

INTEGRATION OF ENVIRONMENTAL PRACTICES AND AWARENESS IN PROMOTING SUSTAINABLE SOLID WASTE MANAGEMENT PRACTICES AMONG PUBLIC ELEMENTARY SCHOOLS

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ABSTRACT

The purpose of this study was to find the relationship between environmental practices and awareness in promoting sustainable solid waste management practices among public elementary school teachers at Sto. Tomas North District for the school year 2021-2022. The study employed descriptive research design. In one instance, descriptive-correlational design was used to describe and understand the variables under study. The researcher opted to use descriptive survey method to determine if the environmental knowledge and awareness is significantly related to solid waste management practices of the teachers. A survey questionnaire was used as the main tool in collecting data for the study. Weighted mean and standard deviation were utilized to assess the solid waste management practices of teachers. To test significant relationship between variables of the study, Pearson Product-Moment Correlation Coefficient was used. Findings revealed that there is a very strong association or correlation between these variables. Therefore, the findings may mean that the null hypothesis is accepted and affirmed that there is a significant relationship between Environmental Practices and Awareness and Solid Waste Management Practices of Public Elementary Teachers. However, integration of these knowledge still has constraints.

Keywords: Solid Waste Management; Environmental Knowledge; Environmental Awareness; Solid Waste Management Practices

I. INTRODUCTION

In today's day and age, environmental awareness is critical. There are far too many people who either refuse to believe in global warming or climate change or are simply too ignorant to understand what it entails. The aggressive pursuit of economic growth by developing countries such as the Philippines has resulted in the production, distribution, and use of products, as well as the generation of waste, all of which contribute to environmental degradation and global climate change. This situation has resulted in both environmental and health issues because of the inability of both local and national governments to implement proper waste management, owing to a lack of financial, human, and technical resources.

Solid Waste Management has become more important in the Philippines, a developing country with a rapidly growing population. In the year of 2001, the Philippine government enacted "Republic Act 9003" (RA 9003), also known as the "Ecological Solid Waste Management Act (ESWMA) of 2000". The Act declared the aim of the country to adopt a systematic, comprehensive, and ecologically compatible SWM program to ensure the protection of public health and the environment (Republic of the Philippines, RA 9003, Chapter I, Article 1, Section 2, 2001).

However, becoming aware of the problems that our world is facing and then doing nothing is worse than what has been happening. To truly incorporate environmental awareness into our lives, we must change our lifestyles and we can begin with the integration of environmental concerns in teaching the students. This can be accomplished by doing small things such as purchasing green products, cleaning supplies, and reusable bags, or by doing anything that results in less plastic and chemicals ending up in landfills and polluting our land, water, and air.

2. Literature Review

2.1 Environmental Practices

Environmental education is a branch of education that emerges when environmental distortions caused by humanity's efforts to dominate nature can only be corrected by further human efforts (Ergin, 2019). This is the process of clarifying thoughts and values in order to develop attitudes and skills necessary for people to understand the relationship between culture and the bio-physical environment. Environmental education focuses on environmental and social issues and is thought to be essential if the community wishes to instill in future citizens a sense of environmental responsibility, environmental ethics, and ecological awareness.

2.2 Environmental Awareness

Teachers have the most influence in educating children and adolescents to become future environmental leaders (Esa, 2010). Knowledge and skills in selecting teaching methods and teaching aids have a significant impact on learning quality. Furthermore, teacher actions

and attitudes toward the environment will be critical because they will be role models for their students in the future, and student behavior is influenced by teacher behavior (Ukar and Campolat, 2019).

2.3 Solid Waste Management

Gequinto (2016) determined the extent of solid waste management practices among college students from various state universities and colleges in CALABARZON. Waste collection received the highest composite mean, particularly on the promotion of the 3Rs (reduce, reuse, recycle), while waste recycling and waste treatment received the lowest composite mean.

Meanwhile, solid waste management studies in primary education are limited and receive little attention. As a result, senior high school students were used in this study. Senior high school curriculum is being integrated into basic education for the first time since R.A. No. 10533, also known as the Enhanced Basic Education Act of 2013, was passed. The researcher would like to determine the level of solid waste management awareness among senior high school students, the sources of their awareness, and their solid waste management practices because the students spend 12 years in basic education with the integration of environmental awareness and education in their curricula.

2.5 Conceptual Framework

This study is anchored on social learning theory. The basis of social learning theory is simple. People learn by watching other people. People can learn from anyone—teachers, parents, siblings, peers, co-workers, YouTube influencers, athletes, and even celebrities. People observe their behavior, and we mimic that behavior. In short, we do what they do. This theory is also known as social cognitive theory.

Independent Variables

1. Environmental Knowledge
 - 1.1 Collection Practices
 - 1.2 Disposal Practices
 - 1.3 Recovery and Processing Practices
2. Environmental Awareness
 - 2.1 School intervention
 - 2.2 Roles and Responsibilities

Dependent Variables

- Solid Waste Management Practices
- i. Segregation of solid Waste
 - ii. Reducing of solid waste
 - iii. Reuse of solid waste
 - iv. Recycle of solid waste
 - v. Disposal of solid waste

Figure 1. The Research Paradigm showing the Relationship of Independent Variables and Dependent Variables

3. Hypotheses

This study posited the following hypotheses:

1. There is no significant relationship between environmental knowledge and solid waste management practices of public elementary teachers.
2. There is no significant relationship between environmental awareness and solid waste management practices of public elementary teachers.

4. Methodology

The researcher used the descriptive-quantitative approach utilizing the Solid Waste Management Practices and Environmental Awareness Questionnaire. Respondents were gathered through total enumeration. Respondents of the study were from Sto. Tomas North District, Division of Batangas with 10 elementary schools. Elementary school teachers served the purpose of the study. Random sampling technique was used to observe the population efficiently and carefully. The study used the researcher-made questionnaire developed by the researchers, patterned from books and existing studies on Solid Waste Management. Part 1 has a total of 20 statements focusing on Environmental Practices. More so, part 2 has a total of 14 items that focuses on Environmental Awareness among respondents. Lastly, part 3 has a total of 35 items that deal with the Solid Waste Management Practices of the respondents. Pilot testing was carried out with non-participating elementary teachers to determine its reliability and validity. The researcher used Cronbach alpha. Permission to conduct the study was sought from the office of the District Supervisor and to the principal/school head. Upon the approval of the letter of request, the researcher employed a survey questionnaire thru google form dealing with the respondents existing knowledge and practices in solid waste management. After four weeks of fielding the instrument, the data were collected. The response was recorded, tallied, and summarized. The data gathered were treated and analyzed using the appropriate statistical tool. A number of statistical tools were used to analyze and interpret the data gathered in the study. The weighted scores on the different variables were tallied, and tabulated. Simple descriptive statistics like frequency distribution, percent count, standard deviation, and mean scores were utilized to describe the perception of the respondents on the variables of the study. To determine the integration of solid waste management in promoting environmental knowledge and awareness. Pearson Product - Moment Correlation Coefficient was utilized.

5. Result

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5.1 Testing of Hypotheses

Table 1. Test of Significant Relationship between Environmental Practices and Solid Waste Management Practices

Environmental Practices	Solid Waste Management Practices					Overall SWMP
	Segregation	Reducing	Reuse	Recycle	Disposal	
Collection Practices	.390**	.359**	.297**	.310**	.393**	.408**
Disposal Practices	.619**	.646**	.462**	.511**	.649**	.672**
Recovery and Processing Practice	.714**	.564**	.625**	.587**	.704**	.745**
Overall Environmental Knowledge	.678**	.620**	.543**	.554**	.688**	.719**

** . Correlation is significant at the 0.01 level (2-tailed). * . Correlation is significant at the 0.05 level (2-tailed).

Verbal Interpretation of r-values: ± 1.0 Perfect positive +/- association ± 0.8 to ± 1.0 Very strong +/- association ± 0.6 to ± 0.8 Strong +/- association ± 0.4 to ± 0.6 Moderate +/- association ± 0.2 to ± 0.4 Weak +/- association 0.0 to ± 0.2 Very weak +/- or no association

The table shows the result of the test of correlation among the variables of environmental knowledge (IV) and solid waste management practices (DV). The r-values are verbally interpreted ranging from the very weak/no association value of 0 to ± 0.2 to very strong +/- association (± 1.0). They are being tested at $p < .05$ significant level. Findings revealed that there is a very strong association or correlation between the two variables. Therefore, the findings may mean that the null hypothesis is accepted and affirmed that there is a significant relationship between Environmental Knowledge and Solid Waste Management Practices of Public Elementary Teachers. It is worthwhile noting that as part of the solid waste management practices, segregation is significantly related to disposal and recovery and processing practices. Comparatively, they both feature the proper disposal of solid waste in designated trash bins like separating biodegradable from non-biodegradable, dry and wet waste, left overs, household waste, non-harmful from toxic waste which should be disposed in marked high density garbage, and of course highlighting the practice of using 5S (Sort, Set in Order, Shine, Standardized and Sustain) as well as 3R (Reuse, Reduce, Recycle). Hence, the results obtained same interpretation as **highly practiced**. Furthermore, reducing, reusing and recycling of solid waste management are obviously related to the recovery and processing practices and disposal practices under environmental knowledge. Converting waste into reusable container, food waste into animal feed and old items into new products are all under the recovery and processing practices. Evidently, they all gained same verbal interpretation as **highly practiced**.

Table 2. Test of Significant Relationship between Environmental Awareness and Solid Waste Management Practices

Environmental Awareness	Solid Waste Management Practices					Overall SWMP
	Segregation	Reducing	Reuse	Recycle	Disposal	
School Intervention	.704**	.587**	.552**	.563**	.584**	.696**
Roles and Responsibilities	.825**	.610**	.603**	.569**	.610**	.747**
Overall Environmental Awareness	.790**	.619**	.597**	.585**	.617**	.746**

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

The table shows the result of the test of correlation among the variables of environmental awareness (IV) and solid waste management practices (DV). The r-values are verbally interpreted ranging from the very weak/no association value of 0 to ± 0.2 to very strong +/- association (± 1.0). They are being tested at $p < .05$ significant level. These findings confirmed that there is a very strong association or correlation between the two variables. Therefore, the results may mean that the null hypothesis is accepted and affirmed that there is a significant relationship between Environmental Awareness and Solid Waste Management Practices of Public Elementary Teachers. Since the survey under the environmental awareness of public elementary teachers resulted in **highly practiced**, it comes as no surprise that teacher-respondents are familiar with the school interventions as well as the roles and responsibilities of solid waste management practices. It is encouraging to note that the teacher-respondents are fully aware of the solid waste management program and policies where they are currently working.

This study attempted to identify the relationship between the teachers existing solid waste management practices and their environmental practices and awareness. Findings revealed that there is a very strong association between two variables. Therefore the findings may mean that the null hypotheses is accepted and affirmed that there is a significant relationship between Environmental Practices and Awareness and Solid Waste Management Practices.

7. Conclusion

Based on the findings and results of the study, the following conclusion are established:

1. There is a significant relationship between the environmental practices and solid waste management practices of the teachers. Thus, the null hypothesis is not sustained.
2. There is a significant relationship between the environmental awareness and solid waste management practices of the teachers. Thus, the null hypothesis is not sustained.

8. Recommendation

In the light of these findings, and conclusions, the following are recommended:

1. It is recommended that implementation of waste disposal, collection and proper segregation of Waste may strictly be implemented and monitored in all school to design appropriate training for teachers in various fields to realize effective education. In designing projects and programs for School-based Solid Waste Management, the stakeholders and building of positive attitudes and awareness leading to proper practice of Solid Waste Management must be highly considered to make a lasting and sustainable program.
2. Continuous education to raise awareness, clarify values and develop proper attitude be done once a problem to address gradual shift of students' motivation from winning in contest to development of proper attitude and behavior so as to keep the Solid Waste Management Program running efficiently and sustainably on the right.
3. When the students have fully developed a culture that values cleanliness, the Solid Waste Management projects will be implemented in areas where segregation is considered normal practice. Teachers may use teaching strategies that include meaningful community service. The Solid Waste Management projects will utilize teaching and learning strategies that integrates meaningful community service with instruction and reflection to enrich the learning experience, teach civic responsibility, and strengthen communities.
4. The school may create policies that will lead to the decrease of residual wastes because this type of waste is now the biggest occupants of trash bins in the school. To ensure a more sustainable Solid Waste Management program, the school must break down existing patterns of behavior on waste generation and reinforce the right attitude, that is, the pupils in the long run cease from consuming food products packed in residual materials. Development of knowledge, skills and attitude and solid waste management can be integrated in the daily lesson in schools starting from 1st Grade.

9. REFERENCES**A. Online Journal**

- Abe, N. and Didham, R. (2007) *Measuring Public Awareness and Actions for 3Rs*. *Warmer Bulletin*, 112, 8-10.
- Abu Qdais, H. (2007). *Techno-economic assessment of municipal solid waste management in Jordan*. *Waste Management*, 27(11), 1666-1672. <https://doi.org/10.1016/j.wasman.2006.08.004>
- Al Seadi, T., Owen, N., Hellstrom, H. and Kang, H. (2013) *Source Separation of MSW*. IEA Bioenergy, London, UK.
- Amasuomo, E., Omagbemi, J. and Syed, A. (2015) *Analysis of Public Participation in Sustainable Waste Management Practice in Abuja, Nigeria*. <https://doi.org/10.5296/emsd.v4i1.7269>
- Arokiaraj, David1, Yamuna, Devi Thangavel2 & Ramanarayan, Sankriti. (April 08, 2019). *Recover, Recycle And Reuse: An Efficient Way To Reduce The Waste*.
- Arora and Agarwal (2011). *Knowledge, attitude and practices regarding waste management in selected hostel students of University of Rajasthan*. *International, Journal of Chemical, Environmental and Pharmaceutical Research* Vol. 2, No.1, 40-43.
- Bisson, Jerry, Guiang, Ernesto S., Walpole Peter and Tolentino, Dionisio Jr., *Better Governance Critical to Reversing Forest Degradation in SouthEast Asia*. http://www.fao.org/DOCREP/ARTICLE/WFC/XII/0837-A4.HTM#P24_2299

- Chukwunonye, E. and Clive, R. (2012) Analysis of Barriers and Success Factors Affecting the Adoption of Sustainable Management of MSW in Nigeria. *Journal of Environmental Management*, 103, 9-14. <https://doi.org/10.1016/j.jenvman.2012.02.027>
- Coad, A., (2005). Private sector involvement in solid waste management. Deutsche Gesellschaft fur, Technische Zusammenarbeit (GTZ), Deutschland. <http://www2.gtz.de/dokumente/bib/05-0412.pdf>.
- Cruz R.V.O., Aliño P.M., Cabrera O.C., David C.P.C., David L.T., Lansigan F.P., Lasco R.D., Licuanan W.R.Y., Lorenzo F.M., Mamauag S.S., et al. 2017 Philippine Climate Change Assessment: Impacts, Vulnerabilities and Adaptation. The Oscar M. Lopez Center for Climate Change Adaptation and Disaster Risk Management Foundation, Inc. and Climate Change Commission; Quezon City, Philippines: 2017. ISSN 2508-089X
- Central Informatics Organisation (CIO) (2017) http://www.cio.gov.bh/cio_eng/default.aspx
- Cruz R.V., Harasawa H., Lal M., Wu S., Anokhin Y., Punsalma B., Honda Y., Jafari M., Li C., Huu Ninh N. Asia. In: Parry M.L., Canziani O.F., Palutikof J.P., van der Linden P.J., Hanson C.E., editors. *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Cambridge University Press; Cambridge, UK: 2007. pp. 469–506. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change
- David C.P., Racoma B.A., Gonzales J., Clutario M.V. A manifestation of climate change? A look at Typhoon Yolanda in relation to the historical tropical cyclone archive. *Sci. Diliman*. 2013;25:79–86.
- D. Y. Ergin, "Environmental awareness of teacher candidates," *World J. Educ.*, vol. 9, no. 1, pp. 152–161, 2019.
- Esa, N., Samsuddin, MA, Yakob N. Yunus HM, and Ibrahim MH (2012). Measuring awareness of waste management among school children using Rasch model S analysis, *World Academy of Science, Engineering and Technology*.
- Fletcher, A. 2003. *Meaningful student involvement: Guide to inclusive school change*, Olympia, Washington. www.info@soundout.org.
- Freduah, G. Problems of solid waste management in Nima, Accra. University of Ghana, Legon. *Research Journal High School Education*. August 11, 2013.
- Gequinto, A. (2017). Solid Waste Management Practices of Select State Universities in CALABARZON, Philippines. *Asia Pacific Journal of Multidisciplinary Research*, 5(1), 1-8. Retrieved from <http://www.apjmr.com/APJMR-2017.5.1.01>
- Han, Z., Duan, Q., Fei, Y., Zeng, D., Shi, G., Li, H. and Hu, M. (2018) Factors that Influence Public Awareness of Domestic Waste Characteristics and Management in Rural Areas. *Integrated Environmental Assessment and Management*, 14, 395-406. <https://doi.org/10.1002/ieam.4033>
- Hasan, S.E. (2004) Public Awareness Is Key to Successful Waste Management. *The Journal of Environmental Science and Health, Part A, Toxic/Hazardous Substances and Environmental Engineering*, 39, 483-492. <https://doi.org/10.1081/ESE-120027539>
- Jeffer, T. and Smith, M. K.(2005) *Informal education, conversation, democracy and learning*, (3rd ed).Derby: Heretics Press.
- Korai, M.S., Mahar, R.B. and Uqaili, M.A. (2017) The Feasibility of Municipal Solid Waste for Energy Generation and Its Existing Management Practices in Pakistan. *Renewable and Sustainable Energy Reviews*, 72, 338-353. <https://doi.org/10.1016/j.rser.2017.01.051>
- Li, Y., Gao, X. and, Wu, D. Promoting source separation – a pilot project for rural Chinese communities, Edmonton Waste Management Center for Excellence, Conference Papers 2011.
- Licy, C.D., Vivek, R., Saritha, K., Anies, T.K., Josphina, C.T. 2013. Awareness, Attitude, and Practice of School Students towards Household Waste Management. *Journal of Environment* 2: 147-150.
- Love T (2002) Constructing a coherent cross-disciplinary body of theory about designing and designs: some philosophical issues. *Design Studies* 23(3): 345-361
- Matunog, V. and Awa, A. (2013). Solid Waste Generation Rate in Ozamiz City, Philippines. *Journal of Multidisciplinary Studies*, 1(1), 73-92. <https://doi.org/10.7828/jmds.v2i1.396>

- Ocenar, Remigio. (2001). "Policy and Planning Responses to Solid Waste Management (SWM) Problems in 250 municipalities in the Philippines: A Case Study. Ph. D. thesis. School of urban and Regional Planning, University of the Philippines, Diliman, Quezon City, Philippines.
- Owens, S. 2000. *Engaging the public: Information and deliberation in environmental policy*. Environment and Planning A
- Paghasian, M. (2017). Awareness and Practices on Solid Waste Management among College Students in Mindanao State University Maigo School of Arts and Trades. *Advances in Social Science, Education and Humanities Research*, 128, 5-12. <https://doi.org/10.2991/icet-17.2017.2>
- Rahman, Fahzy Abdul. (January 2014). *Reduce, Reuse, And Recycle: Alternatives for Waste Management*. Guide G-314
- Republic of the Philippines. 2001. Republic Act 9003. Retrieved March 18, 2015, from The LAWPHIL Project: http://www.lawphil.net/statutes/repacts/ra2001/ra_9003_2001.html
- Reyes, P.B., Furto, M.V. 2013. Greening of the Solid Waste Management in Batangas City. *Journal of Energy Technologies and Policy* 3: 187-194.
- Sabiiti, E. and Katongole, C. Evaluation of the urban solid Waste management system in Kampala, Uganda. Edmonton Waste Management Center for Excellence, Conference Papers 2011.
- Subash, A. (2002), *Community Participation in Solid Waste Management*, office of enviornmental justice.
- Umuhire, M.L. and Fang, Q. (2016) Method and Application of Ocean Environmental Awareness Measurement: Lessons Learnt from University Students of China. *Marine Pollution Bulletin*, 102, 289-294. <https://doi.org/10.1016/j.marpolbul.2015.07.067>
- Villanueva, R. 2011. Enlist schools in ecological waste management, DepEd urged. www.philstar.com downloaded June 26, 2013.
- Vivek, R. et al 2013. Awareness, attitude and practice of school students towards household waste management. *Journal of Environment*. Vol. 02, Issue 06, pp. 147-150. <http://www.scientific-journals.co.uk/web.pdf>.
- Wahid, A. (2015) Importance of Awareness in Solid Waste Management. *Envirocivil*. <https://envirocivil.com/energy/importance-awareness-solid-waste-management/>
- Young, K. (2006). *The art of youth work*, (2nd ed), Lyme Regis: RHP.
- Zagozewski, R., Judd - Henry, I., Nilson, S., and Bharadwaj, L. (2011) Perspectives of past and present waste disposal practices: A community based participatory research project in three Saskatchewan first nations communities. *J. Environmental Health Insights*, 5, pp. 9-20.

B. Online Resources

<http://bagong.pagasa.dost.gov.ph/information/climate-change-in-the-philippines>

<https://www.onenews.ph/phl-facing-garbage-crisis-16-6-million-metric-tons-of-waste-this-year-can-fill-99-philippine-arenas>

[http:// www.goc.ph/aboutphil/general.asp](http://www.goc.ph/aboutphil/general.asp)