

THE IMPLEMENTATION OF GEOGRAPHY LEARNING THROUGH THE CONCEPT OF GREEN BUILDING IN GRADE XI SOCIAL STUDIES STUDENTS OF SMAN 3 JEMBER TOWARDS ENERGY-SAVING ATTITUDES (WATER AND ELECTRICITY)

Umi Fauziah

SMA Negeri 3 Jember

umifauziah216@gmail.com

ABSTRAK

Intergovernmental Panel pada Climate Change (IPCC) memperingatkan bahwa hanya ada 12 tahun tersisa atau sampai tahun 2030 untuk mencegah bencana iklim ekstrim yang terjadi karena pemanasan global (Global Warming). Salah satu pemicu terjadinya pemanasan global adalah pencemaran udara yang dipicu dari besarnya emisi gas rumah kaca global (GHG). Upaya untuk mengurangi besarnya emisi rumah kaca yang dikeluarkan oleh gedung-gedung berskala besar ataubangunan sipil adalah dengan menerapkan konsep Green Building. Desain penelitian dalam penelitian ini adalah penelitian survei dengan metode *expost facto*. Instrumen penelitian menggunakan test dan kuesioner untuk menjawab hipotesis penelitian, dengan teknik analisis data menggunakan uji Paired Sampel T Test untuk mengukur pengaruh konsep green building terhadap hasil belajar dan koefisien korelasi regresi linier sederhana untuk mengukur pengaruh pembelajaran konsep green building terhadap sikap hemat energy. Dari hasil uji Paired Sampel t test diperoleh nilai $t = 0,525$, karena nilai $t > 0,05$ maka hipotesis H_a dapat di terima, sehingga terdapat pengaruh signifikan pembelajaran menggunakan konsep green building dengan hasil belajar siswa kelas XI peminatan IPS SMAN 3 Jember. Sedangkan untuk hasil uji koefisien korelasi regresi linier sederhana diperoleh hasil ada pengaruh signifikan pembelajaran konsep green building dengan sikap hemat energi air dan listrik siswa kelas XI peminatan IPS SMAN 3 Jember.

Kata kunci: green building; hemat energi; energi air; energi listrik

ABSTRACT

*The Intergovernmental Panel on Climate Change (IPCC) warns that there are only 12 years left or until 2030 to prevent extreme climate disasters that occur due to global warming (Global Warming). One of the triggers for global warming is air pollution triggered by the large emissions of global greenhouse gases (GHGs). Efforts to reduce the amount of greenhouse emissions emitted by large-scale buildings or civil buildings are to apply the Green Building concept. The research design in this study is survey research with the *expost facto* method. The research instrument uses tests and questionnaires to answer the research hypothesis, with data analysis techniques using the Paired Sample T Test test to measure the impact of the green building concept on learning outcomes and a simple linear regression correlation coefficient to measure the effect of green building concept learning on energy-saving attitudes. From the results of the Paired Sample t test, a value of $t = 0.525$ was obtained, because the value of $t > 0.05$ then the H_a hypothesis can be accepted, so there is a significant*

Received Maret 07, 2023; Revised April 22, 2023; Accepted Mei 02, 2023

* Umi Fauziah , umifauziah216@gmail.com

influence on learning using the green building concept with the learning outcomes of class XI students specializing in social studies at SMAN 3 Jember. As for the results of the simple linear regression correlation coefficient test, the results of which there was a significant influence on learning the green building concept with a water and electricity energy-saving attitude of class XI students specializing in social studies at SMAN 3 Jember.

Keywords : green building; energy saving; water energy; electrical energy

Introduction

The world's climate scientists, members of the Intergovernmental Panel on Climate Change (IPCC), have warned that there are only 12 years left until 2030 to prevent severe climate disasters due to global warming and a 1.5°C rise in temperature. (Fajar, 2018).

An increase in global temperatures of more than 1.5 degrees Celsius will increase the risk of natural disasters such as extreme heat, droughts, storm-induced floods, and melting ice at both poles of the Earth. many islands. . In Indonesia, the five islands that are threatened with sinking due to global warming are Kelor Island, Sentut Island, Padang Island, Tembora Island and Bali Island, because these islands have begun to decrease in land area (Lahitani, 2014)

Various efforts have been made to prevent the destruction of nature due to global warming through the implementation of Agenda 21. The first ten years of the Agenda 21 program are as follows: (1) the concept of sustainable development will be born out of a focus on problems going forward. pay attention to the relationship between the environment and development. (2) there is an international top-down movement that includes principles - institutions, buildings-national organizations and "grassroots" processes at the local government level, (3) Agenda 21 requires science-based conferences (Utina, 2015)

Efforts to protect and manage the environment (PPLH) can be carried out systematically and organized to protect the ecosystem and prevent pollution and/or damage to the environment, which includes planning, utilization, management, management, supervision, and law enforcement (UU no. 32 pasal 1 ayat, 2009). As a form of planning and monitoring efforts to protect and manage the environment (PPLH) in the field of energy use in large buildings or municipal buildings is to apply the concept of Green Building to encourage environmentally friendly development in construction areas by using the residential, social and economic environment (Berawi, 2019). The five important factors underlying Green Building are ; considerations of environmental protection, effectiveness of space use, use of existing natural resources, green parking and thermal environment, and use of land resources (Huo, 2019)

The concept of Green Building is important to be applied in Indonesia because the energy efficiency of buildings in Indonesia is still poor while 85% of humans are in buildings that use a lot of energy to support their activities, so this is related to the stage of operation or management in the Green building concept (GBCI, 2015). Some buildings that have been certified or obtained a green label tend to be only for the design stage even though the concept of energy saving should be emphasized on the integration between project design, construction and technology used in green buildings (Ding, 2018) The concept of Green building can also

be referred to as the concept of "Zero energy", namely buildings do not need to use fossil fuels, but replace them with renewable energy sources such as solar energy, this can be realized by making building designs to meet the needs of energy in buildings (Dwaikat, 2018) The importance of applying the green building concept is expected to be able to influence people's lifestyles to save on energy use.

The Green Building concept is not only oriented towards the evaluation of new buildings and existing buildings, but can also be used as subject matter given to students, so that the energy-saving programs that have been launched by the government can be implemented and used as energy-saving habits in the community (Firnando, 2015). The school building as a support for learning facilities can be used as a pilot object for student learning, by introducing the concept of green building to students at school. It is hoped that by socializing this green building concept at the high school level, this concept can begin to be understood, including what obstacles are encountered in the application of this concept so that it is hoped that there will be a change in attitude from now on to be more efficient towards energy use. Habituation to the wisdom of energy use is expected to be able to contribute at the global level to the surrounding environment.

In accordance with the 2013 curriculum law that prioritizes local wisdom, the concept of green building is a concrete example that can be used as a tool to facilitate student understanding, especially in sustainable development. Through the understanding that students have as a result of the implementation of the green building concept in subjects can improve their learning outcomes and understand the concept of green building in the form of implementing an energy-saving attitude (water and electricity).

METHOD

This research uses quantitative research methods with survey research designs. Respondents in this study were determined in a purposive way, because the respondents in this study had the same characteristics. The respondents in this study were class XI students in the social studies specialization which totaled 94 students. The data collection technique used in this study used an instrument in the form of a questionnaire. The design of the data collection technique in this study is the One Group Pretest-Posttest Design. The analytical methods used in this study include: (1) Table presentation, (2) Using the Paired Sample T Test according to (Sugiyono, 2015), (3) using the correlation coefficient on simple linear regression is used to test whether or not the relationship between two variables is significant through their regression coefficients.

FINDINGS AND DISCUSSION

In the discussion of the results of the first research will be studied is the influence of learning the green building concept on the learning outcomes of class XI students specializing in social studies at SMAN 3 Jember with a total of 94 respondents (all class XI students specializing in social studies). All students are given pre-test questions to find out the effect of learning the green building concept on student learning outcomes before getting green building concept material.

This material is given as material for enrichment of geography subjects on Basic Competencies in the use of environmentally sound and sustainable natural resources. The purpose of providing this material is expected to emerge students' understanding of the importance of applying energy-saving principles in everyday life. This is in line with the government's program to reduce greenhouse gas emissions until 2030 through the National Agenda 21 which contains a reference to incorporate the principles of sustainable development into the implementation of national development.

Based on table 1 (Pre test Standard Deviation Test and Post test results)

Table 1. Pre test Standard Deviation Test and Post test results

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre Test	66,4681	94	8,28225	,85425
	Post Test	75,4468	94	6,51486	,67196

The average value of the pre-test is 66.468 and has a standard deviation of 8.28225, while the average post-test value is 75.446 but the standard deviation value of the average post test is lower than the standard deviation value of the pre-test, which is 6.51486. Based on the results of this study, this is because students who in the pre-test implementation have low scores, due to learning the concept of green building become more understanding of the concept of green building, and how to apply the concept of green building to existing buildings. Students' understanding of the basic concepts of green building can also be seen in table 2

Table 2. Description of students' understanding of the basic concepts of green building

Jawaban	Kriteria									
	Pengertian		Tujuan		Organisasi		Parameter		Kriteria	
	N	%	N	%	N	%	N	%	N	%
Benar	84	89,4	66	70,2	81	86,2	69	73,4	9	9,5
Salah	10	10,6	28	29,8	3	3,2	14	14,9	84	89,4
Tidak Tahu	0	0,00	0	0,00	10	10,6	11	11,7	1	1,1
Total	94	100	94	100	94	100	94	100	94	100

Table 2 taken from the questionnaire results data shows that four of the five basic indicators of understanding the concept of green building can be understood by students with a percentage figure of more than 70% for the categories of understanding, goals, organization and parameters of green building. Additionally referring to table 3

Table 3. Assessment of the suitability of school buildings with the concept of green building

No	Jawaban	Frekuensi	
		N	%
1	Sudah	46	48,94
2	Belum	47	50,00
3	Tidak Tahu	1	1,06
Total		94	100

46 students (48.69%) have been able to correctly evaluate school conditions according to GBCI parameters

Table 4. Paired Sample Test Results

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	Pre Test - Post Test	8,97872	7,37765	,76095	-10,48981	-7,46764	11,799	,000	

In table 4, the calculated t value is 11.799 while the t value of the table seen from the t distribution table is 1.66140 with the significance of the pretest and posttest of 0.00. Because the signification value < 0.05, the alternative hypothesis (H_a) can be accepted. The acceptance of the alternative hypothesis shows that learning the concept of green building affects the learning outcomes of class XI students specializing in social studies at SMAN 3 Jember. This also shows that to provide an understanding of the material related to the principles of sustainable development, students need concrete examples of sustainable development models. Examples of kongkit in the form of concepts and real behaviors are expected to be able to provide changes in student learning outcomes in understanding the learning material they obtain.

The hope of learning the green building concept is given as a material for student enrichment so that students can understand the importance of energy-saving attitudes applied both at home, at school and in the community. Optimism about this energy-saving effort can be implemented by students.

Table 5. Opinions About the Energy Crisis and Energy Saving

No	Jawaban	Kriteria			
		Krisis Energi		Penghematan Energi	
		N	%	N	%
1	Sudah	76	80,85	94	100
2	Belum	13	13,83	0	0,00
3	Tidak Tahu	5	5,32	0	0,00
Total		94	100	94	100

Referring to table 5 taken from the questionnaire data states that 80.85% of students think that the world is currently experiencing an energy crisis. The belief in the success of planting this energy-saving attitude through learning the concept of green building is the data from the questionnaire in table 5 where 100% of students stated the need for energy saving efforts. Students' main motivation for making energy-saving efforts is driven by awareness to preserve the environment (table 6).

Table 6. Energy-saving motivation

No	Jawaban	Frekuensi	
		N	%
1	A	22	23,40
2	B	72	76,60
3	C	0	0,00
Total		94	100

The problem faced so far related to energy-saving efforts is the lack of education for students about how to cultivate attitudes that lead to the energy saving movement. Though based on the table 7

Table 7. Confidence in energy-saving efforts

No	Jawaban	Frekuensi	
		N	%
1	A	49	52,13
2	B	42	44,68
3	C	3	3,19
Total		94	100

Table 7 obtained from questionnaire result data 52.13% of students expressed positive and active in saving energy and believed in changes, and 93.60% in table 8

Table 8. Responses to the energy-saving movement

No	Jawaban	Frekuensi	
		N	%
1	A	88	93,62
2	B	6	6,38
3	C	0	0,00
Total		94	100

From the results of the questionnaire, students stated that they wanted to take an active role in energy-saving movements. For this reason, the provision of green building concept material in learning geography is important to be given as a real contribution to understanding students about energy-saving attitudes with indicators that need to be understood to students, especially efforts to save water and electricity energy.

Table 9. Test t green building concept against water energy saving

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
	1 (Constant)	54,278	4,117				13,184	,000		
GE	,390	,063	,544	6,213	,000	,544	,544	,544	1,000	1,000

In table 9 (Test t of the green building concept against water energy saving) the significance level of 0.00 calculated value of 6.213, this value is higher than the ttable (db=92) which is 2.63033 at a significant level of 5%, which means that the ttable > calculation so that the alternative hypothesis (Ha) is accepted. From the t test, it can be concluded that there is an influence of learning the green building concept on the attitude of saving water energy in class XI students specializing in social studies at SMAN 3 Jember. This gives a positive meaning that the application of the concept of green building to geography materials for the principle of sustainable development which has the important objective of instilling austerity attitudes and

actions in the use of natural resources can be achieved. Direct examples given in the form of understanding the concept of energy saving contained in the principle of assessing the concept of green building, including energy efficiency and conservation as well as water conservation attached to the form of energy saving can be understood by students and applied in everyday life.

For example, in an effort to save water energy, so far students do not understand that showers and springlers are tools created to minimize water use.

Table 10. Water energy saving attitude

No	Jawaban	Frekuensi	
		N	%
1	A	94	100
2	B	90	95,7
3	C	88	93,6
4	D	86	91,5
5	E	85	90,4
6	F	67	71,3
7	G	76	80,9
8	H	53	56,4
9	I	27	28,7

In the table of 10 students who had used the shower for activities at home about 76 students (80.9%), and who used springlers to water the plants 85 students 90.4%). In addition, it is important to socialize the creation of biopore holes in each house that can function as groundwater reserves around the house.

Table 11. Use of Water Sources at Home

No	Jawaban	Frekuensi	
		N	%
1	PDAM	41	43,62
2	Sumur	52	55,32
3	Lain-lain	1	1,06
Total		94	100

Based on table 11 (Water sources at home) as many as 52 students (55.32%) stated to use well water as a source of water at home, whereas based on table 10 (Water energy saving attitude) only 27 students (28.7%) stated that they had made biopore holes in their homes..

For the energy saving attitude of water which is to recycle waste in table 10 (Water energy saving attitude) 53 students (56.4%) students have made these energy-saving efforts in the form of utilizing it for watering yards or plants. The positive attitude in water energy saving efforts that has been carried out by all students in table 10 (Water energy saving attitude) is to close the water tap if it is not used 94 students (100%) have done so. From the results of research for water energy saving attitudes, students have made many savings efforts for various reasons, whether for economic reasons or environmental preservation reasons (table 6 motivation for energy saving). These simple efforts can be used as learning materials so that students can be more wise in utilizing water energy which indirectly contributes to preserving our earth.

The great emphasis on efforts to save energy other than water is the use of electrical energy, where electricity is already considered a staple energy for our society. Based on the

results of the questionnaire given to students related to the use of electrical appliances at home is shown in table 12

Table 12. Electrical appliances used at home

No	Jawaban	Frekuensi	
		N	%
1	A	87	92,55
2	B	7	7,45
3	C	0	0,00
4	D	0	0,00
Total		94	100

87 students (92.55%) gave the answer having more than 5 electrical appliances at home, and only 7 students 7.42% 0 students answered having less than 2 electrical appliances. This shows the amount of use of electrical energy which is based on the amount of greenhouse gas emissions that become negative from its use.

Table 13. Test t the concept of green building against saving electrical energy

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1 (Constant)	65,444	4,114		15,908	,000					
GB	,256	,063	,392	4,082	,000	,392	,392	,392	1,000	1,000

Based on table 13, it shows that the calculation result of the calculation of the calculation of 4.082 is higher than the ttable (db = 92) which is 2.63033 a significant level of 5%, so the calculation of the ttable > then Ha is accepted and Ho is rejected. From the results of the t test, it shows that there is an influence of learning the green building concept on the attitude of saving electrical energy for class XI students specializing in social studies at SMAN 3 Jember.

The results of the calculation of the t test can be strengthened by table 13

Table. 13 electrical energy-saving attitudes

No	Jawaban	Frekuensi	
		N	%
1	A	90	95,7
2	B	84	89,4
3	C	56	59,6
4	D	33	35,1
5	E	83	88,3
6	F	72	76,6
7	G	59	62,8
8	H	72	76,6
9	I	75	79,8

Students where 95.7% of students have taken the act of turning off the lights when not in use and 89.4% of students turning off electrical appliances if not in use, as well as 88.3% of students making a habit of opening windows to take advantage of the lighting from sunlight. Meanwhile, to regulate the air conditioner at a temperature of 24°C is the smallest answer,

namely 33 students (35.1%) who have done so, this can be due to the small number of students who use the air conditioner as a cooler at home

The description of the attitude of saving water and electricity energy that has been carried out by students provides an overview of how students have used water and electricity energy so far. The attitude that students have taken in the use of water and electricity energy can be considered as a result of learning in schools in applying the concept of green building with an orientation to reduce exhaust emissions triggered by energy use. The hope is that the learning of the green building concept carried out in schools will provide education to students, how to make the best use of existing energy and energy saving efforts to reduce the negative impacts it causes for the survival of our earth.

In accordance with the mandate of the 2013 curriculum which emphasizes character education, it is hoped that in every learning teacher is able to develop materials that are oriented towards changing the character of students. To facilitate the transfer of material that leads to a change in attitude, it is necessary to enrich the material that emphasizes concepts that are not only easy for students to learn, but can also be applied in their daily lives. The change in attitude is an indication of a change in the character of the student, for that it requires continuous habituation in the hope that something that is usually done will become a character and the character that is accustomed will become a culture

CONCLUSIONS

Based on the results of the discussion of this thesis research, it can be concluded that there is a significant influence of learning using the green building concept with the learning outcomes of class XI students specializing in social studies at SMAN 3 Jember. The results of the Paired Sample T Test show that the calculation result = 0.525 is greater than the t_{table} , which is 0.05 with a significance value of 0.00 smaller than 0.05. Then there is a significant influence between learning the green building concept on water energy-saving behavior in class XI students specializing in social studies at SMA Negeri 3 Jember. From the calculation results of the calculation of 6.213 when compared to the t_{table} ($df = 92$) which is 2.63033 a significant level of 5%, so $t_{calculate} > t_{table}$, and there is a significant influence between learning the concept of green building on electrical energy-saving behavior in class XI students specializing in social studies at SMA Negeri 3 Jember. From the calculation results of the calculation of 4.082 above compared to the t_{table} ($df = 92$) which is 2.63033 significant level of 5%, so $t_{calculate} > t_{table}$.

REFERENCES

- UU no. 32 pasal 1 ayat. (2009). Undang-Undang Republik Indonesia No. 32 tahun 2009. *Perlindungan dan Pengelolaan Lingkungan Hidup*. 3 Oktober 2009. Lembaran Negara Republik Indonesia Tahun 2009 Nomor 5059. *Jakarta : Undang-Undang Republik Indonesia*.
- Berawi, D. (2019). Stakeholders' Perspectives On Green Building Rating: A Case Study in Indonesia. *Depok : A Department of Civil Engineering, Faculty of Engineering, Universitas Indonesia, Depok, 16424 Indonesia*, 3 – 26.

- Ding, Zaikun. Fan, V. (2018). *Green Building Evaluation System Implementation* (Elsevier). *China : Department of Construction Management and Real Estate, Shenzhen University, Shenzhen, 518060, China*, 133: 32-40.
- Dwaikat, Luay. Ali, K. . (2018). *The Economic Benefits of A Green Building Evidence From Malaysia*. (Elsevier). *Malaysia : Department of Quantity Surveying, Faculty of Built Environment, Universiti Teknologi Malaysia (UTM), 81310 Johor Bahru, Johor, Malaysia*, 18:448-453.
- Fajar, J. (2018). IPCC : Hanya Tersisa 12 Tahun untuk Mencegah Bencana Ekstrim Akibat Perubahan Iklim. *Jakarta : Mangabay, Situs Berita Lingkungan*.
<https://www.mongabay.co.id/2018/10/09/ipcc-hanya-tersisa-12-tahun%02untuk-mencegah-bencana-ekstrim-akibat-perubahan-iklim>
- Firnando, N. (2015). *Penilaian Kriteria Green Building Pada Bangunan Gedung Rumah Sakit Universitas Sumatera Utara*. Medan : Universitas Sumatera Utara. Medan. Kampus USU Press.
- GBCI. (2015). *GreenShip Neighborhood Version 1.0*. Green Building Council Indonesia. *Jakarta Selatan : Green Building Council Indonesia*, 4–5.
- Huo, X. dkk. (2019). *Critical Factors in Site Planning and Design of Green Buildings: A Case of China*. *Journal of Cleaner Production*. Hong Kong : Department of Building and Real Estate The Hong Kong Polytechnic University, 685 – 694.
- Lahitani, S. (2014). *Pulau-pulau di Indonesia Terancam Tenggelam*. Jakarta : PT Elang Mahkota Teknologi Tbk.
- Sugiyono. (2015). *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif, dan R&D)*. Bandung: CV Alfabeta, edisi 2.
- Utina, R. (2015). *Pemanasan Global: Dampak dan Upaya Meminimalisasinya*. Gorontalo : FMIPA Universitas Negeri Gorontalo.