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Geography Teachers' Knowledge of Sustainable Development Goals (SDGs)

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Abstract

The 2030 Agenda of Sustainable Development Goals (SDGs) has now been accepted as an idea for a more peaceful world. Malaysia has implemented the SDGs into the 11th Malaysia Plan, and including the education sector. The Secondary School Standard Curriculum (KSSM) Geography has incorporated elements of global sustainability and global citizenship at the lower and upper secondary education levels. Geography teachers have a responsibility to understand the idea of SDGs that they need to integrate in the teaching and learning (T&L) activities in the classroom. However, the findings from previous studies showed that the level of teachers' knowledge about Education for Sustainable Development (ESD) and SDGs is still low level, even though they have been introduced for a long time. This study was conducted to measure the level of knowledges among Geography teachers in Penang and to examine the differences between option and non-option teachers based on their SDGs knowledges. A total of 252 participants were involved in this study. This study used a quantitative method through a questionnaire instrument. The findings showed that the overall general knowledge of SDGs were at a high medium level which included the term of Sustainable Development (SD), Sustainable Development Goals (SDGs), and meaning of sustainable dan targeted SDGs by year 2030. Meanwhile, for 17 goals of SDGs showed high and high medium levels among Geography teachers. Overall, teachers' knowledge was at a high level for the dimension of environmental based on the 17 goals of SDGs. The rest of the goals were observed at high medium levels for the economic and social dimensions. Besides, the findings indicated that there is a significant difference between the groups of option and non-option teachers. Therefore, in this case, specific training in the SDGs agenda is required for Geography teachers to increase knowledge and facilitate the integration of SDG elements into the teaching and learning (T&L) activities.

Keywords: Sustainable Development Goals; Geography Teachers; Teachers' Knowledge; option teachers; non-option teachers; qualitative.

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Introduction

The world has now accepted the idea of Sustainable Development Goals (SDGs), which is sustainable development (SD), as the triple bottom line for a peaceful world (Sachs, 2012). The SDGs have integrated, consolidated, and balanced the three pillars of economic, social and environmental related elements of sustainable development (SD) as shown in Figure 1

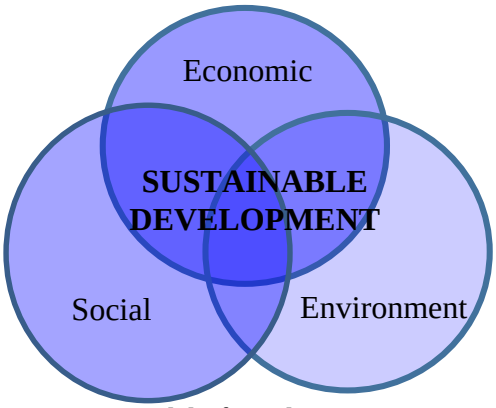


Figure 1. Model of Triple Bottom Line

The SDGs were introduced as a United Nations Development Program starting from 2015 to 2030, which has been extended from the Millennium Development Goals (MDGs), to achieve unsuccessful targets (Ferri, 2015). Seventeen objectives of the SDGs have been introduced to address global problems such as poverty, unemployment, increasing inequality and differences related to gender, wealth and power, political and environmental threats (UN, 2015). In addition, the SDGs form a part of the 2030 Agenda for Sustainable Development (UN, 2015) to provide assurance for future generations (UN, 1987). The specific goals for the 17 SDG goals are as shown in Figure 2.

Figure 2. Seventeen Goals of Sustainable Development Goals (2016-2030)

Malaysia is committed in implementing the SDGs and upholds the aspirations to change the world by 2030 through the Post-2015 Agenda (Economic Planning Unit, 2017). The 11th Malaysia Plan was formulated by incorporating various elements as a multi-dimensional mirror of the SDGs' themed "Developing the people" with an integration of the goals of the SDGs and the New Economic Model. The 11th Malaysia Plan is, in essence, aligned as a major part of the Sustainable Development Goals (SDGs). Mokshein (2019) has stated that the New Economic Model was announced in 2009 with the main target of high income, inclusiveness, and sustainability as long-term development by 2020.

The Economic Planning Unit (2016) has introduced the Integration of Agenda 2030: The Malaysian SDGs Framework by assimilating this Agenda 2030. A specific theme for the Malaysia SDG Framework Plan has been set as "no one is left behind" (Economic Planning Unit, 2016). Now, Malaysia have been moved to phase II of the Malaysian SDGs Framework after end of 11th Malaysia Plan. Three phases of SDGs' implementation that have been finalized are as follows:

i. Phase I (2016-2020): Prioritising the SDGs according to the 11th Malaysia Plan
ii. Phase II (2020-2025): Focus on post 2020 goals and targets
iii. Phase III (2025-2030): Remaining goals and targets in line with Malaysia's capacity and global role.

Thus, the role of education is very important to bring the goals of the SDGs to the young generation, as well as to ensure that the people and the country meet the goals and achieve the Agenda 2030. Education plays an important role in fostering sustainability (UNESCO, 2006) and sustainability education enables the implementation of other goals in the SDGs (UNESCO, 2017). Furthermore, according to Wooltorton (2004), education is a very important medium for developing the human perspectives, cultivated through sustainable values. Meanwhile, the Agenda 21, has also established the policy stating education as a medium to convey messages about the environment and development in the world (UNCED, 1992). Education is essential to promote sustainable development and increase the capacity of citizens to address environmental and development issues (UNCED, 1992).

Teachers, on the other hand, are important agents of change to take the necessary actions in the field of education to achieve the goals of the SDGs (UNESCO, 2017). The knowledge and competencies of teachers will restructure of educational processes and educational institutions towards sustainability and teacher education must also meet the challenges with changes towards ESD (UNESCO, 2017). According to Guo et al. (2018), Geography plays a very important role in Education for Sustainable Development (ESD) even though Sustainable Development (SD) is classified as a Science discipline. Therefore, Geography teachers should expand their knowledge to have a deeper impact on teaching and learning (Guo et al., 2018). According to Rieckmann, Mindt and Gardiner (2017), the achievement of the SDGs depends on ESD activities in education. In fact, the study of space and place in Geography plays a major role in conveying ESD (Sanchez, 2011). Thus, the role of Geography teachers is crucial and they are responsible to bring the SDGs agenda into their teaching practices in the classroom.

In 2013, the Malaysian Education Development Plan (PPPM) was launched over a period of 12 years starting in 2013 to 2025 and a new curriculum, the Secondary School Standard Curriculum (KSSM) was introduced. In Secondary School Standard Curriculum (KSSM) for Geography has incorporated elements of global sustainability and global citizenship at the lower and upper secondary education levels to produce students who are positive attitudes towards a sustainable environment (Bahagian Pembangunan Kurikulum, 2015). These elements are in line with the Goal of SDG4.7, which is to develop knowledgeable and skilled students to promote sustainable development through ESD and global citizenship (Building and Employment, 2016). In this case, Mohammad Zohir (2016) stressed that Geography education in Malaysia is based on ideas and concepts involving education and a global dimension that include the dimensions of sustainable development (SD) and education for sustainable development (ESD). Therefore, Geography curriculum in Malaysia has achieved the global requirement and Geography teachers should play an essential role to deliver the goals of SDGs during the teaching and learning (T&L) processes based on their understanding.

Research Objective

Teacher's knowledge about ESD and SDGs from various studies indicated a low level even though they have been introduced to the concepts for a long time. The focus of research in ESD or SDGs among Geography teachers in Malaysia and other countries still lacks the attention of researchers. However, Geography plays an important role in ESD to determine the achievement of SDGs. According to UNESCO (2017), ESD is a key instrument for achieving other goals in the SDGs. Thus, this study is important to identify the level of knowledge among Geography teachers about the SDGs agenda.

In addition, the issue of teachers teaching out of the fields, including Geography, also becomes a factor in the teachers' ability to bring the SDGs agenda into the classroom. According to Zainizam and Chew (2015), the placement and exchange of teachers in Malaysia are based on humanitarian considerations and not according to service needs and options. This method is still implemented to this day and teachers are forced to teach out of the field of options and professional qualifications. In case of Geography, Mohammad Zohir (2016) stated that the problem of lack of option teachers who teach Geography does not get due attention. This study also attempts to identify the difference between the groups of option and non-option Geography teachers and their knowledge about SDGs.

Literature Review

According to UNESCO (2015), the SDGs rely on ESD activities which are a key factor of quality education as in the SDG4 goals. Hopkins and Mckeown (2005) stated that, the integration of ESD in the curriculum is a need for a more holistic approach. Malaysia has implemented a sustainable development education approach in schools in the form of competitions since 2005 through the Environmental Award Sustainable Schools Competition (SLAAS). Based on a study by Rabiatul Adawiah and Norizan (2012), the overall knowledge of ESD among secondary and primary school teachers in various fields was considered good, but at a minimum in the relationship between the three dimensions of environmental, economic, and social.

Meanwhile, studies in other countries related to teacher's knowledge found that the levels were still low. The study of Guo et al. (2018) among teachers in China with over 10 years of experience teaching Geography subjects, found that teachers have lack knowledge and need support during the implementation of elementary content. In addition, another research by Aye, Win, and Maw (2019) also found that lower secondary teachers in Myanmar have less knowledge in implement the ESD. The same results were observed among pre-service teachers in Thailand about the 17 goals of the SDGs which indicated a lack of knowledge about sustainability (Sunthonkanokpong & Murphy, 2019).

Methodology

This study used the quantitative approach through questionnaire instrument to collect data. According to Creswell (1994), quantitative studies can explain the phenomenon through data collection methods in the form of numerical data and analysed using statistics. Meanwhile, the population of the study was as teachers who teach Geography in secondary schools in Penang. The total participants involved in this study was 252 teachers which exceeded the minimum Krejcie & Morgan (1970) requirement of around 185 respondents. The sampling in this was conducted in random sampling method through online resources considering restriction during the Covid-19 pandemic.

The instrument used in this study was a questionnaire consisting of 21 items adapted from Afroz & Ilham (2020) and Zamora-polo et al. (2019). A five -point Likert scale was used as the respondent's feedback option ranging from scale 1 (very low) to scale 5 (very high). The questionnaire was adapted from the original version in English. All items were translated into Bahasa Melayu (Malay language) using the 'back-to-back translation' method, by ensuring that they do not deviate from their true meaning in English (Brislin, 1970). These items were then reviewed by two experts in the field of the English language and Bahasa Melayu. Feedback from this face validity review were used for improvement of each item involved. Whereas the content validation assessment were made by experts in ESD, SDGs and Geography experts in education.

Each item was analysed through the Content Validity Index (Item Content Validity Index) (i-CVI). Each item used had met the item suitability criteria with a difference in mean value = 0.99. According to Lynn (1986), the minimum value for i-CVI is 0.78, as representing an acceptable item. In addition, for the consistency aspect of the instrument, the Cronbach's Alpha reliability test was performed. Each item had a high instrument consistency with the Cronbach's Alpha value exceeding 0.965. According to Lim (2007), a reliability coefficient value of over 0.90 is considered as very good.

Findings

This study involved a total of 252 respondents consisting of Geography teachers from various types of secondary schools in Penang. Based on Table 1, the respondents consisted of a total of 194 female teachers (77%), which is a majority, compared to 58 male teachers (22%). Most of the respondents were specialized in the field of Geography or mentioned as option teachers, which is 159 people (63.1%), and the rest were non-option teachers of Geography, or called as out-of-field, as many as 93 people (36.9%).

Table 1. Profile respondent

	Profile Respondent		N	%
1.	Gender	Male	58	23
		Female	194	77
2.	Group of teachers	Option Geography	159	63.1
		Non-option Geography	93	36.9

In this study, descriptive analysis was conducted to compare mean value (M) and standard deviation (SD). The mean scores of knowledge levels were interpreted based on Nunnally and Bernstein (1994). The five-point Likert scale used on the knowledge section in the questionnaire instrument was converted to 4 levels, as shown in Table 2 below.

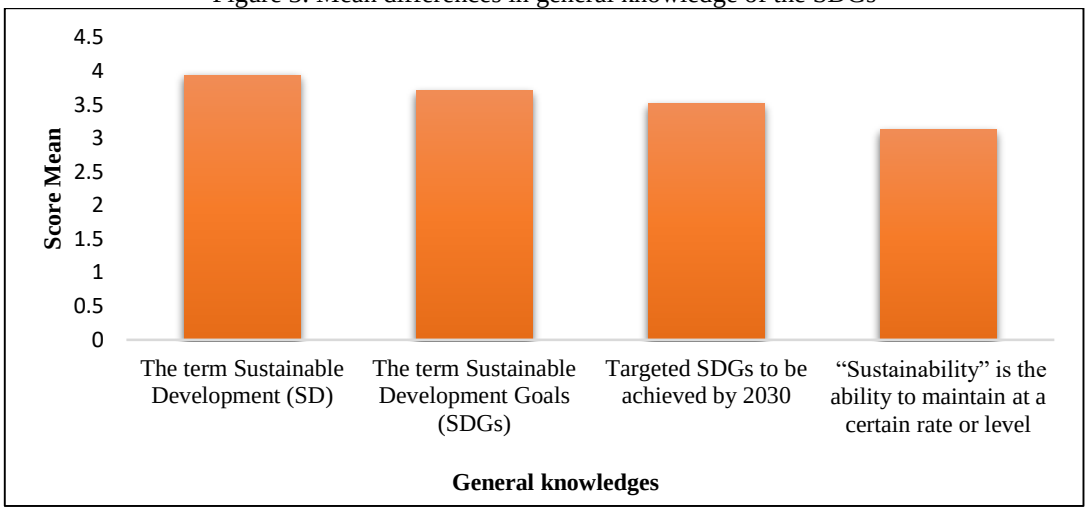
Table 2. Interpretation of mean scores for knowledge levels

Mean Scores	Interpretation of knowledge levels
1.00 – 2.00	Low
2.01 – 3.00	Low Medium
3.01 – 4.00	High Medium
4.01 – 5.00	High

Source: Nunnally and Bernstein (1994)

Based on Table 2, the overall findings show that the level of Geography teacher's knowledge of SDGs is at a high medium level. Based on the mean difference, "the term Sustainable Development (SD)" showed that the mean value almost reached a "high level" (M = 3.94, SD = 0.861), compared to other general knowledge, and was followed by the meaning of "the term Sustainable Development Goals (SDGs)" (M = 3.71, SD = 0.818). Meanwhile, "high medium" levels were obtained for "SDGs is targeted to be achieved by 2030" and "the term Sustainability", with mean values of (M = 3.51, SD = 0.963) and (M = 3.13, SD = 0.989), respectively. The differences for the four elements of general knowledge related to the SDGs are shown in Figure 3.

Figure 3: Mean differences in general knowledge of the SDGs



Based on the finding of general knowledges showed that the term of SD is very familiar to the teachers but the term of SDGs still new for them. SDGs has just been introduced in education and in line the targets to be achieved by 2030. In addition, the element of global sustainability was introduced on 25 September 2015 into the national curriculum through the Malaysian Education Development Plan (PPPM) for 2013-2025, in line with the SDGs declaration and the aspirations of the SDGs goals (Bahagian Pembangunan Kurikulum, 2016). Meanwhile, Sustainable Development (SD) has been introduced in the formal education system since 2001 and also through the Environmental Award Sustainable Schools Program in Malaysia (SLAAS) in 2005 (Jabatan Alam Sekitar. 2012).

The results for the 17 goals of SDGs revealed that for SDG7, SDG11, SDG13, SDG14 and SDG15, teachers were at a "high level" of knowledge. Meanwhile, for other SDGs, it was at a "medium high" level. In addition, the results were also analysed the 17 goals according to the SDGs dimensions, namely economic, social, and environmental. Overall based on average, teachers' knowledge was at a "high level" for the dimension of environmental (M = 4.02; SD = 0.859), compared to the dimension of economic (M = 3.70; SD = 0.880), and social (M = 3.56; SD = 0.931). The environmental dimensions are related to "access to clean water and sewerage" (SDG6), "access to non-polluting energy" (SDG7), "responsible use and production" (SDG12), "weather protection measures" (SDG13), "protection of aquatic life" (SDG14), and "protect life in terrestrial ecosystems" (SDG15). A previous study by Maidou et al. (2019) related to SD among pre-service teachers also showed that understanding of the environment is more important but less awareness of social and economic aspects, and there were similarities in the findings with a study among pre-service teachers of Geography and Science in elementary schools (Summer, Corney & Childs, 2004. The findings in this study indicate that the level of knowledge among Geography teachers for environmental elements higher than economic and social elements and these are in line with the findings on previous studies of SD knowledge.

Table 3 Distribution of scores by item for teachers' knowledge of the SDGs

	Statements	M	Level of Mean Score	(SD)	SDGs Dimension
General knowledge of the SDGs					
1.	The term Sustainable Development (SD)	3.94	Medium high	0.861	
2.	The term Sustainable Development Goals (SDGs)	3.51	Medium high	0.963	
3.	The SDGs are targeted to be achieved by 2030	3.13	Medium high	0.989	
4.	"Sustainability" is the ability to maintain at a certain rate or level	3.71	Medium high	0.818	
Knowledge of the SDGs					
SDG1	Poverty reduction	3.36	Medium high	0.914	Economic
SDG2	Hunger reduction	3.38	Medium high	0.926	(Mean Average
SDG3	Health care and wellness	3.72	Medium high	0.886	=3.70, SD Average
SDG8	Decent work and economic growth	3.82	Medium high	0.860	=0.880)
SDG9	Industry, innovation and infrastructure	3.88	Medium high	0.848	
SDG4	Quality education	3.80	Medium high	0.847	Social
SDG5	Gender equality	3.26	Medium high	0.979	(Mean Average
SDG10	Reducing inequalities	3.46	Medium high	0.924	=3.56, SD Average
SDG11	Creating sustainable cities and communities	4.08	High	0.846	=0.931)
SDG16	Peace building, justice and corruption-free institutions	3.49	Medium high	0.963	
SDG17	Building alliances to achieve the above goals	3.29	Medium high	1.028	
SDG6	Access to clean water and Sewerage	3.95	Medium high	0.843	Environment
SDG7	Accessible and non-polluting energy	4.02	High	0.870	(Mean Average
SDG12	Responsible consumption and production	3.86	Medium high	0.870	=4.02, SD Average
SDG13	Weather care	4.08	High	0.887	=0.859)
SDG14	Care of underwater life	4.10	High	0.834	
SDG15	Care for life in terrestrial ecosystems	4.12	High	0.851	

As mentioned above, two group of teachers were involved in this study, which were "option teachers" and "non-option teachers". The difference between the two group was analysed through mean and t-test analysis as shown in Table 4. The t-test analysis conducted revealed that there was a statistically significant difference for the knowledge on the SDGs for both groups of option and non-option teachers in term of SDGs knowledges, $t(237, p=.000) = 5.253$, $p<0.05$. Besides, there was a difference between option ($M = 3.877$; $SD =.644$) and non-option ($M = 3.429$; $SD = .668$) teachers in SDGs knowledge. The results of the mean analysis reported high medium level for both of the group of teachers. However, the knowledges of SDGs for group of option teachers was higher than the non-option group in all elements.

Table 4. Differences of option and non-option teachers based on SDGs knowledges

No.	Group of teachers (N=252)	No. of Teachers (%)	Mean (M)	Standard Deviation (SD)	t-score *(df)*	Sig. (2-tailed)
1	Option	63.10	3.877	0.644	5.253 (237)	0.000
2	Non-option	36.90	3.429	0.668		

The number of non-option teachers involved in this study represented more than one third of the sample (36.90%). This shows that the issues of out-of-field teachers teaching Geography is still unresolved, even though, similar concerns of the lack of option in Geography had been reported in study by Mohammad Zohir (2016). Caldis dan Kleeman (2019) stated that except for the classes taught by a specialist teacher, the quality of teaching in Geography classrooms is deteriorating. Moreover, the effective teaching by a Geography teacher is also an important feature for excellent Geography education (Lane, 2015; Weldon, 2016). As a result, in this case, special training in SDGs agenda is very important for Geography teachers to achieve the competency in the implementation of SDGs in their teaching and learning (T&L) sessions. The effectiveness of T&L is critical to develop knowledgeable and skilled students to promote sustainable development.

Conclusion

The Sustainable Development Goals (SDGs) are an important agenda for Geography teachers to bring the elements to the classroom. In addition, Geography teachers have a responsibility to understand the idea of SDGs so that they can integrate into the teaching and learning (T&L) activities. In this study, it is concluded that the overall general knowledge of SDGs among Geography teachers were at a medium high level, which included the term of Sustainable Development (SD), Sustainable Development Goals (SDGs), meaning of sustainability dan targeted SDGs by year 2030. Meanwhile, for the 17 goals of SDGs, the results revealed high and medium high levels among the Geography teachers. The findings showed that overall, teachers' knowledge was at a high level for the dimension of environmental, especially for SDG7, SDG13, SDG14 and SDG15. The rest of the goals were found at medium high levels, namely for the economic and social dimensions. Moreover, the findings indicated that there is a significant difference between the groups of option and non-option teachers in terms of SDGs knowledges. Thus, to increase the knowledge of the SDGs, special training is required for all the teachers, especially for the group of non-option teachers who teach Geography. The teacher's competency in SDGs knowledge is very important to enhance the effectiveness of the implementation of SDGs in classroom activities.

Limitation and future research

Limitation

This study used a quantitative research method that is limited to the number of respondents among secondary school teachers who are involved in teaching the Geography subject. The findings do not reflect the teachers of other subjects in terms of their teaching practices in different classrooms or environments. The study was conducted only in the state of Penang which may not be generalized to represent Geography teachers in Malaysia.

Future research

This study was conducted using a questionnaire instrument, which is a quantitative approach to obtain data. Future research may consider using one of the qualitative methods, such as in-depth interview. This method can generate more detailed information related to the SDGs through the analyses of the qualitative data. Although, this methodology can be quite challenging but can produce more conclusive results about the actual phenomenon. Besides, a mixed method research is also suggested to be considered in this types of study.

Future studies can also consider the pre-service teachers who are specializing in Geography, which focus on teacher competence regarding the SDGs. Competencies of teachers can be identified at an early stage to develop the teachers' understanding of the SDGs, attitudes, and approaches to the teaching practices that use elements of the SDGs.

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