Journal of Biology Education

Effectiveness of Zero Waste Learning to Attitude and Commitment Zero Waste Lifestyle of Students Level 4th SMK Raja Permaisuri Bainun Malaysia as an Effort to Maintain Ecosystem

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Article Info	Abstract
	The problem of plastic waste in the world is worsening until there is a leakage of plastic waste into the oceans that is adversely affecting ecosystems around the world. Zero Waste learning in students is one of the efforts that can help reduce plastic waste. The purpose of this study is to analyze the effectiveness of zero waste learning towards the attitude and commitment of zero waste lifestyle (ZWL) for students' level 4th SMK Raja Permaisuri Bainun Malaysia. This research is quantitative research with Pre-experimental methods and research patterns by providing initial questionnaires to be filled out before being treated and filling out the final questionnaire after treatment. The population in this study was SMKRPB students with a sample of SMKRPB level 4th students. Learning zero waste as an independent variable and its dependent variables is the attitude and commitment of the implementation of zero waste lifestyle of students in an effort to maintain the ecosystem. The initial data was taken before the study and the final data was taken after the study was collected with observation methods, questionnaires, and documentation analyzed and tested validity, normality, paired sample t-test and N-gain with SPSS version of 25. The results showed that ZWL profile of students before lifestyle learning was implemented had moderate criteria for both aspects namely 41% for attitude aspect and 54% commitment, while the final profile after implementation of Zero Waste learning has very high criteria for both aspects which is 83% for attitude aspect and 89% commitment. T calculated value for attitude aspect 30,938, commitment aspect 8,819 so it is proven that there is a learning influence of Zero Waste in improving the attitude and commitment of Zero Waste Lifestyle students. the average N-gain score for the attitude aspect is 0.67, and the average value of the N-gain commitment aspect score of 0.69 belongs to the moderate category. Zero Waste learning effectively improves students' attitudes and commitments. Zero Waste learning can be done not only at level 4th because Zero Waste learning is effective in the classroom.

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INTRODUCTION

Marine ecosystems ranging from coastal areas to the deep sea have increased pollution, increased habitat destruction, and continued loss of marine biodiversity resources to this day. The cause of the damage to the ecosystem is due to pollution and over exploitation in the sea and is more dominated by oil pollution, and garbage.[1] Deforestation in coastal areas, decreased water quality, overexploitation and pollution, also fatally impacting marine ecosystems.[2] The amount of plastic waste that pollutes land and oceans is adversely affecting animals that belong to ecosystems around the world. Some cases include the carcass of a Sperm Whale (*Physeter macrocephalus*) found by katopa islanders in Wakatobi on November 18, 2018 with 5.9 kilograms of plastic waste in his stomach, a Penguin (*Eudyptula minor*) was found dead on Troubridge Island, Australia with plastic stuck around his neck, a bird carcass (*Laysan albatross*) with a stomach full of plastic waste on Midway Island, as many as 97.5% of baby Albatross had eaten plastic waste , the Female turtle (*Chelonia mydas*) died with a lot of plastic waste in her throat, and fishing wire in her stomach.[3] In Malaysia itself, there was a similar case, the Sabah Department of Fisheries published the discovery of a Whale Shark (*Rhincodon typus*) found dead on Tanjung Aru Beach, Sabah, Malaysia with a large plastic bag in its stomach.[4]

Currently recorded plastic waste weight in the world's oceans reaches 150 million tons and is likely to increase by another 250 million tons if the trend of urbanization, production and consumption continues. The report from World Economic states that there will be more plastic than fish (by weight) unless there are effective post-use pathways for plastics, drastic reduction of plastic leakage to natural systems, especially the oceans and a cessation of plastic use.[2] Recycling efforts have not been made to reduce the leakage of plastic waste into the oceans, as only 20% of plastics have the value of harvesting for recycling. Seeing recycling efforts as not enough to help reduce plastic waste leakage, Zero Waste Lifestyle is rated as one of the efforts that can help reduce plastic waste. Zero Waste Lifestyle is a lifestyle that adheres to a philosophy about avoiding littering as much as possible.[5] One of the educations about Zero Waste Lifestyle can be done to the next generation such as children and adolescents, including students. Education about the Zero Waste Lifestyle lifestyle can be done at the local level, because although plastic waste pollution is a global challenge, the solution requires action at the local level, since most of the waste wasted into the sea comes from local household waste in daily life.

It is written in the Integrated Curriculum for Secondary School that education in Malaysia must have scientific attitudes and noble values in every material taught and education in Malaysia, especially in secondary schools has material with the theme of investigating the relationship of life with the environment with the field of ecosystem learning threatened in the subjects of biology level 4th written in the "Integrated Curriculum of Secondary School" that students are asked to assess human activity that threatens ecosystems as well as the impact on living beings and the environment , in addition, students are also asked to devise strategies to address the problem of water pollution. So that in this material can be taught about Zero Waste Lifestyle to students through zero waste learning as a means to instill scientific attitude and nobel values in students, this learning can also foster 21st century skills in students, especially in critical thinking and problem solving competencies, as well as as one of the strategies to tackle the problem of water pollution.

RESEARCH METHOD

This research was conducted at SMK Raja Permaisuri Bainun, Ipoh, Malaysia in August- September 2019. The population in this study was level 4th students and the sample used 3 classes from level 4th students, namely rho, miu, sigma class with a total of 44 students. The design of this research is quantitative with pre-experimental design as the method. Learning zero waste as an independent variable and dependent variable is the attitude and commitment of the implementation of zero waste lifestyle of students to maintain the ecosystem.

The initial data was taken before the study and the final data was taken after the study was collected with observation methods, questionnaires, and documentation analyzed and tested validity, normality, paired sample t-test and N-gain with SPSS 25.

RESULT AND DISCUSSION

This research reveals the effectiveness of Zero Waste learning to the attitude and commitment of Zero Waste Lifestyle students which also reveals the difference between the initial profile and the final profile of the student. The initial profile is a profile of the attitude and commitment of Zero Waste Lifestyle students before being given zero waste learning obtained from the average results of the initial questionnaire filled out in all students of level 4 of miu, rho, and sigma classes. The final profile is the attitude and commitment profile of Zero Waste Lifestyle students after being given Zero Waste learning obtained from the average questionnaire filled out in level 4 rho class.

Zero Waste Lifestyle profile of students.

Table 1 Results of initial and final profile analysis of Zero Waste Lifestyle students of 4th level SMK Raja Permaisuri Binun Malaysia

Profile	Average Attitude Score	Average Commitment Score	Criteria
Initial	43,79545 (41,70995238%)	98,20455 (54,55808333%)	Moderate
Final	87,29412 (83,13725714%)	165,5294118 (91,96078433%)	Very high

Based on the results of the analysis of the research data, listed in Table 1 it is known that the initial profile of Zero Waste Lifestyle students for aspects of attitude and commitment has moderate criteria, supported by the results of the initial questionnaire of students, which most students consider that environmental pollution due to plastic waste is not a highlighted issue and should not be seriously addressed. Most students say that environmental problems that are in the spotlight and should be seriously addressed are global warming, also based on observations obtained more students who use single use plastic stuff which is 73%, than students who use reusable stuff that is only 13%, while the other 14% do not use both, so it is appropriate to then do zero waste learning on this threatened ecosystem material , because Zero Waste is one of the steps that can be taken to address the problem of threatened ecosystems. After zero waste learning students become more aware of the importance of Zero Waste Lifestyle to reduce plastic waste, evidenced by the final profile data of Zero Waste Lifestyle students for attitude and commitment aspects have very high criteria, supported by the results of filling out the final questionnaire of students and observation results obtained more students using reusable stuff that is as much as 75%, than students who use single use plastic stuff as much as 14% , while the other 11% do not use both. The results are in line with previous research that zero waste is a new concept and can offer a way out of the problem of increasing waste and this way can be applied in all walks of life.[6] Research in 2018 also proves that commitment is also a supporting role in the implementation of zero waste programs that can support the implementation of zero waste lifestyle programs until finally able to support a clean and healthy environment.[7]

Effectiveness of Zero Waste Learning

To find out if Zero Waste learning is effective to improve students' attitude and commitment, pre test and post test data is obtained to obtain a level of effectiveness. The tests to be done are the Shapiro-Wilk normality test, the paired T-Test, and the N-gain test. Statistical analysis conducted entirely conducted with SPSS version of 25.

Table 2 Shapiro-Wilk normality test results

Questionnaire results	Attitude			Commitment		
	Statistic	df	Sig.	Statistic	df	Sig.
Initial	.957	17	.568	.969	17	.803
Final	.940	17	.317	.953	17	.507

Based on Table 2. written that the value of Sig. for attitude aspects, the preliminary questionnaire was 0.568 and the final 0.317 was 0.317. Sig value. for the commitment aspect, the initial questionnaire was 0.803 and the final 0.507 was 0.507. The data is said to be distributed normally in the Shapiro Wilk test when sig values. greater than 0.05 because of sig value. for all of these aspects > 0.05, it can be concluded that the results of the initial and final student questionnaire on Zero Waste Lifestyle in terms of attitude and commitment are distributed normally.

Table 3 Output paired samples statistics.

Aspect	Data	Mean	N	Std. Deviation	Std. Error Mean
Attitude	Initial	52.35	17	4.212	1.022
	Final	87.29	17	7.768	1.884
Commitment	Initial	134.71	17	16.925	4.105
	Final	165.53	17	8.457	2.051

Table 3 shows a summary of the descriptive statistical test results of the initial and final questionnaires of both aspects of Zero Waste Lifestyle. Attitude aspects were obtained by filling out the initial questionnaire with an average or mean of 52.00 less than the final questionnaire with an average or mean of 87.29. The commitment aspect was obtained by filling out the initial questionnaire with an average or mean of 134.71 less than the final questionnaire with an average or mean of 165.53. Since all aspects have an average score of the initial questionnaire fill out < the final questionnaire filling result, it can be interpreted descriptively that there is a difference and an increase in the average of study results between the initial and final questionnaire filling results.

Table 4 Output paired samples correlations

Aspect	Data	N	Correlation	Sig.
Attitude	Initial and final questionnaire results	17	.862	.000
Commitment	Initial and final questionnaire results	17	.525	.000

Based on Table 4 correlation coefficient value of attitude aspect 0.823 with significance value (Sig.) by 0.000. The coefficient value of the commitment aspect correlation is 0.525 with a significance value (Sig.) of 0.000 Because all aspects have sig values. 0.000 < probability of 0.05 it can be said that the data is significant and related.

Table 5 Output Paired Samples Test

| | Paired Differences | | | | | | | |
| | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | t | df | Sig. (2-tailed) |
				Lower	Upper			
Attitude	-34.941	4.657	1.129	-37.335	-32.547	-30.938	16	.000
Commitment	-30.824	14.410	3.495	-38.233	-23.414	-8.819	16	.000

Data in Table 5 it is the third output of the paired t-test and is the most important because it is in Table 5. answer whether H1 is accepted or rejected. Table 5 indicates that the sig value. (2-tailed) aspect of attitude and commitment of $0.000 < 0.05$ so that according to the guidelines it can be said that H0 is rejected and H1 is accepted. So, it is proven that Zero Waste learning is effective and influential in improving the attitude and commitment of Zero Waste Lifestyle students' level 4 SMK Raja Permaisuri Bainun Malaysia to maintain the ecosystem. Based on the table of distribution of t values statistic table with df 16 obtained table t value of 2,120. Because the t value of all aspects of > t table is 2,120 then according to the decision-making guidelines that H0 is rejected and H1 is accepted, so it is proven that Zero Waste learning is effective and influential in improving the attitude and commitment of Zero Waste Lifestyle students level 4th SMK Raja Permaisuri Bainun Malaysia to maintain the ecosystem.

Table 6 N-gain test results

No	Attitude	Commitment
1	0,73	0,87
2	0,48	0,49
3	0,57	0,85
4	0,82	0,70
5	0,54	0,59
6	0,72	0,67
7	0,86	1,0
8	0,72	0,78
9	0,49	0,76
10	0,69	0,54
11	0,62	0,59
12	0,7	0,30
13	0,65	0,52
14	0,73	0,89
15	0,47	0,57
16	0,74	0,74
17	0,87	0,86
Average	0,67	0,69
Minimal	0,47	0,30
Maximal	0,87	1,0

Based on the test results N-gain above, it appears that the average N-gain score for attitude aspect 0.67 belongs to the moderate category of effectiveness level, and the average value of N-gain commitment aspect score 0.69

belongs to the moderate category of effectiveness level. It can be said that Zero Waste learning effectively improves the attitude and commitment of Zero Waste Lifestyle students of level 4th smk Raja Permaisuri Bainun to maintain the ecosystem. As noted in other studies that the concept of zero waste is an effective way to solve the problem of plastic waste problems.[8] This study is also included in non-legislative interventions that provide valuable and effective opportunities that contribute to the reduction of marine plastic pollution.[9] Environmental conditions with zero waste learning show positive changes, in the documentation on the attachment of 17 single use plastic waste scarcely found in school environments and give the impression of a cleaner environment. The reduced use of single use plastic and human activity in Malaysia also provides positive changes such as the phenomenon dorall wrote that the reduced human activity that pollutes the environment has a good impact on animals in Malaysian and Thai waters where dugong swarms are seen in the waters after so long invisible and also baby leatherback turtles hatch and successfully return to the sea after the last 5 years no turtle nests are found. Their return after reduced human activity that pollutes the environment proves that in order for nature to recover, humans must stop the harmful activities that humans used to do that cause pollution.[10]

Refuse and reuse in zero waste lifestyle is also said to be a much more effective way to reduce negative impacts on the environment than recycling alone which will not provide effective results to get a clean and healthy environment,[11] but not all people in the world agree in the implementation of zero waste lifestyle this previous research also found arguments against the addition of reduction programs to the prohibition of single use plastic because as Lau wrote in his 2018 research that pockets plastic is considered convenient for low-income families, and prohibition can have an un proposional impact on these families[12]. Another argument says that a ban on plastic bags could result in a 35% increase in the use of paper bags, which could lead to more environmental damage[13]. Reusable fabric bags also require more effort and more hassle because washing needs to be done to keep sanitation and avoid the spread of Escherichia coli[14]. Looking at the various arguments above can be seen there are still some world societies that disagree, therefore we as a society and part of the ecosystem are expected to be wise in choosing and using single use plastic and reusable stuff products and understand properly the concept of zero waste and why zero waste lifestyle needs to be done so as not to cause adverse impacts to the ecosystem.

CONCLUSION

Based on the results of research and discussion concluded that zero waste learning is effectively applied to improve the attitude and commitment of zero waste lifestyle of 4th level students at SMK Raja Permaisuri Bainun Malaysia in an effort to maintain the ecosystem.

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