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Raising Environmental Awareness in Kampong Tridi and Kampong Warna-Warni (Malang, Indonesia) through Digital-Based Workshop on Constructed Wetlands

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Abstract Kampong Tridi and Warna-Warni are two small communities in Malang, Indonesia, which have started efforts to realize a sustainable environment within a broader national movement to eliminate slum areas. Colourful artwork and painted murals have made them popular tourist spots that attract 150 tourists per day on average, which helps boost the local economy. However, both kampongs are still lacking sanitation service. Blackwater and greywater generated from inhabitants' activities are directly dumped into the Brantas River, negatively impacting water quality. A workshop was organized to increase the participants' awareness of environmental issues, particularly in water resource sustainability, and obtain a commitment to adopt constructed wetlands as sustainable, nature-based solutions for wastewater treatment. Two types of the questionnaire (pretest and posttest) were distributed to 50 participants to identify perception differences generated through the workshop. A digital game and a 3D simulation were developed to educate the participants on constructed wetlands as wastewater treatment systems in fun, attractive, and effective ways. Participants' awareness of environmental issues in water resources increased from 67% to 76%, and the workshop had motivated the participants to adopt constructed wetlands in their neighbourhood.

1. INTRODUCTION

Kampong Tridi and Kampong Warna-Warni are two local popular tourism destinations in Malang City, Indonesia. Kampong Warna-Warni, as the name calls it, is a settlement where houses are painted in colourful and bright accents and with plenty of decorations dangling above the walkways. Kampong Tridi has more than 120 substantial live-like murals painted on the walls, which appear three-dimensional (Prianggoro, 2017). Many tourists have their pictures taken as they pose before various characters such as animals, cartoons, national figures, etc. According to the kampongs' leader, this attracts about 150 tourists on weekdays, 300 on weekends, and 800 on national holidays each day (Sutrisnanto & Parin, 2019).

The kampongs lack sanitation services and environmental management despite the attractive aesthetics. There are 139 houses in Kampong Tridi of which only 52 (37%) are equipped with private toilets and septic tanks. Similarly, all inhabitants of the 87 houses of Kampong Warna-Warni have access to a private toilet, but only a few of those are connected to a septic tank. Making things worse, a specific place to collect garbage cannot be found anywhere (Ramadani, 2018) except for Kampong Warna-Warni, which has started putting trash together.

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The absence of wastewater treatment also indicates this lack of environmental management. Blackwater, as the main share of the toilets, and greywater generated from inhabitants' other activities (washing and bathing) has been discharged without further treatment into the Brantas River (Widianto, 2016). As this condition still persists, it leads to a significant contribution to water pollution (surface and groundwater) and deterioration of people's health (Patil & Ingle, 2017). A recent report confirms that the pollution in the Brantas River is worsening (EJEA, 2018).

Constructed wetlands (CWs) are a sanitation technology that utilizes natural removal mechanisms provided by vegetation, soil, and associated microbial populations (Maiga et al., 2017). They form robust barriers, remove multiple contaminants (organics, pathogens, nutrients and micropollutants), minimize chemicals, use minimal energy, and have a small carbon footprint. According to UN-HABITAT (2008), this technology meets the need of wastewater treatment systems for developing countries since it can be less expensive than other treatment options and is simple in its construction (can be built with local materials), operation, and maintenance. CWs work well for treating household wastewater or greywater (Hoffmann et al., 2011) and convert it into reusable water for watering gardens, keeping fish and toilet flushing (Chandra, 2008; Yulistyorini et al., 2019). However, there is one recurring drawback: the land requirement of CWs, which is a severely limiting factor in densely populated settlements such as kampongs Warna-Warni and Tridi. It is nevertheless possible to optimize space usage in two ways: (1) increasing pollutant degradation rates per unit area, or (2) locating CWs in otherwise non-used areas. The first option can be achieved by intensified CWs, in which oxygen transfer limitations into the CWs will be solved by (low-energy-consuming) aeration (Ilyas & Masih, 2017). The second option can be done by converting green roofs into CWs (Pereyra, 2016) or by converting green wall systems into CWs (Masi et al., 2016, Lahko et al., 2022).

To improve the environmental management awareness and introduce the idea of CWs as a sustainable technology, an education workshop with the addition of a CWs game was introduced to the kampongs' community, and its effects on education were evaluated.

Environmental awareness is assumed to be a crucial ecological protection requirement in which socio-environmental relations play an essential role in increasing environmental awareness. Stimulating environmental awareness is significantly important to enhance the effectiveness and responsiveness of the environmental management policies and strengthen community engagement (Du et al., 2018). Community's environmental awareness becomes more important these days as a poor lifestyle creates pollution affecting fundamental water sources in many places across Indonesia. A better sanitation system can reduce diseases and mortality, particularly among children.

The national access to sanitation facilities in Indonesia was 56% in 2010, 73% of which represents urban inhabitants (Ministry of Health, 2010). At the national level, less than 1% of the Indonesian population has access to a sewerage system to discharge the daily untreated wastewater (Kearton et al., 2013). Meanwhile, the majority of the population still uses on-site facilities for sewage treatment. Moreover, large volumes of greywater are still discharged directly into the environment. Continued discharge of untreated greywater leads to pollution risk in soil and water because it creates surface ponding or leaching into groundwater (Beal et al., 2005).

1.1 Constructed Wetlands

Constructed wetlands (CWs) are engineered natural wastewater treatment systems constructed to remove pollutants from wastewater by utilizing aquatic vegetation, filling media such as gravel or sand, and microorganisms (Vymazal, 2010).

CWs for wastewater treatment can be categorized as either free water surface (FWS) or subsurface flow (SSF) systems. In FWS systems, water flow is above the ground, and plants are rooted in the sediment layer at the base of the water column. In SSF systems, water flows through porous media such as gravel or aggregate, in which the plants are rooted (Mitchell et al., 1998). Table 1 describes the type of vegetation used in each system and the contact area between the water column and various vegetation types.

FWS systems are more appropriate for polishing secondary and tertiary effluent and can remove organic matter, nitrogen, phosphorus, heavy metals, pathogens, and other pollutants. SSF systems are more appropriate for treating primary wastewater because there is no direct contact between the water column and the atmosphere. Consequently, there is no opportunity for vermin to breed, and they are safer from a public health perspective. Therefore, SSF systems are beneficial for the on-site treatment of septic tank effluent or greywater (Mitchell et al., 1998). The profile of FWS and SSF are shown in Figure 1 and 2. In practice, SSF can be categorized as horizontal sub-surface flow (HSSF) and vertical sub-surface flow (VSSF) constructed wetlands (Vymazal & Kropfelova, 2008).

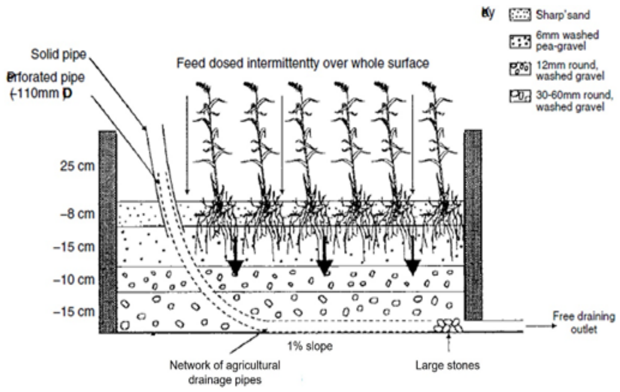

Figure 1. Live demo of sophisticated endodontic treatment with dental fiber pegs

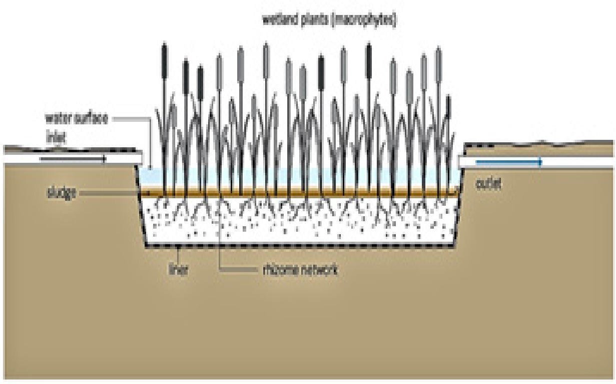

Figure 2. Profile of free water surface constructed wetlands

2.1 General Profile of Kampong Tridi and Kampong Warna-Warni

Our study was conducted at Kampong Tridi and Kampong Warna-Warni are located in Blimbing, Malang City, East-Java, Indonesia. Both share 15.000 m2 of land under the Brantas Bridge, with the Brantas River separating Kampung Tridi to the north and Kampong Warna-Warni to the south. In terms of topography, the kampongs are 466 meters above sea level and are 1.9 km away from Malang city centre (Kelurahan Jodipan, 2014). The location and an aerial view of the kampongs are shown in Figure 3 and Figure 4.

Figure 3. Location of Kampong Tridi and Kampong Warna-Warni

Figure 4. View of Kampong Tridi (left) and Kampong Warna-Warni (right) and the Brantas river

2.2 Inhabitants' Perception on Environmental Issues

Perceptions towards environmental issues can differ from one individual to another. A quick survey was conducted by distributing a pretest and posttest questionnaire to 50 participants before and after the workshop took place to obtain information about the participants awareness of the surrounding environmental issues. The participants were a group of 90% males and10% females whose ages varied from 25 to 50 years old and with diverse education backgrounds, i.e., mainly high school graduates, and a few of them went to universities. The number of questions provided was different between the pretest and posttest. The pretest questionnaire consisted of 10 statements, and the posttest questionnaire consisted of 20 statements. Ten questions in the posttest were identically copied from the pretest questionnaire, and therefore they could reveal the participants' responses after the workshop. The pretest and posttest questionnaire comparison is presented in Table 2. The scale used in the questionnaire was a Likert scale with four levels which are explained in Table 3. The questions were delivered in Indonesian to the participants.

Participants were instructed to put a scoring scale in the appropriate columns based on the level of their agreement with the statements, as shown in Table 3. In addition to evaluating a change in perception after the workshop, the posttest questionnaire was also used to perceive participants' motivation of building and operating their own constructed wetland, based on a further ten questions.

From the two types of questionnaires, quantitative data were collected and analyzed using descriptive statistical analysis. Equation 1 was used to calculate the average score obtained from both questionnaires.

$$P=\frac{\sum X}{\sum Xi} \text{ x } 100\%$$

Where P – present the average score percentage
$\sum X$ – present the obtained score
$\sum Xi$ – present the maximum score

2.3 Pipaku: An Educational Game Developed as Digital Media

A digital game named Pipaku with a theme of greywater treatment through constructed wetlands was developed by two experts: an expert on environmental engineering acted as Pipaku scenario and content writer, while another expert on Informatics and Technology acted as the game programmer. Such a game was considered necessary to keep the participants engaged while the primary information was still delivered effectively during the workshop. The development of this game was based on a site scenario that might happen if fresh water resources become contaminated, a story closely similar to the kampongs' present condition. As a racing game, Pipaku demands its player to connect all pipes from every virtual house to a constructed wetland, as nature-based wastewater treatment before the time is up. A preview of the game is shown in Figure 5.

As an interactive media, this game shows different stories at the end depending on whether a player could join all pipes. Players will receive a positive message whenever they connect all pipes to the CW. Otherwise, a negative message will be displayed if a player cannot correctly join the pipes within the given time. As shown in Figure 6, different categories of statements are meant to educate the participants on how wastewater affects environments in general. The game was developed in Indonesian to ease information transfer to the target users (Indonesian kampong citizens).

Figure 5. A preview of Pipaku gameplay

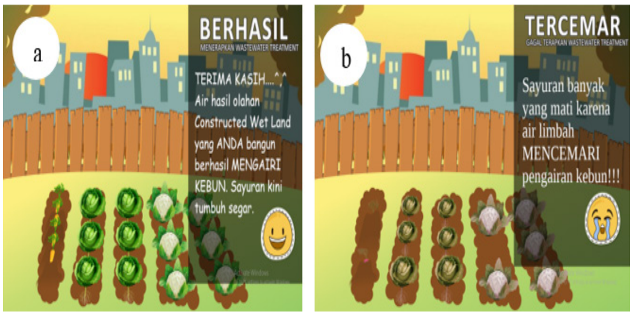

Figure 6. a) Sample of messages when mission succeeds (left); b) fails (right)

Throughout the workshop, participants were divided into 16 groups, hence one group consisted of at least 3 participants. Each group was provided with a laptop (Figure 9). The participants were then instructed to play and study any phenomenon shown on the screen.

2.4 3D Simulation on building a Constructed Wetland

The experts developed a 3D simulation and introduced it to improve the participants' understanding of CWs and the construction steps. Simulation is commonly used when a person has not experienced certain events in real life (Darmawan, 2015). Simulation in this workshop was developed and promoted to overcome the impossibility of constructing a wetland due to workshops' time limitation. This 3D simulation simulates every step of creating a wetland, from soil excavation to water output (Figure 7).

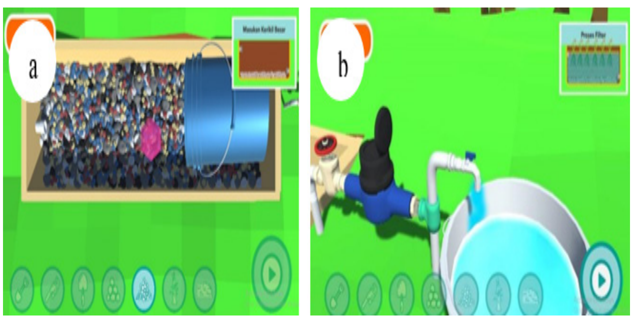

Figure 7. a) Illustration of 3D simulation gameplay: gravels setup (left); b) water output (right)

3. RESULT AND DISCUSSION

The availability of well-built sanitation facilities in a community is closely related to inhabitants' awareness of wastewater treatment in their neighbourhood (Jeratagi et al., 2017). Data collected from the pretest questionnaire showed that the participants' awareness of the environmental damage caused by wastewater was very low. This indicator was represented by a score of 67.6% (calculated according to Equation 1). Many participants revealed their ignorance in deteriorating water resources quality. About 32% of the participants agreed that contaminated water could be safely disposed of into the river without treatment. About 24% of them confessed that they use a considerable amount of detergent without expecting it to pollute the river water.

According to the kampong leaders, many environmentalists have undertaken numerous information disseminations. However, those efforts did not cover the need for sanitary education and thus untreated discharge continued. A considerable amount of wastewater is directly disposed of in the water due to the lack of information about the negative impacts of wastewater disposal (Tendean et al., 2014). In addition, financial aspects play an essential role in providing ideal facilities and infrastructures for water treatment (Wibowo, 2018). Discharging untreated wastewater negatively affects the environment, human health, other organisms' sustainability, and the economy (Kumar & Bahadur, 2013). Reports revealed that adequate water and sanitation services and better hygiene practices could significantly contribute to economic progress (Ghosh, 2019). Unfortunately, some participants did not consider the importance of wastewater treatment. Other indicators which state the participants' low awareness of the environmental deterioration caused by wastewater are also revealed in Figure 8.

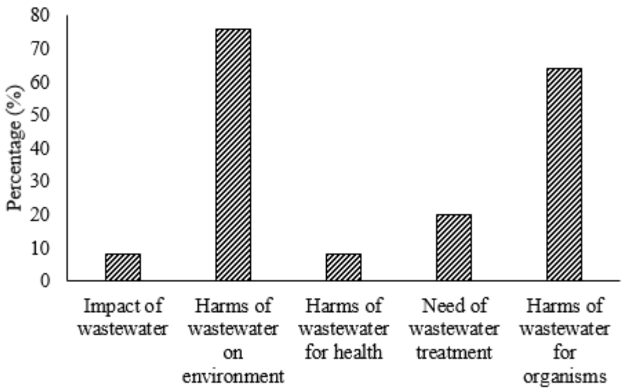

Figure 8. Share of participants who are not aware of several environmental issues.

Figure 8 illustrates that 8% of the participants think that direct disposal of the wastewater cannot cause water pollution. The majority of the participants do not know that wastewater will harm the environment if it is disposed of untreated (76%). Another significant misconception was that untreated wastewater would not negatively affect organisms, mainly aquatic living beings (64%).

Since a digital-based approach was chosen, the workshop relied on electronic equipment i.e., laptop.

Figure 9. Women participants were gaining information through Pipaku game.

Therefore, the partakers - both men and women - should have the ability to operate a laptop. However, in this workshop, there were only four female participants who could operate a laptop. Women participants were mainly selected from housewives who met the qualifications mentioned above while male participants' backgrounds varied. Figure 9 shows female participants who took part in the workshop activity. Using a game can increase participants' motivation to learn a topic (Allegra et al., 2013). Consequently, participants were engaged in the issue and could actively participate in the discussion and make decisions (Figure 10). Participants were educated by using the Pipaku game, which helped to effectively increase participants' awareness of water resource issues and environmental management (Cheng & Su, 2011).

Figure 10. Participants were engaged in playing Pipaku game.

According to other studies, simulation can create the same effect as practical experience (Wouters et al., 2013). From the workshop perspective, the participants found no difficulties to build constructed wetland themselves as they successfully made their virtual one. This condition was then studied further to learn if the participants were motivated to adopt the wastewater treatment system in their neighbourhood. The findings suggested that 16% of the participants were highly interested in adopting CWs in their community, and the other 84% were interested.

Eventually, the data taken from the posttest questionnaire were analyzed, and it turned out that the participants' awareness of environmental issues increased to 76.3% (increased by 8.7%). The workshop set-up, which combined lectures, games, 3D simulation, and discussion, had generated a better awareness of the environmental issues and understanding the wastewater treatment concept using constructed wetland technology. Answers given to the questionnaire were also studied from the perspective of their response to the presentation technique presented in Table 4. Such a result shows that enjoyment raises the motivation to learn new knowledge presented in an environment-related game, aligned with the study conducted by Rosyid et al. (2018).

4. CONCLUSION

The community of Kampong Tridi and Kampong Warna-warni are two communities in Malang that settle on the Brantas riverbank, and they are lacking sanitation facilities. This workshop was carried out to educate and raise their awareness of the sustainable environment and introduce the constructed wetlands technology through an educational game. The game helped deliver the knowledge efficiently through a combination of a lecture, the Pipaku digital game, 3D simulation, and problem-based discussion. Based on the analysis of pre- and post-event evaluations, the combination of the workshop delivery techniques had raised the people's awareness of environmental sustainability in the community. The participants aspired to adapt the constructed wetlands technology for their wastewater treatment in their neighbourhoods.

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CONFLICT OF INTERESTS

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced is outcome. We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We have agreed that the corresponding author is the sole contact for the editorial process who will communicate with the other authors about progress, submissions of revisions and final approval of the manuscript.

REFERENCES

Allegra, M., La Guardia, D., Ottaviano, S., Dal Grande, V., & Gentile, M. (2013). An agent based methodology to design serious game in social field. The Games and Learning Alliance Conference (GALA). Paris.

Beal, C., Gardner, E., Christiansen, C., Beavers, P. (2005). A review of on-site wastewater practices in south-east Queensland. Water 32 (4), 69–72.

Chandra, V. (2008). Small-scale constructed wetlands for greywater and total domestic wastewater treatment. Maharashtra: ESF.

Cheng, C., & Su, C. (2011). A game-based learning system for improving student's learning effectiveness in system analysis course. Social and Behavioral Sciences, 31(2012), 669-675. Retrieved from https://www.sciencedirect.com.

Darmawan, D. (2015). Teknologi pendidikan (education technology). Bandung: Remaja Rosdakarya.

Du, Yi., Xiaoyang Wang., Daniele Brombal., Angela Moriggi., Andrew Sharpley., and Shujiang Pang. (2018). Changes in environmental awareness and its connection to local environmental management in water conservation zones: The case of Beijing, China. Sustainability. Vol. 10.

EJEA. (2018). Information document of environmental management performance in East Java (dokumen informasi kinerja pengelolaan lingkungan hidup Daerah Jawa Timur). Surabaya.

Ghosh, S. N. (2019). Access to water and sanitation is not enough, but their management to end the crisis. International Journal of Science and Research, 8(2), 80-82. Retrieved from https://www.ijsr.net.

Hoffmann, H., Platzer, C., Winker, M., & von Muench, E. (2011). Technology review of constructed wetlands. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). Eschborn.

Ilyas, H., & Masih, I. (2017). Intensification of constructed wetlands for land area reduction: a review. Environmental Science and Pollution Research, 24(1). doi:10.1007/s11356-017-8740-z

Jeratagi, S., Kumar, Y., & Mallapur, M. D. (2017). Awareness about sanitary toilets in a rural area of North Karnataka, India: a cross sectional study.

Kearton, R., Alvarez, V.V., Section, I.M., Soraya, G., Fook, C.E., Pollard, R., Ignacio, D.M. (2013). East Asia Pacific Region urban sanitation review; Indonesia country study, Jakarta, Indonesia. p.52

Kelurahan Jodipan. (2014). Regional profile. Retrieved from Kelurahan Jodipan: https://keljodipan.malangkota.go.id.

Kumar, A., & Bahadur, Y. (2013). Water quality of River Kosi and Rajera system at Rampur (India): Impact assessment. Hindawi Journal of Chemistry, 2013. doi:10.1155/2013/618612

Lakho, F.H, Asif Q., Laura D. D. N., Veerle D., Teun D.,Stijn W.H. Van Hulle, Diederik P.L. Rousseau. (2022). Performance of a green wall (Total Value Wall™) at high greywater loading rates and life cycle impact assessment. Science of the Total Environment. 821 .153470. DOI: 10.1016/j.scitotenv.2022.153470

Maiga, Y., von Sperling, M., & Mihelcic, J. (2017). Constructed wetlands. Michigan State University, E. Lansing, MI, UNESCO.

Masi, F., Rizzo, A., Bresciani, R., & Edathoot, A. (2016). Green walls for greywater treatment and recycling in dense urban areas: A case-study in Pune. Journal of Water, Sanitation, and Hygiene for Development, 6(2). doi:10.2166/washdev.2016.019

Ministry of Health. (2010). Riset kesehatan dasar (basic health research). Jakarta, Indonesia. p.431.

Mitchell, C., Rod, Wiese, and Rachael Young. (1998). Design of wastewater wetlands. The Constructed Wetlands Manual.

Patil, Y., & Ingle, S. (2017). Status of the Ulhas River with reference to water pollution at Badlapur City, Dist. Thane. International Journal of Science and Research, 14(2013), 453-455.

Pereyra, M. Z. (2016). Design and development of two novel constructed wetlands. CRC Press.

Prianggoro, A. (2017). Wisata murah dan seru di Kampung Tridi, Kampong Glam-nya Singapura di Malang (affordable and fun tour in Kampung Tridi, Malang's Singaporean Kampong Glam). Retrieved from Tribunnews: http://www.tribunnews.com

Ramadani, A. (2018). Ratusan kilo sampah kotori Kampung Warna Warni (hundreds kilograms of garbage is messing up Kampung Warna-warni). Retrieved from Malang Voice: https://malangvoice.com

Rosyid, H. A., Palmerlee, M., & Chen, K. (2018). Deploying learning materials to game content for serious educational game development: A case study. Entertainment computing, 26, 1-9.

Sutrisnanto, V., & Parin, S. (2019, March). (A. Yulistryorini, Interviewer)

Tendean, C., Tilaar, S., & Karongkong, H. H. (2014). Domestic wastewater treatment in Slum Area of Calaca and Istiqlal, Wenang Sub-district. Sabua Journal of Built Environment and Architecure, 6(3), 293-306. Retrieved from https://ejournal.unsrat.ac.id

UN-HABITAT. (2008). Constructed wetlands manual. Kathmandu: UN-HABITAT Water for Asian Cities Programme.

Vymazal, J. and Kropfelova, L. (2008). Wastewater treatment in constructed wetlands with horizontal sub-surface flow. Czech Republic: Elsevier.

Vymazal, Jan. (2010). Constructed wetlands for wastewater treatment. Water. Vol. 2, p. 530-549.

Wibowo, F. A. (2018). Analysis of possible reasons for community and industry to dispose waste into river (analisis kemungkinan alasan warga dan pabrik membuang limbah di sungai). Retrieved from Academia: https://academia.edu.

Widianto, E. (2016, October 16). Kampung warna-warni Malang, dulu 'kumuh' sekarang jadi tempat wisata (Kampong Warna-warni Malang, formerly 'slum', now becomes tourism spot). Retrieved from BBC News: https://www.bbc.com

Wouters, P., van Nimwegen, C., van Oostendorp, H., & van der Spek, E. D. (2013). A meta-analysis of the cognitive and motivational effects of serious games. Journal of Educational Psychology, 105(2), 249-265. Retrieved from https://www.researchgate.net

Yulistyorini, A., Arum, K. P., Mujiyono, & Astri, A. (2019). Removal BOD and TSS of student dormitory greywater using vertical sub-surface flow constructed wetland of Ipomoea aquatic. Materials science and engineering, 515(012056). doi:10.1088/1757-899X/515/1/012056

ATTACHMENT

Table 1. Vegetation types and water column contact in constructed wetlands

Wetland Type	Vegetation Type	The section in connection with the water column
Free water surface (FWS)	Emergent	Stems, limited leaf contact
	Floating	Root zone, some stems/tubers
	Submerged	Photosynthetic parts, possibly root zone
Subsurface flow (SSF)	Emergent	Rhizome and root zone

Table 2. Pretest and Posttest Comparison

	Pretest		Posttest
1.	Greywater pollutes water.	1.	Information is presented interestingly.
2.	Greywater is not harmful to the environment.	2.	By playing the game, I understand greywater management more.
3.	Polluted water can cause various diseases.	3.	I learned the danger of greywater contamination in water by playing the game.
4.	Polluted water can still be utilized according to its allocation.	4.	By discussing, I can share my opinion with other participants about the danger of greywater contamination in water.
5.	Greywater can be directly released into sewer and river.	5.	Greywater pollutes water
6.	Greywater needs to be managed well.	6.	Greywater is not harmful to the environment.
7.	Soap and detergent belong to water pollutants.	7.	Polluted water can cause various diseases.
8.	Water pollution can only affect humans.	8.	Polluted water can still be utilized according to its allocation.
9.	Fish can live in water with greywater contamination.	9.	Greywater can be directly released into sewer and river.
10.	I know constructed wetlands.	10.	Greywater needs to be managed well.
		11.	Greywater needs to be processed before finally released into the sewer or river.
		12.	Soap and detergent belong to water pollutants.
		13.	Water pollution can only affect humans.
		14.	Fish can live in water with greywater contamination.
		15.	I know what constructed wetland is.
		16.	I understand how a constructed wetland works.
		17.	Constructed wetland minimizes greywater contamination effect in the water.
		18.	The outcome of constructed wetland can be utilized for irrigation and keeping fish.
		19.	I am interested in building constructed wetlands in my neighbourhood.
		20.	I plan to build constructed wetland to reduce greywater contamination.

Table 3. Scoring scale

Score	Meaning
1.	Participant strongly disagrees with the statement
2.	Participant disagrees with the statement
3.	Participant agrees with the statement
4.	Participant strongly agrees with the statement

Table 4. Participants' response to the workshop

Response	Percentage (%)
People who enjoyed attending the session	100
People who considered the game was informative	95
People who feel their environmental awareness increased through playing the game	91
People who could share opinions with other participants	100