycling activities on campus. PKSUKM is a role model provided by UKM that fulfils Dahle and

Neumayer's concept of how a higher-educational institution can serve to model good environmental behaviour by implementing an appropriate recycling system on campus (Dahle & Neumayer, 2001).

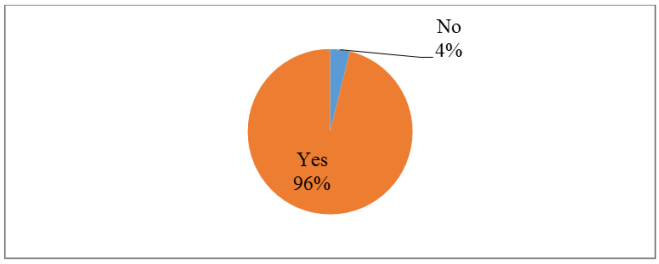

Figure 2(a). The percentage of students who know of the existence of PKSUKM.

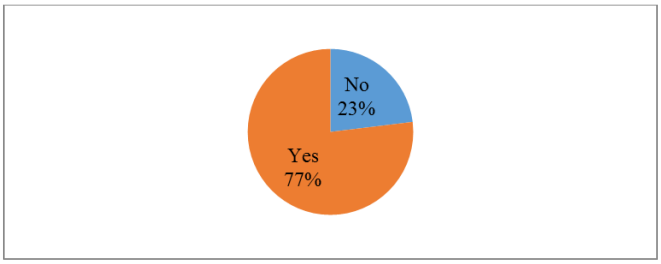

Figure 2(b). The percentage of students who know about the actual functional use of PKSUKM.

Students' Perception of the Importance of Recycling

The 3R environmental campaign (Reduce, Reuse and Recycle) implemented in Malaysia since the 1990s to encourage environmental conservation indicates awareness at the governmental level of the importance and benefit of recycling to Malaysians. With respect to Islam, environmental conservation is considered the individual's responsibility towards God, the Creator of the universe.

Figure 3(a) demonstrates that 92% of the students agreed that by recycling, problems linked to solid-waste disposal can be reduced. The practice of recycling materials such as paper, plastic, glass and others can reduce the volume of waste sent to landfill sites. Figure 3(b) shows that 96% of the students agreed that recycling is one way to protect the environment, while Figure 3(c) shows that 96% of the students agreed that the practice of recycling appreciates the natural environment created by God as Lord of the universe.

This section demonstrated that from the students' perception, recycling was important with respect to solid-waste management, environmental conservation and religion. The majority of the students were aware of the importance of recycling, which can be seen from the results shown in Figure 3(a), Figure 3(b) and Figure 3(c). Thus, by providing education and

conducting awareness campaigns, students may gain knowledge on the importance of recycling. In this respect, encouragement and incentives should be provided to them so that they will be keener to participate in on-campus recycling activities. A student who has learnt the value of waste as a resource and the importance of recycling will continue doing so later in life and will impact other individuals in their recycling behaviour (Christakis & Fowler, 2009).

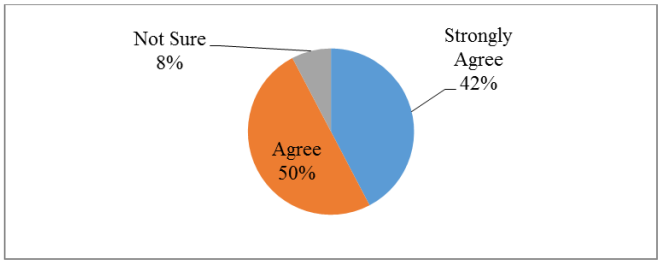

Figure 3(a). The perception of students towards the practice of recycling to reduce the problem of solid-waste management.

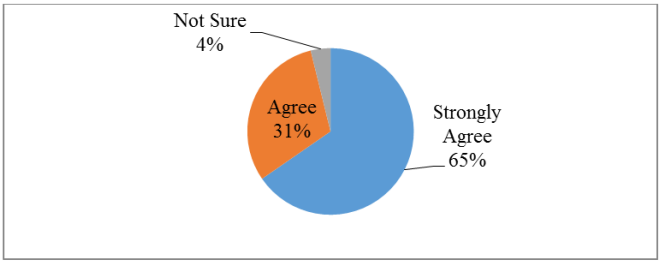

Figure 3(b). The perception of students towards the practice of recycling for environmental conservation.

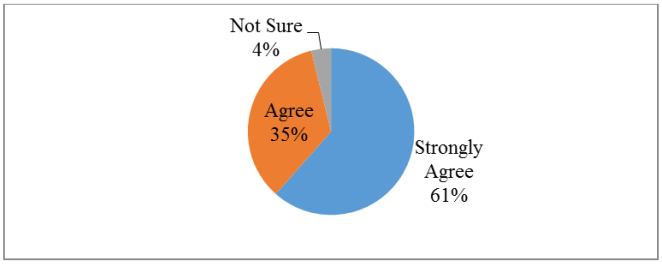

Figure 3(c). The perception of students that the practice of recycling is to appreciate the environment created by God.

Students' Perception on the Actual Condition of Recyclable Items

The actual condition of recyclable items involves concerns over cleanliness and the willingness to recycle even though recycling may be considered a dirty task. According to a study conducted by Gurder-Adams (1990) and Burca et al.

(1994), individuals who were interested in recycling activities generated more waste that could be recycled in comparison to individuals who were less interested to participate in recycling activities. On the other hand, situational factors such as the inconvenience of recycling also plays a role in individuals' intention to recycle (Derksen & Gartrell, 1993; McCarty & Shrum, 1994; Domina & Koch, 2002; Kelly et al., 2006).

Figure 4(a) shows that 53% of the students thought that recycling was not a dirty task; however, 16% thought that recycling was a dirty task, while 31% were uncertain about the issue. When asked about their willingness to recycle even though it was perceived as a dirty task, 46% of the students agreed that they would recycle even though the task was dirty, with 8% strongly agreeing and 38% agreeing, while 42% of the students were unsure. However, 12% of the students did not agree to recycle due to the task often involving working with materials that are dirty. This is shown in Figure 4(b). In conclusion, most of the students did not agree that items that could be recycled were dirty. This is because they believed that if an item that could be recycled was separated before disposal, there would then be no problems in terms of cleanliness. Most of the students were willing to recycle even though the waste was likely to be in a dirty condition.

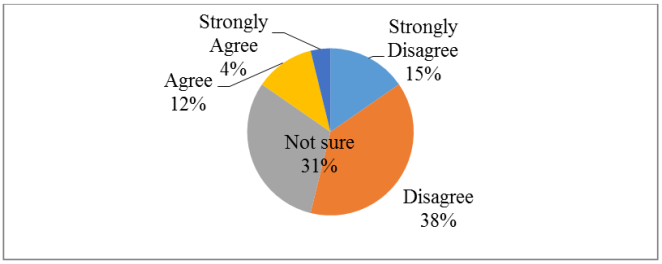

Figure 4(a). The perception of students towards the actual condition of recycling seen as a dirty task.

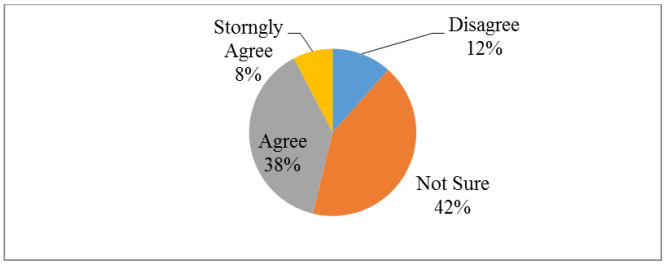

Figure 4(b). Percentage of students who were willing to practise recycling even though it was perceived as a dirty task.

Students' Perception on Individual Recycling Rate

The recycling rate in Malaysia is 10.5%, which is still low considering the target is 22% by the year 2020. In order to achieve the target, various efforts are being pursued by the Malaysian government. Among the implementations are improvement to recycling facilities and enhancing awareness campaigns. Some studies show that an individual is more likely to recycle if he or she thinks recycling is morally correct behaviour (Beck & Ajzen, 1991; Conner & Armitage, 1998; Chu & Chiu, 2003). Therefore, the objective of the next section of the questionnaire was to show what the students' perception towards recycling was if recycling was seen to be morally correct behaviour.

In the fourth part of the questionnaire, the students were asked if they knew the recycling rate per day of the average Malaysian. Figure 5(a) shows that 50% of the students agreed (31%) and strongly agreed (19%) with the statement that the recycling rate per day for the average Malaysian was very low, while 16% of the students disagreed (8%) and strongly disagreed (8%) with the statement. However, 34% of the students were unsure. The students were also asked if they knew the recycling rate per individual at UKM. Figure 5(b) shows that 57% of the students were unsure about whether the recycling rate in UKM was low, while 35% of the students agreed (27%) and strongly agreed (8%) with this statement, while 8% did not agree. Finally, Figure 5(c) shows that 46% of the students could estimate their own recycling rate in a day, while 27% of the students were unsure and another 27% of the students did not know their own recycling rate.

By analysing the results shown in Figure 5(a), Figure 5(b) and Figure 5(c), it can be concluded that most of the students were aware that the recycling rate of the average Malaysian was considered low, and the trend was the same among UKM students. Further, they also thought that their own recycling rate was low. This could be due to the fact that the students themselves realised that they did not play their part in recycling. There were some conflicting attitudes demonstrated by the students themselves in that they failed to practise recycling even though they were informed of the availability of the recycling facilities at the university. Therefore, further action is needed to change the mentality of the students as part of the effort to increase the recycling rate in Malaysia.

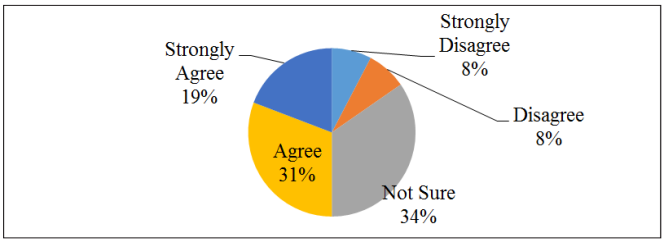

Figure 5(a). Response to the statement that the recycling rate of the average Malaysia was very low.

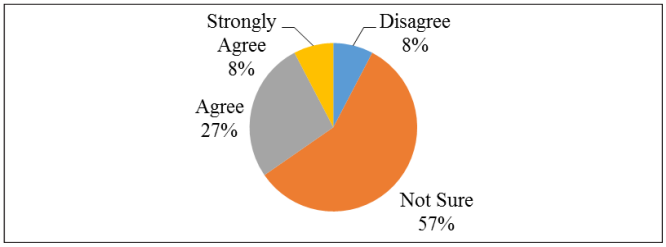

Figure 5(b). Response to the statement that the recycling rate at UKM was very low.

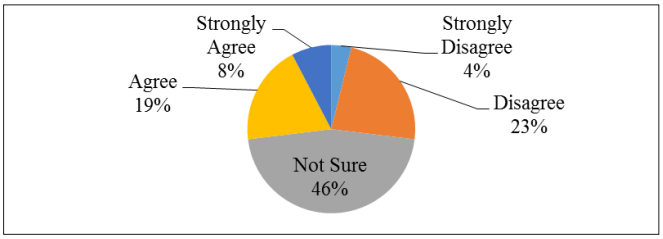

Figure 5(c). Response to the statement that the students' individual recycling rate was low.

Students' Perception on Issues Affecting Solid-Waste Management

Figure 6(a) shows that 62% of the students disagreed (31%) and strongly disagreed (31%) with the statement that Malaysia was a clean country and had no problems regarding solid-waste management, while 34% of the students were unsure and 4% agreed with the statement. During the environmental awareness programme held at the department, the students were exposed to solid-waste management issues in Malaysia. Figure 6(b) shows that 73% of students agreed and strongly agreed that Malaysia faces issues on solid-waste management, while 23% of the students were unsure and 4% did not agree with the statement.

The results shown in Figure 6(a) and Figure 6(b) indicate that the students became aware of the issues on solid-waste management in Malaysia as a result of the awareness programme. Therefore, awareness programmes should be continuously organised by the university in order to educate students on becoming responsible citizens who will conserve the environment.

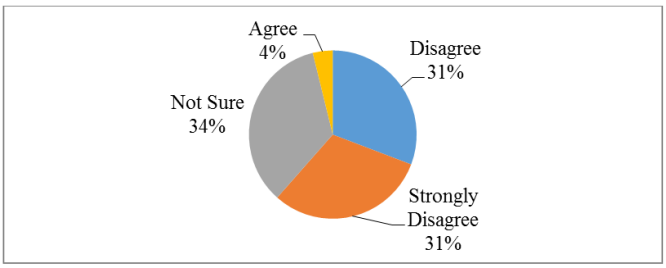

Figure 6(a). Perception of students that Malaysia is a clean country and there is no issue regarding solid-waste management.

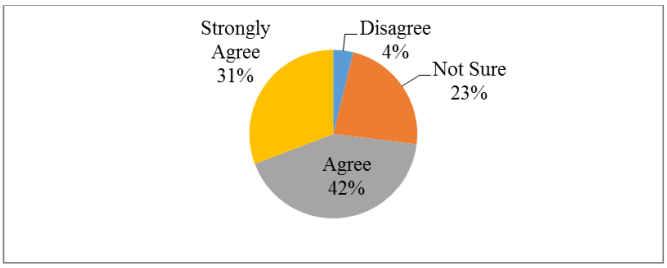

Figure 6(b). Perception of students that Malaysia is facing a critical solid-waste management issue.

Students' Perception of Individual Responsibility to Recycle

Conserving the environment is the responsibility of each individual. This responsibility is not assigned to the local authorities or the Department of Environment. Knowledge about the technical aspects of recycling e.g. which materials belong in which bin, has been found to increase individuals' motivation to recycle (De Young, 1989; Hornik et al., 1995; Schultz et al., 1995; Oskamp et al., 1998). Therefore, individuals need to be made aware that it is their responsibility to take care of and protect the environment from being polluted. It is also important for every individual to conserve the environment for future generations.

Figure 7(a) shows that the majority of the students (84%) disagreed (46%) and strongly disagreed (38%) with the statement that environmental responsibility was the duty of the local authorities, while 12% were unsure and 4% agreed with this statement.

The environmental awareness programme held at the department was intended to create understanding among students of the importance of conserving the environment. This study was also conducted to identify the effectiveness of this programme in increasing the level of awareness of the need for environmental conservation. Figure 7(b) shows that 92% of the students agreed (58%) and strongly agreed (34%) that protecting the environment was very important, while

8% of the students were unsure. The programme also aimed to raise awareness of the need for improving understanding among the students of the responsibility of each individual to protect the environment from being polluted. Taking into consideration the percentage of students who answered 'agree' (58%) and 'strongly agree' (38%) as shown in Figure 7(c), it can be concluded that this programme had succeeded in alerting the participants about their responsibility to care for the environment.

The duty to conserve the environment is not just the responsibility of the local authorities, but in fact also that of every individual. Therefore, the local authorities should work hand in hand together with each community to ensure that the environment is being protected.

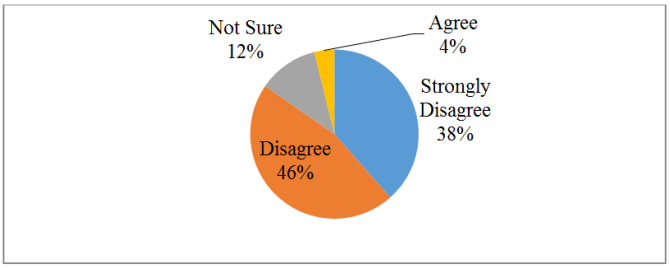

Figure 7(a). Perception of students that environmental conservation is the responsibility of local authorities only.

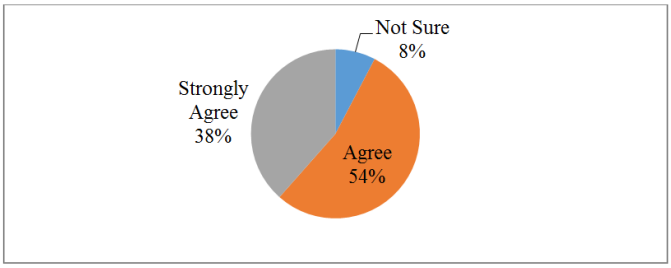

Figure 7(b). Perception of students of the importance of protecting the environment.

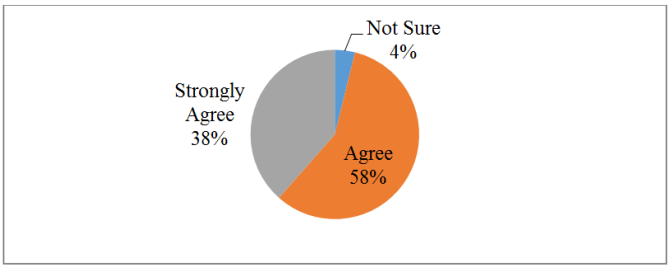

Figure 7(c). Percentage of students who were aware of their responsibility to conserve the environment.

CONCLUSION

Based on all the results obtained as shown in the figures above, it can be concluded that most of the students had knowledge of the existence of the recycling centre on campus and understood its actual functional use. In the students' perception, recycling was important with respect to solid-waste management, environmental conservation and religion. Most of the students were willing to recycle even though the waste could be dirty. However, there were some conflicting attitudes among the students as not all practised recycling even though they were informed of the availability of the on-campus recycling facilities. Therefore, further action is needed to change the mentality of the students as part of the effort to increase the recycling rate in Malaysia. Awareness programmes should be continuously organised at the university in order to educate students on becoming responsible citizens who will conserve the environment in the future. Awareness programmes such as the MAMA programme are useful in increasing awareness of the need for recycling because it combines spiritual value and environmental value. Such programmes can be developed into modules for future use. To improve recycling practices, it is important that this study be monitored over a period of years. In this case, the best target group is first-year students of any field to enable monitoring of the results and to allow for the research methodology to be improved over time. Finally, the local authorities should work hand in hand with each community to ensure that the environment is being protected.

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REFERENCES

Alias, A. Y. (2010, January 27). Amal kitar semula. *Utusan Malaysia*. Retrieved from www.utusan.com.my

Ali, A. O. (2008). Attitude of Malaysian on recycling of municipal solid waste: case studies in the major towns of the east coast and north Malaysia. *Doctor of Philosophy (PhD.)* PhD (Doctoral dissertation, Thesis, Universiti Sains Malaysia, Penang).

Beck, L., & Ajzen, I. (1991). Predicting dishonest actions using the theory of planned behavior. *Journal of Research in Personality*, *25*(3), 285–301.

Burca, D. D., Dodd, V. A., Dennison, G. J., Cullinan, N., & Madden, N. (1994). Assessing the role of kerbside recycling in municipal waste management in the Dublin Region. In *Proceedings of the 10th International Conference on Solid Waste Management.* Philadelphia: USA.

Christakis, N. A., & Fowler, J. H. (2009). *Connected: The amazing power of social networks and how they shape our lives.* New York, Boston, London: Little, Brown & Company.

Chu, P. Y., & Chiu, J. F. (2003). Factors influencing household waste recycling behavior: Test of an integrated model 1. *Journal of Applied Social Psychology*, *33*(3), 604–626.

Conner, M., & Armitage, C. J. (1998). Extending the theory of planned behavior: A review and avenues for further research. *Journal of Applied Social Psychology*, *28*(15), 1429–1464.

Dahle, M., & Neumayer, E. (2001). Overcoming barriers to campus greening: A survey among higher educational institutions in London, UK. *International Journal of Sustainability in Higher Education, 2*(2), 139–160.

De Young, R. (1989). Exploring the difference between recyclers and non-recyclers: The role of information. *Journal of Environmental Systems, 18*(4), 341–351.

Derksen, L., & Gartrell, J. (1993). The social context of recycling. *American Sociological Review*, *58*(3), 434–442.

Domina, T., & Koch, K. (2002). Convenience and frequency of recycling: Implications for including textiles in curbside recycling programs. *Environment and Behavior*, *34*(2), 216–238.

Gebril, A. O., Omran, A., Pakir, A. H. K., & Aziz, H. A. (2010). Municipal solid waste management in Benghazi (Libya): Current practices and challenges. *Environmental Engineering and Management Journal*. *9(*9), 1289–1296.

Gruder-Adams, S. (1990, April). Recycling in multi-family units. *BioCycle*, 36–37.

Hassan, M. N., Chong, T. L., Rahman, M., Salleh, M. N., Zakaria, Z., & Awang, M. (2001, October). Solid waste management in Southeast Asian countries with special attention to Malaysia. In *Proceedings Sardinia, 8th International Waste Management and Landfill Symposium, Italy* (pp. 1-5).

Hornik, J., Cherian, J., Madansky, M., & Narayana, C. (1995). Determinants of recycling behavior: A synthesis of research results. *The Journal of Socio-Economics, 24*(1)*,* 105–127.

Ismail, H. (2014, February 14). Kitar semula hanya 10.5 peratus. *Utusan Malaysia*. Retrieved from www.utusan.com.my

Jabatan Pengurusan Sisa Pepejal Negara. (2012). *Lab Pengurusan Sisa Pepejal.* Retrieved from http://jpspn.kpkt.gov.my/resources/index/user-1/Sumber-Rujukan/kajian/lab-sisa-pepejal.

Kelly, T. C., Mason, I. G., Leiss, M. W., & Ganesh, S. (2006). University community response to on-campus resource recycling. *Resources, Conservation and Recycling, 47*(1)*,* 42–55.

McCarty, J. A., & Shrum, L. J. (1994). The recycling of solid wastes: Personal values, value orientations, and attitudes about recycling as antecedents of recycling behavior. *Journal of Business Research, 30*(1)*,* 53–62.

Mongkolnchaiarunya, J. (2005). Promoting a community-based solid-waste management initiative in local government: Yala Municipality, Thailand. *Habitat International Journal*. *29*(1), 27–40.

Oskamp, S., Burkhardt, R. L., Schultz, P. W., Hurin, S., & Zelezny, L. (1998). Predicting three dimensions of residential curbside recycling: An observational study. *The Journal of Environmental Education, 29*(2), 37–42.

Sakawi, Z. (2011). Municipal solid-waste management in Malaysia: Solution for sustainable waste management. *Journal of Applied Sciences in Environmental Sanitation*, *6*(1), 29–38.

Schultz, P., Oskamp, S., & Mainieri, T. (1995). Who recycles and when? A review of personal and situational factors. *Journal of environmental psychology, 15*(2), 105–121.

Troschinetz, A. M., & Michelcic, J. R. (2009). Sustainable recycling of municipal solid waste in developing countries. *Waste Management*, *29*(2), 915–923.

Wang, F. S., Richardson, A. J., & Roddick, F. A. (1997). Relationships between set-out rate, participation rate and set-out quantity in recycling program. *Journal of Resources, Conservation and Recycling*, *20*(1), 1–17.