Journal of Education and Teacher Training Innovation (JETTI)
Published by Pusmedia Group Indonesia

Journal of Education and Teacher Training Innovation
Volume 2 Issue 2 Year 2025 Pages 164-171
e–ISSN : 3025-3500
DOI: 10.61227
e-mail : jetti.pusmedia@gmail.com
https://journal.pusmedia.com/index.php/JETTI

Video-based Learning for Knowledge and Readiness on Waste Separation at Source (WSAS) Practice among Engineering Students

Sitty Nur Syafa Bakri [1*]

Preparatory Centre for Science and Technology, University Malaysia Sabah (UMS), Jalan UMS, 88400, Kota Kinabalu, Sabah, Malaysia

Correspondence e-mail : syafa@ums.edu.my

Abstract: Video-based learning is a visual storytelling that have proven to be highly effective tools in disseminating information and engaging students. In this study, waste separation at source (WSAS) were demonstrated in a video to explores the effectiveness of video-based learning in promoting knowledge and readiness for WSAS practice among engineering students. The students were exposed to two types of videos: Video 1-Penang and Video 2-Sapporo. After watching both videos, they were given a questionnaire to assess their willingness to practice WSAS and the level of knowledge gained on the subject. The finding indicated that students answered higher percentages (scale 4-5) for knowledge learned through video visualisation. All students agreed to do WSAS with correlation of 0.7 between their knowledge gained and willingness to adopt the practice. For immediate action for waste separation implementation, 85% of the students prefer to adopt Video 1-Penang over Video 2-Sapporo. Therefore, this study suggests that utilisation of video-based learning in educating engineering students has proven to be effective in promoting knowledge and readiness about waste separation at source practice. Based on the results of the study, the implications that can be identified are that video-based learning has proven to be effective as an educational tool to improve students' knowledge and readiness in the practice of waste sorting at source (WSAS).

Keyword : Engineering student, Environmental Education, Waste Segregation, Waste Separation at Source

Article info: Submitted : 2025-02-01 | Accepted : 2025-02-24 | Published : 2025-02-26

How to Cite:

Introduction

Environmental problems have developed into a serious threat to human survival, with impacts increasingly felt in various aspects of life. The climate crisis has triggered a rise in global temperatures, resulting in various extreme natural disasters such as heat waves, floods, and droughts that are increasingly intense and frequent. In facing these challenges, education plays a crucial role as an instrument for behavior change and the formation of environmental awareness (Brauch, 2005; Myers & Patz, 2009; Singh & Singh, 2017). Through an education system that is integrated with sustainability principles, the younger generation can understand the complexity of environmental problems and develop innovative solutions to address them. Effective environmental education not only transfers theoretical knowledge, but also builds the practical skills and values necessary to live a sustainable lifestyle. Educational

programs that focus on ecosystem understanding, resource management, and eco-friendly practices have proven effective in changing people's mindsets and behaviors (Ardoin et al., 2020; Debrah et al., 2021; Kopnina, 2020). At the university level, the integration of sustainability aspects in the engineering and science curriculum has resulted in green technology innovations and sustainable solutions to overcome various environmental problems. Thus, education is key in shaping a generation that not only understands environmental challenges but also has the competence and commitment to create a more sustainable future.

In an era marked by rapid technological advancements and intensified emphasis on environmental sustainability, the role of multimedia tools in education has gained significant attention (Haleem et al., 2022). Among these tools, video-based mediums have emerged as powerful instruments for enhancing student engagement and facilitating knowledge retention (Sablić et al., 2021). The ability of visual storytelling to convey complex information in an accessible format underscores its relevance in contemporary educational practices (Ginting et al., 2024). Particularly in the field of environmental education, the importance of instilling effective waste management practices is paramount (Qu et al., 2023).

Although environmental education plays an important role in creating awareness and understanding of waste issues, practical implementations such as waste separation at source (WSAS) are concrete steps that are no less crucial in effective waste management. WSAS is the practice of separating various types of waste such as organic, plastic, paper, and metal from the source of waste production, such as households, educational institutions, or workplaces.

Waste separation at source (WSAS) is a critical strategy that not only reduces the amount of waste sent to landfills but also promotes recycling and resource recovery (Bakri, 2021). For future engineers who will play an important role in addressing environmental challenges, developing a comprehensive understanding of waste management through WSAS practices is essential. This study positions video-based mediums as effective instrument for fostering both knowledge and readiness to adopt WSAS practices among engineering students. By leveraging the engaging and illustrative nature of videos, crucial concepts can be presented in a manner that resonates more deeply with students related to waste management (Bakri, 2022).

Based on previous research that has been presented, the novelty or novelty of the research "Video-based Learning for Knowledge and Readiness on Waste Separation at Source (WSAS) Practice among Engineering Students" can be identified in several aspects. This study provides a significant update compared to the research of Bernstad (2014) which only focuses on two conventional strategies, namely the use of leaflets and the installation of sorting equipment. While Bernstad's research found that written information is less effective, this study presents innovations by integrating video-based learning that is more interactive and in accordance with the learning characteristics of engineering students in the digital era. This video-based learning approach bridges the limitations of written media found in Bernstad's research, while providing practical visualizations that can improve understanding and readiness for implementation. Compared to Gou's (2022) research which focuses on the analysis of factors influencing urban community waste sorting behavior in general, this study provides novelty by: 1) Developing a learning approach specific to the context of

engineering higher education, which has not been studied before in the context of WSAS; 2) Using video-based learning as a measurable method of intervention, in contrast to general approaches such as publicity and social norms researched by Gou and 3) Focusing on measuring the effectiveness of learning not only in terms of knowledge, but also the readiness of the implementation of WSAS practices, which is a crucial aspect in Engineering education. Thus, this study fills the gap in the literature by presenting technology-based learning methods that are more in line with the learning characteristics of engineering students, as well as providing practical solutions to increase the effectiveness of WSAS education in the higher education environment.

Consequently, this research aims to explore how video-based learning not only informs students about WSAS but also enhances their willingness to incorporate sustainable practices into their professional lives. Through a focus on visual narratives, this study seeks to demonstrate the connection between multimedia technology, enhanced knowledge acquisition, and readiness for implementing environmental stewardship initiatives.

Methodology

A total of 33 Engineering students from Civil, Chemical, Mechanical, Oil and Gas and Electrical and Electronic programs of University Malaysia Sabah (UMS), have participated in this study. Respondents from each program were approached to watch two videos about 'how to do waste separation'. Videos were entitled Video 1-Penang and Video 2- Sapporo. Videos and questionnaires were given to the students through a google form, where students answered the questions immediately after watching the videos. The questionnaire was divided into 5 major sections: demographic data, video attachment, knowledge and readiness, video preferences and awareness. 5-point likert scale (1- strongly disagree, 2- disagree, 3-moderate, 4-agree and 5-strongly agree) were applied. Data collected were then analysed using descriptive analysis. Correlation for knowledge and readiness were also calculated.

Result and Discussion

The findings of this study, as presented in Table 1, reveal students' knowledge, readiness, video preferences, and awareness regarding waste separation, as influenced by the provided video content. Analysis of responses to Likert scale questions (Q1-Q5, Q8, Q12-Q14) indicates a predominance of agreement, with the majority of students selecting higher ratings (4 and 5). This suggests a generally positive perception of both their knowledge and readiness to engage in waste separation practices. In contrast, Q6 showed a notable highest percentage (36.4%) of students selecting a scale 3, indicating uncertainty about their readiness to practice waste separation independently, even after viewing the videos.

Table 1.
Feedback from UMS Engineering Student on the Questionnaire After Watching the Video

No.	Statement	1	2	3	4	5	Mean
1.	I have gained the knowledge from both video	0%	0%	3.0%	33.3%	63.6%	4.60
2.	I have positive attitude towards the waste separation as shown from the video	0%	0%	9.0%	18.2%	72.8%	4.63
3.	The knowledge I have gained from both videos will motivate me to continue learning and applying waste separation practices	0%	0%	15.2%	27.3%	57.6%	4.42
4.	The knowledge that I have gained from both video will inspire me to improve myself by participating in waste separation practices in the future	0%	0%	9.1%	30.3%	60.6%	4.51
5.	Both video able to increase my readiness for waste separation practice	0%	0%	6.1%	36.4%	57.6%	4.51
6.	How would you rate your readiness to practice waste separation WITHOUT those video?	0%	0%	36.4%	27.3%	36.4%	3.63
7.	As for overall, from the knowledge and understanding you've gained from the video, predict which benefitted the most from waste separation at source practice?	Recycle (27.3%), reduce the amount of solid waste generated (3.0%), Prolong the landfills life (3.3%), Reduce solid waste disposal cost (6.1%), all of the answer (63.6%)					
8.	Do you think you that the waste separation at source practice should be exposed in your course?	0%	0%	9.1%	18.2%	72.7%	4.63

9.	Which video show you a comprehensive knowledge to separate waste at source?			Video 1 – Penang (9.0%) Video 2 – Sapporo (27.3%) Equal from both video (63.6%)			2.51
10.	For your situation, which waste separation practice from the video that practical for you to apply immediately?			Video 1 – Penang (84.8%) Video 2 – Sapporo (15.2%)			1.15
11.	Which practice you would like to see being implemented to your area for long term?			Video 1 – Penang (51.5%) Video 2 – Sapporo (42.4%) Both (6.1%)			1.54
12.	Before watching those video, my knowledge about waste separation is	0%	6.1%	12.1%	42.4%	39.4%	4.15
13.	How would you rate your current awareness about waste separation ?	0%	3.0%	21.2%	33.3%	42.4%	4.15
14.	How would you rate your current awareness about 3R practice	0%	18.2%	39.4%	24.2%	18.2%	3.42

Table 2.
Correlation Between Knowledge and Readiness for Waste Separation at Source Practice Among UMS Engineering Students

	Q1. I have gained the knowledge from both video	Q2. I have positive attitude towards the waste separation as shown from the video	Q3. The knowledge I have gained from both videos will motivate me to continue learning and applying waste separation practices	Q4. The knowledge that I have gained from both video will inspire me to improve myself by participating in waste separation practices in the future
Q5. Both video able to increase my readiness for waste separation practice	0.61	0.40	0.73	0.70

The data in Table 2 further illustrates the relationship between knowledge acquisition and students' readiness to implement waste separation practices at the source. The results indicate that exposure to the videos significantly influenced students' motivation (Q3) and inspiration (Q4), thereby enhancing their readiness to engage in waste separation. This finding aligns with a study by Ayob et al., (2017), Liao & Li, (2019) and Zhang et al., (2023), which emphasized the importance of educational initiatives in promoting waste separation among university students and schools. The introduction of videos, as an educational tool, could thus serve as a strategic first step in disseminating environmental knowledge (Cosmo et al., 2024 ; Corvellec & Stål, 2017; Karahan & Roehrig, 2015; Kim et al., 2016). In terms of video content, both Video 1 – Penang and Video 2 – Sapporo provide comprehensive demonstrations of waste segregation, with the latter offering a more detailed categorization of waste (i.e., burnable, non-burnable, and recyclable materials). Despite the more complex nature of the Sapporo video, students displayed a preference for the Penang example, with almost 85% of respondents in Q10 indicating a higher likelihood of implementing the waste separation practices demonstrated in Video 1. This preference could be attributed to the perceived immediacy and simplicity of the practices depicted in the Penang video (Bakri, 2022). Nevertheless, despite the challenges associated with the practical implementation of waste separation, students demonstrated a positive attitude toward environmental stewardship, as reflected in their consistent responses in Q9. These findings underscore the potential of video-based educational tools in fostering environmental awareness and motivating students to adopt sustainable waste management practices.

These findings imply that higher education institutions can adopt video-based learning as an effective strategy in educating students on WSAS practices. In particular, videos that showcased simpler and easier-to-implement waste sorting practices (such as the Penang example) were more preferred by students, indicating the importance of presenting content that is practical and locally relevant.

Conclusion

In conclusion, the findings suggest that video-based education on waste separation can effectively enhance students' knowledge and readiness to practice waste separation at the source. Approximately 63.6% of UMS engineering students reported that they acquired valuable knowledge from the videos, with a positive correlation of 0.70 indicating that the knowledge gained contributed to an increased readiness to engage in waste separation practices. Additionally, around 85% of the students expressed a preference for applying the waste separation practices demonstrated in Video 1 – Penang. These results underscore the potential of video as a compelling educational tool to promote environmental awareness and sustainable waste management practices. Future studies, particularly those conducted on a larger scale, could further explore the impact of such interventions, with the aim of reducing national waste generation and increasing recycling rates, particularly in the state of Sabah.

References

Ardoin, N. M., Bowers, A. W., & Gaillard, E. (2020). Environmental education outcomes for conservation: A systematic review. Biological Conservation, 241, 108224.

Ayob, S. F., Sheau-Ting, L., Abdul Jalil, R., & Chin, H. C. (2017). Key determinants of waste separation intention: empirical application of TPB. Facilities, 35(11/12), 696-708.

Bakri, S.N.S. Knowledge and readiness on waste separation at source among UMS foundation students. In Proceedings of 2nd PPST STEM Seminar 2022 Academia & Beyond, Open Educational Resources UMS (2022), 79-87

Bakri, S.N.S. Waste separation at source: an example from Sapporo City. In Proceedings of PPST STEM Seminar 2021 STEM: Engaging the scientific exploration, Open Educational Resources UMS (2021), 79-87.

Bernstad, A. (2014). Household food waste separation behavior and the importance of convenience. Waste management, 34(7), 1317-1323.

Brauch, H. G. (2005). Threats, challenges, vulnerabilities and risks in environmental and human security. UNU-EHS. http://collections.unu.edu/eserv/UNU:1868/pdf4040.pdf

Corvellec, H., & Stål, H. I. (2017). Evidencing the waste effect of product-service systems (PSSs). Journal of Cleaner Production, 145, 14–24.

Cosmo, C.F.A., Jesus, A.S., Sales, M.M., Luz, M.P. & Mascarenha, M.M.A. (2024). Educational videos on erosion disseminated through social media for soil education. Revista Brasileira de Ciencia do Solo. https:/doi.org/10.36783/18069657rbcs20230166

Debrah, J. K., Vidal, D. G., & Dinis, M. A. P. (2021). Raising awareness on solid waste management through formal education for sustainability: A developing countries evidence review. Recycling, 6(1), 6.

Ginting, D., Woods, R. M., Barella, Y., Limanta, L. S., Madkur, A., & How, H. E. (2024). The Effects of Digital Storytelling on the Retention and Transferability of Student Knowledge. Sage Open, 14(3). https://doi.org/10.1177/21582440241271267

Guo, D., Wang, X., Feng, T., & Han, S. (2022). Factors influencing the waste separation behaviors of urban residents in shaanxi province during the 14th national games of China. International Journal of Environmental Research and Public Health, 19(7), 4191.

Haleem, A., Javaid, M., Qadri, M & Suman, R. (2022). Understanding the role of digital technologies in education: A review. Sustainable Operations and Computers 3, 275-285. https://doi.org/10.1016/j.susoc.2022.05.004.

Karahan, E., & Roehrig, G. (2015). Constructing Media Artifacts in a Social Constructivist Environment to Enhance Students' Environmental Awareness

and Activism. Journal of Science Education and Technology, 24(1), 103–118. https://doi.org/10.1007/s10956-014-9525-5

Kim, Y., Huang, J., & Emery, S. (2016). Garbage in, garbage out: Data collection, quality assessment and reporting standards for social media data use in health research, infodemiology and digital disease detection. Journal of Medical Internet Research, 18(2), e41.

Kopnina, H. (2020). Education for the future? Critical evaluation of education for sustainable development goals. The Journal of Environmental Education, 51(4), 280–291. https://doi.org/10.1080/00958964.2019.1710444

Liao, C., & Li, H. (2019). Environmental education, knowledge, and high school students' intention toward separation of solid waste on campus. International Journal of Environmental Research and Public Health, 16(9), 1659.

Myers, S. S., & Patz, J. A. (2009). Emerging Threats to Human Health from Global Environmental Change. Annual Review of Environment and Resources, 34(1), 223–252. https://doi.org/10.1146/annurev.environ.033108.102650

Qu, D., Shevchenko, T., Shams Esfandabadi, Z., & Ranjbari, M. (2023). College Students' Attitude towards Waste Separation and Recovery on Campus. Sustainability, 15(2), 1620. https://doi.org/10.3390/su15021620

Sablić, M., Mirosavljević, A. & Škugor, A. (2021). Video-Based Learning (VBL)—Past, Present and Future: an Overview of the Research Published from 2008 to 2019. Tech Know Learn 26, 1061–1077. https://doi.org/10.1007/s10758-020-09455-5

Singh, R. L., & Singh, P. K. (2017). Global Environmental Problems. In R. L. Singh (Ed.), Principles and Applications of Environmental Biotechnology for a Sustainable Future (pp. 13–41). Springer Singapore. https://doi.org/10.1007/978-981-10-1866-4_2

Zhang, D., Chen, J., Liu, L., Hao, M., & Morse, S. (2023). The waste separation behaviour of primary and middle school students and its influencing factors: Evidence from Yingtan City, China. Environmental Research Communications, 5(4), 045002.