

Assessing the Knowledge and Awareness Level of On-Job Training Graduates on Environmental Sustainability Issues

Hui-Suan Wei, Kok-Chin Khor and Veeramuthu Veerapan

Abstract- Human activities have accelerated greenhouse effect at an alarming level. It is everyone's responsibility to take immediate and sustained action in mitigating the issues on global warming. Therefore, the purpose of this research is to assess the knowledge and awareness level of on-job training graduates on environmental sustainability issues. It is quasi-experimental research adopting a two-groups of pre-test and post-test design with two groups of on-job-training graduates students (GITN and T.M.) who attended seven hours course on environment sustainability. GITN group consists of 87 participants, and T.M. group consists of 73 participants. Pre-test and post-test consist of 15 environment-related questions that had been administrated via Kahoot in the classroom. Students feedback were collected via google form at the end of the course to explore their will of participating in environmental sustainability. Slides presentation, videos and movies were used as the intervention between the pre-test and the post-test. Data collected in both pre-test and post-test were analysed descriptively using 5-number summaries and boxplots. The findings showed that concerning the environmental sustainability knowledge level, both groups had no performance difference in the pre-test and had gained improvement in the post-test. However, TM group gave a better improvement than GITN group. The results indicated that both groups showed a high willingness to address global warming issues. We shall improve our future research by having practical sessions at recycling centres or alternative practical activities related to environmental sustainability issues.

Keywords- Global Warming, Environment Sustainability, Green House Effect, Assessing Training Graduates

I. INTRODUCTION

Environmental sustainability issues have received much attention in recent years. For instance, issues caused by the global warming effect have a significant impact on human life and animal habitats. Scientists declared that the enhancement of "greenhouse effect causes global warming effect". The greenhouse effect is a natural process in keeping the earth surface warm at 33 degrees Celsius. Greenhouse gases consist of carbon dioxide, methane, water vapour, ozone, nitrous oxide and some other artificial chemicals. When the sun's energy reaches the earth's atmosphere, some of it is reflected back to space, and some are trapped by the gases, and the heat is radiated back to the earth surface. This process is essential to maintain the temperature on the earth to support most forms of life on

earth. However, human's activities such as burning fossil fuels, agriculture, livestock farming and deforestation have produced pollutants and increased the concentrations of greenhouse gases released in the atmosphere. These issues have gradually accelerated greenhouse effect to an alarming level. Environmental sustainability concerns the fundamental issues in protecting and maintaining environmental resources for future generations. It focuses on sustaining a balance of ecosystem for future economic and social needs.

The importance of environmental sustainability has been echoing over the last few decades. In 1987, Doctor Gro Harlem Brundtland presented the word "sustainable" in the Brundtland Report (entitled 'Our Common Future'). The word conceptualised as 'the needs of the present without compromising the ability of future generations to meet their own needs'. The concept has received a great response from media and academics. This report was then used by the United Nations to establish the United Nation Programme of Action on Sustainable Development. The report yields the foundations for the Rio Summit in 1992 in Rio de Janeiro, which has ultimately led to the creation of the United Nation Commission on Sustainable Development in the same year (Michelle E. Jarvie 2016).

In 2006, California Governor Arnold Schwarzenegger signed into law a sweeping global warming initiative that imposes the cap on greenhouse gas emissions, which has marked a new chapter of environmental protection in the U.S. nation (Ben Margot, 2006). On 1st January 2016, the United Nation Summit had officially launched the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development. These 17 new goals are universally applied to all over the world in the next fifteen years, in which countries will mobilise efforts to end all forms of poverty, fight inequalities and tackle climate change while ensuring that no one is left behind (United Nation, 2016). These efforts have aroused the importance of environmental sustainability in mitigating global warming effect.

Furthermore, the increased intensity and the rapid happened of natural disasters in the last two decades have witnessed the global warming effect. Natural disasters such as earthquake, tsunami, typhoon, flood, wildfire, extreme weather have caused immense suffering to people in the world from both develop and developing countries. EM-DAT database shows that the occurrence of natural disasters from 2009-2018 was 343 types as compared to 396 types in 2019. EM-DAT contains data of the

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occurrence and effects of more than 23,000 natural disasters from 1900 to the present day.

Global warming issues have gained much attention in the last few decades. United nation and world NGOs organisation have shouted for a move on environmental protection. In 2019, the U.N. Climate Action Summit aimed to reduce greenhouse gas emissions for preventing the rise of the mean global temperature by more than 1.5 °C (2.7 °F) above preindustrial levels. The submit fair initiatives include supporting jobs, clearing the air for better health, protecting the most vulnerable, initiating on adaptation, agriculture and early warning systems that will protect 500 million additional people against the impacts of climate change. However, the initiatives did not received supportive answers from all nations eventhough most of the nations has agreed with it (https://en.wikipedia.org/wiki/2019_UN_Climate_Action_Summit).

Many NGOs in Malaysia work to addresses key environmental issues and focus on a sustainable future for future generations. They are: Tzu Chi Foundation, Global Environment Centre (GCE), Malaysia Nature Society, Sabah Wetlands Conversation Society (SWCS), World Wide Fund for Nature (WWF), Water Watch Penang (WWP), Sabah Alam Malaysia (SAM), Treat Every Environment Specia (TrEES), Centre for Environment, Technology and Development (CETDEM), and Partners of Community Organisations in Sabah (PACOS Trust) (<https://www.jirehshope.com/>).

Statistically, the research works in environmental sustainability are increasing along with the awareness of the public on the importance of sustainability, yet it remains the world greatest problem. Human's activities through industrialisation, urbanisation, deforestation, land exploitation, livestock farming, etc. are at the forefront of global environmental pollution. The consequences have impacted all nations and mankind in the world. The awareness of environmental sustainability among young adults who will be leading the world in the next few decades is important for future environmental sustainability. In this study, the objective is to explore the level of environmental sustainability knowledge of two groups of on-job training graduates before and after the training. The implication of the study contributes to the direction of future research in the discipline of sustainability. The two groups of participants were from two companies, i.e. Telekom Malaysia and GITN Sdn Bhd.

II. LITERATURE REVIEW

A. Environmental Sustainability

Environmental issues continue as the largest story of the 21st century. For instance, the current Covid-19 pandemic has brought havoc life to people, but is this an accident or a consequence? The world is fighting with Covid-19, but the war between mankind and Covid-19 signify telling mankind to pay attention to environmental issues? As stated by the Food and Agriculture Organization of the

United Nations (FAO,2005), global warming or any climate change might increase the spread of influenza viruses and may lead to a further or severe global pandemic, just like the current created of Covid-19. This is because global warming may alter the life pattern of wild animals, such as migration, and eventually, the risk of contact between infected animals and humans would increase (Curseu, Popa, Sirbu, & Stoian, 2010). In addition, a recent early overview towards Covid-19 pointed out that human factors mainly determine the impact of Covid-19. This is because the relationship between human and the environment is closely related (Cheval, Mihai Adamescu, Georgiadis, Herrnegger, Piticar, & Legates, 2020).

Environmental sustainability is about protecting and maintaining environmental resources for future generations. It is also about protecting long-term productivity and resource health to meet future economic and social needs, such as protecting food supplies, farmland and fishery resources. Human beings are responsible for their behaviours, which brings about problems related to environmental sustainability issues (Abusafieh & Razem, 2017). Again, there is a significant interconnection between human beings and the environment. Therefore, it is necessary to educate different groups of people, such as graduates, so that they can gain a fuller understanding of the issues related to environmental sustainability, and help all environmental stakeholders to sort out the urgent ones among the issues.

Researchers from different backgrounds, such as environmental science, economics, business, agriculture, etc. are beginning to worry about the environmental issues that affect the consequences of human behaviours on environmental sustainability resources (Du Plessis, Nel, & Al-Shamaa, 2012). In the past few decades, about 97 per cent of climate scientist claimed that the earth's atmosphere had undergone dramatic changes due to human activities, which has led to climate change, especially global warming (Shahzad, 2015). These activities include illegally burning of garbage, and deforestation that causing a large amount of carbon dioxide to release to the atmosphere. Thus, human beings are feeling "boiled", and the increase in temperature is affecting both flora and fauna. Therefore, people need to understand the causes and impacts of global warming, whether it is catastrophic or a potential threat to human survival, and start to find solutions, especially for our future generations. Human beings should understand the responsibility in mitigating the global warming effect as well as other environmental issues.

B. Education in Environmental Sustainability

Education plays an important role in educating students, particularly creating awareness related to environmental issues among them (Boca & Saraçlı, 2019). Routines and habit of human beings are easily overlooked and may cause global warming and other adverse effects on the environment. Therefore, it is crucial to carry out some workshops and programmes related to environmental sustainability for nurturing good habits such as turning off the lights when they are not used, brushing teeth with water-tap closed and so on (Khan, Haque, & Khan, 2020).

According to research conducted by the University of Lampung, Indonesia, education level is a factor in determining students' knowledge towards global warming issues (Rosidin & Suyatna, 2017). Besides, research also showed that university students have a better understanding towards environmental issues and that they intend to gain more knowledge about the issues (Tshuma, Risiro, Murwendo, 2014; Freije, Hussain, & Salman, 2017). Research also showed that students' views and knowledge towards environmental issues are positively correlated to the education level, especially university education (Alcock & Cotton, 2012). University students have a better commitment to environmental sustainability as compared to other adults' who did not study at the university. Moreover, they are consistent in committing themselves to environmental sustainability. On the contrary, there is research that argues the social responsibility of university graduates of U.S. in environmental sustainability. The research showed that university graduates had taken courses related to sustainable development and green building strategies and environment quality. However, their concerns on the environmental issues were significantly low even though they had taken the courses (Jung, Park, & Ahn, 2019).

Much current research is exploring, selecting, assessing and evaluating the best knowledge they can provide in maintaining environmental sustainability, such as architectural experts, assisting changes in human behaviour toward environmental-friendly behaviour development (Abusafieh & Razem, 2017). Many schools have also implemented awareness programs aimed at maintaining environmental sustainability for youngsters and adults (Correia, Conde, Nunes, & Viseu, 2020).

Research shows that most people have the knowledge to make environmental resources sustainable, and people also understand what would make the environment resources unsustainable (Ausamah, Felix, & Darkwa, 2012). In other words, people needs a meaningful learning to put the knowledge into practice and to gain new insight in their life; which is referring to the practice of environmental protection in this study.

C. Zone of Proximal Development

Cognitivism explains the learning process involving think, memory and problem-solving. In other words, the entire learning strategy of cognitivism is to learn through receiving new information and matching it with existing known knowledge (Ertmer & Newby, 1993). University graduates are expected to gain a better knowledge of the issues on environmental sustainability. However, only a few research were conducted on them. In this study, constructivist Vygotsky's Zone of Proximal Development is used to explained the learning behavior where participants gained and construct new knowledge. The knowledge formed between the area of what is known and what is not known is called Zone of Proximal. The theory suggests that appropriate intervention, motivation and guidance are required to develop and maximize the zon of proximal in the learning process. This study aims to

enhance the knowledge level of environmental sustainability among on-job training graduates. Pre-test and post-test in the study implies the knowledge and cognitive ability of the participants. The participants' "what is known" in the knowledge of environmental sustainability was explored using a pre-test before new information about environmental sustainability is obtained at the workshop. An intervention was given to fill the participants' knowledge gap. Lastly, participants' knowledge level was re-assessed using a post-test.

D. Summary

All in all, it is particularly important to let the graduates understand and know the importance of maintaining environmental sustainability. Firstly, they are at a better education level, as education level plays a role in determining students' knowledge towards environmental issues (Rosidin & Suyatna, 2017). Secondly, they are in the progress of stepping into society. Thus, maintaining environmental sustainability should not be ignored by them. The goal no 13 of United Nation SGDs is related to climate action. Thus, it is time for people to look seriously into climate issues. It is important for our generation to understand their responsibility in handling environmental issues and maintaining environmental sustainability.

III. RESEARCH METHODOLOGY

In this research, we would like to explore the knowledge level of environmental sustainability among on-job training graduates. The purpose of this research is to assess the knowledge level of on-job training graduates on environmental sustainability issues. It is quasi-experimental research adopting a two-groups of pre-test and post-test design with two groups of on-job-training graduated students. They attended seven hours course on environment sustainability. GITN group consists of 87 participants, and T.M. group consists of 73 participants. The participants are aged between 21 to 25 years old.

Before the intervention, participatns were given 15 environment-related questions that had been administrated via Kahoot in the classroom. The questions were derived from the content of the training covering the cause and effect of climate change on earth, human activities that contribute to pollutants, and the solution in mitigating climate change. The training started with a role-play buying packed foods from the stall to arouse the awareness of the amount of rubbish produces every day, especially plastic bags and styrofoam food container. Slide and videos were used to explain the cause and effect of human activities that expedite the impact of global warming. Videos showing the impact of global warming on polar bear's habitat and north pole ice melting took by scientists on National Geographic were played to elaborate on the needs of sustainability. Furthermore, participants were exposed to the major natural disasters that happened from 2000 to 2019. After the explanation of the cause and effect of global warming, participants were requested to search for information related to the impact of global

warming and presented using google slides. Subsequently, a video entitled “Game Changer” was devised to provide information on healthy diets and environment protection.

After the intervention activities, participants were requested to answer post-test questions which were the same questions posted on pre-test after completion of the training to determine what the participants have learned. Participants’ feedbacks were also collected via google form at the end of the course to explore their will of participating in environmental sustainability. Data collected was analysed descriptively by comparing the score of pre-test and post-test within the group and among the group.

IV. FINDING AND DISCUSSION

We compared the performance (scores in percentage) of the two groups of on-job-training graduates in both pre-test and post-test using 5-number summaries, median and standard deviation. The 5-number summaries were then visualised using boxplots to ease comparison. Using the boxplot, we excluded outliers in our considerations so that we can understand the actual group performance.

TABLE 1. THE 5-NUMBER SUMMARIES, AVERAGE AND STANDARD DEVIATION FOR BOTH GITN AND T.M. GROUPS IN THE PRE-TEST.

Group	Min	Q1	Median	Q3	Max	Mean	Standard Deviation
GITN	0	32.76	45.34	58.84	100	45.67	18.78
TM	8.83	31.30	44.43	52.55	91.36	43.69	16.92

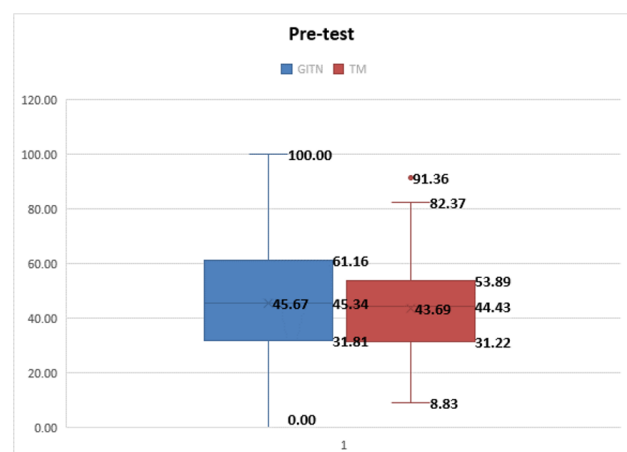


Figure 1. Comparing the performance of GITN and T.M. in the pre-test using boxplots. The dot outside the boxplot is an outlier.

As shown in Table 1 and Fig. 1, there was not much performance difference in the pre-test for both groups of on-job-training graduates. Both groups showed about the same centre of distribution with a slight difference in data spread. Further, both groups were also very similar in Q1, median and mean. In short, neither group showed their advantage in the pre-test. Performance-wise, both groups were about similar. However, the

standard deviation was large for both groups, indicating that there are students who are unable to copy or show their interests as well as students who can pick up very well in the pre-test.

Table 2. The 5-number summaries, average and standard deviation for both GITN and T.M. groups in the post-test.

Group	Min	Q1	Median	Q3	Max	Mean	Standard Deviation
GITN	0	63.32	75.47	88.48	98.48	74.36	18.60
TM	0	86.29	91.43	96.17	100	88.46	13.86

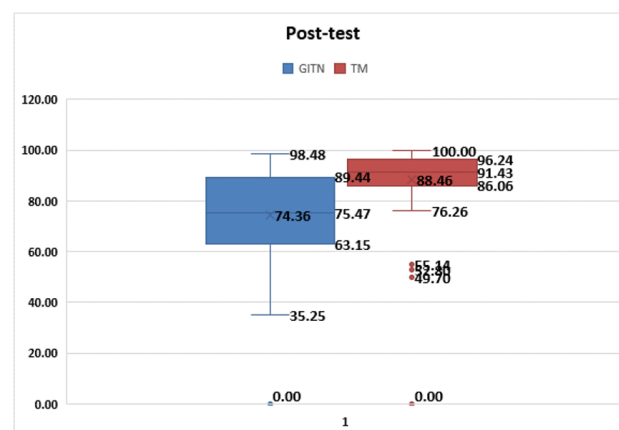


Figure 2. Comparing the performance of GITN and T.M. in the post-test using boxplots. The dots outside the boxplot are outliers.

Both groups showed a better performance in the post-test than the pre-test with an increase of scores in overall. Such results indicated that both groups had gained a learning improvement in issues related to environmental sustainability. Nevertheless, the T.M. group performed better than the GITN group showing a left-skewed distribution with a mean value of 88.46 and a rather smaller data spread (Fig. 2 and Table 2). In short, the on-job training graduates of the T.M. group had increased their score significantly in the post-test.

V. CONCLUSION AND FURTHER RESEARCH

The results showed that knowledge and awareness are acquired through a meaningful intervention. The intervention has filled the knowledge gap. Therefore, in the learning process, participant’s past experience has been recalled and integrate with the new knowledge that construct a new experience or knowledge.

As elaborated in the introduction, the global warming effect is at an alarming level, the awareness and action towards mitigating global warming through human activities is an urge. However, the statistics showed that the awareness and knowledge of graduate students on environmental sustainability were relatively low, with a big gap in the knowledge level among the students. The results reflected that the young graduates did not have enough knowledge exposure or did not concern about environmental issues. Another possibility is lack of enforcement of environmental sustainability education in

school and higher education. The results have relayed an important message that our society needs to enforce education in creating awareness on environmental sustainability. School and higher education may need to relook into the curriculum and co-curriculum, embedding topics on environment issue and implement practical session into the learning process.

The drastic increased in the knowledge level after the training implies that the young graduates were ready to learn. Evidently, they have gained new knowledge and insight into perceiving environmental issues. Tabling the natural disasters that happened around the world over the years helped to open up their eyes while the knowledge on environmental sustainability could help them implement the green concept or green technology in their future working environment. Moreover, the implementation of 5R concept (Refuse, Reduce, Reuse, Repair, and Recycle) directly contribute to the effective cost management of the company. The intervention has successfully embedded the knowledge of environmental sustainability and cultivate the sense of responsibility towards themselves and the environment. Nonetheless, in this study, there were participants who showed no interest and concerns on environmental issues. These are the target group who need further exposure and enhancement activities. The impose of law on environment protection may discipline the people; culture and moral behaviour form the nation.

The improved of the participants' knowledge on environmental sustainability in this study has sparked the flame of hope in educating the society of the importance of environmental protection. A longitudinal research in tracking the change of the behaviour of the participants

after attending the training on environmental sustainability are proposed for the future research.

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