

Implementation of education for sustainable development in geography subjects among trainee teachers

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ABSTRACT

Education for sustainable development (ESD) is a truly positive measure. This study was unique in that it made students aware of the positive qualities. Therefore, ESD is crucial to be inculcated among students. If the students are provided with in-depth knowledge related to sustainable development, hence it is not impossible for the sustainable development concept to come true. The study was conducted at Universiti Pendidikan Sultan Idris (UPSI), Perak, Malaysia. The respondents involved are geography students who have undergone teacher training in semester 7 and semester 8. This study also focused on the level of knowledge and the level of mastery among trainee teachers on ESD. In addition, this study was carried out for the trainee teachers to obtain the data the on the implementation of ESD values in teaching and learning (T&L) of geography subjects via a survey. Result showed that T&L of geography subjects shall be interesting and challenging so that students can enjoy fun learning. Teachers need to be smart in finding approaches to be tailored to the curriculum, especially in the geography subjects.

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1. INTRODUCTION

The relationship between humans and the environment has been established since the existence of the former on earth. To deliberate on the issue, sustainable development is one of the significant aspects of the relationship [1]. The concept of sustainable development is established due to the awareness of the importance of conservation and preservation of environmental resources [2]. There are some issues on environment were discussed at the Rio De Janerio Earth Summit in 1992 and Johannesburg on August 26 to September 4, 2002 [3]. Agenda 21 was created as a result of the 1992 conference, which is an action plan that outlines a set of Principles that cover all aspects to be used as a guide to facilitate the parties involved in implementing policies and programs that involve environmental conservation and preservation [4].

The existence of education for sustainable development (ESD) is a positive move. The existence of ESD helps to inculcate awareness and positive values among the students [5]. Therefore, ESD is crucial to be applied to them. If students are provided with in-depth knowledge related to sustainable development, hence it is possible to realize the concept of sustainable development [6]. This study aimed to provide awareness among the trainee teachers of the importance of ESD to students. Also, this study aimed to provide expose students with the importance of the education on the environmental conservation and preservation through ESD. Figure 1 shows the concept of ESD theory, which provides guidance and exposure to the trainee teachers of the importance of the conservation and preservation of the environment via ESD.

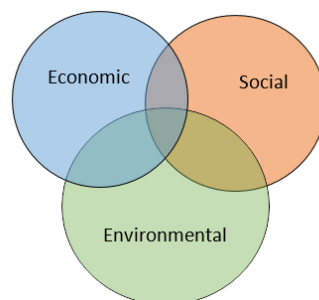


Figure 1. ESD theory [7]

2. LITERATURE REVIEW

Sustainable development is defined as the process or target as an idea for a good eternal life [8], [9]. Sustainable development also means development that meets the current needs without affecting the environment at present so that future generations can fulfill their own needs [2], [10]. Meanwhile, united nations educational, scientific and cultural organization (UNESCO) defines sustainable development as an aspect that includes social, environmental and economic components, which are intertwined [11], [12].

The sustainable development goals (SDG) is a program that focuses on human rights that comprises three dimensions, namely, social, environment and economy [13], [14]. SDGs help to maintain the developmental balance that takes into account all parties involved. SDGs outline conservation of resources, physical development, improvement of environmental quality, social equality and political participation [7]. Among the goals emphasized are to ensure that the resources get replenished and the use of non-renewable resources is reduced.

In fact, SDGs aim for societal wellbeing in an integrated context that involves economic, social and ecological aspects. In general, development is defined as the transformation process to achieve a better quality of life [15]. Likewise, development can be defined in a broader concept, where it leads to the process of planned improvement for the purpose of achieving goals that have been set. In general, sustainable development is defined as the development that leads to the wellbeing of the current generation on an ongoing basis but also takes into account the wellbeing of future generation.

2.1. Education for sustainable development

ESD is an educational approach that is required for the purpose of maintaining and improving the quality of life for future generation [16]. The application of ESD can be implemented via education or learning [17]. The United Nations has declared that the period between 2005 and 2015 is for sustainable development, UNESCO also highlights that education is a medium that can uplift society to a more sustainable dimension [18]. The main purpose of this goal is to create a more sensitive and educated society that comprises all aspects and include the domain of sustainability [19]. Education involving sustainable development shall be given attention in the curriculum of geography [20]. ESD is not just a theory, idea, concept and issues that involve sustainable development, it also encompasses student-centered pedagogy [21]. It does help to shape autonomous thinking, critical thinking that in the meantime builds skills of inquiry, creativity, imagination, and collective decision making. ESD refers to the process of increasing awareness, competence, attitudes and values to help them to engage more effectively with sustainable development [22].

UNESCO defines ESD as a complex and dynamic process since its scope is broader and has relevance to social, economic and environmental aspects [23]. On top of that, knowledge is one of the components that influence behavior [24]. This means that the understanding and knowledge in ESD will influence behavior towards the environment. An in-depth understanding in education involving sustainable development shall render an impact and change in the value of attitudes as well as skills and behavior [25]. Thus, the deeper the teachers' knowledge on issues related to sustainable development, the greater the impact of the matter on their students. The teachers' attitude of affects the students since teachers are the executing agent. Teachers' knowledge significantly affects the students' thinking so they shall ensure that the information transferred to their students is accurate [20]. Teachers shall be equipped with the knowledge in environmental education and master the environmental education philosophy to disseminate messages pertaining to environmental care.

The development in geography education is influenced by the pre-colonial perspective, prior to independence and during the early post-independence period [5]. Education is an offensive approach, its impact on SDGs is crystal clear due to the existence of ESD. Besides ESD, there are other types of education

with regards to the environment. One of them is environmental education. Issues involving the environment are emphasized worldwide, including education and the sustainable development agenda.

According to ESD was formally implemented in 2001 in the Malaysian school system via the sustainable school-environment award (SLAAS) program. This is in line with the goals in the national environmental policy. Education is the most ideal approach to convey messages and information related to environmental protection [26]. Malaysia fully supports the efforts related to sustainability in development. In fact, Malaysia has proposed sustainability of development in education or ESD. As a result, the first measure taken by the higher learning institutions is to come up with guidelines that are specific and tailored to the design for sustainable campuses [27].

The sustainable development concept in Malaysia has adapted the technology from the outside. The awareness of the importance of environmental care in this country has led to various measures being taken so that the environment is always preserved. One of them is the concept of sustainable residential college (KKL), to be carried out once all aspects encompassing the principles and the guidelines have been considered. ESD is an organized effort that aims to provide the community with formal education or otherwise to preserve the community wellbeing and survival [21].

This is a great move by the government to introduce ESD as a subject in the education system. This renders a desired effect on teachers, it also helps students to be more sensitive to the environmental issues. ESD is a lifelong learning process for the purpose of providing information and engaging the community to be more creative. ESD can be delivered either formally or informally. In terms of formality, environmental education takes into account local values and is in line with the purpose of ESD [28]. Education has the major purpose to improve the knowledge of the community and their sensitivity to the environment. This proves that education does influence the attitudes and practices of the society. Education is not just about receiving knowledge, it also needs to be sought [29].

Education involves activities to help stimulate students in learning. It is an effective platform in spreading awareness because knowledge is a long-lasting legacy. Education can also influence individual character and skills. In this regard, a form of education has been established to spread awareness to the community so that they are more sensitive to environmental issues [30].

ESD has existed since the last 15 years and has developed gradually, which is in line with the positive impact from the historical studies that were at first conducted via natural learning before being shifted towards remedial measures and finally switched to environmental education [31], [32]. Time has changed, so does human beings. Hence, people should now shift their paradigm for sustainable development. The younger generation must be educated from a young age so that they will be inculcated with the values that care for the environment exists [33]. Teachers play an important role in educating the younger generation. Education is the best way to produce a generation equipped with high knowledge and awareness of the environment [34].

3. RESEARCH METHOD

This study involved determination of population and sampling, collection methods, measurement methods and data analysis. Quantitative approach was utilized in the process of gathering information through questionnaire. This study was conducted to figure out the extent of knowledge and mastery of trainee teachers in ESD as well as the practice of ESD in geography subjects by Universiti Pendidikan Sultan Idris (UPSI) trainee teachers. Using quantitative methods, accurate and clear information that fulfilled the requirements of the research questions was obtained.

3.1. Research location

This study was conducted at UPSI, in Sultan Azlan Shah Campus and Sultan Abdul Jalil Shah Campus, Tanjong Malim, Perak, Malaysia. This university is one of the public higher learning institutions and the first education university in Malaysia. This study was conducted in UPSI since the respondents are the students enrolling in geography courses in their semesters 7 and 8.

3.2. Population and sample

The population in this study refers to the group that is made up of the research target to obtain the study findings. The target population is 130 geography students who were currently in their semesters 7 and 8. These students are those who have enrolled in the bachelor of education program. The sample size is determined based on the Krejcie and Morgan [35]. There were 97 geography students selected as the research sample for each semester. Sample selection was conducted randomly to avoid prejudice or bias.

3.3. Research instrument

In this study, questionnaire was distributed among the respondents to gauge the trainee teachers' knowledge and practice in ESD. A set of questionnaires consisting of 37 items to be filled by them. The items used in the questionnaire are split into five sections: i) The respondents' background; ii) Knowledge of ESD; iii) Level of mastery on ESD; iv) The practice of ESD in geography subjects as well as comments; and v) Suggestions in the last section.

The questionnaire was created to obtain information and data on the level of trainee teachers' knowledge in ESD as well as the practice of ESD in geography subjects. There is no time limit for the respondents to complete the questionnaire. The questions are set with multiple responses in the form of Likert scale [36]. Respondents only need to state their level of agreement (Likert scale) by marking their choice in the space provided based on the instructions. The detail of this scale is presented in Table 1.

Table 1. Likert scale

Likert scale	Response
1	Strongly disagree
2	Do not agree
3	Neutral
4	Agree
5	Strongly agree

Reliability of a questionnaire refers to the accuracy of a measuring instrument built for the purpose of obtaining findings in measuring a variable. The reliability of a tool can be trusted if it generates the similar values repeatedly. The most common indicator used to measure reliability is Cronbach's alpha. Cronbach's alpha is used as the determinant of reliability, since Likert scale is used as the research instruments in this study. According to Babbie [36], reliability values are categorized as: low (less than 0.30), medium (0.30-0.69), high (0.70-0.89) and very high (0.90 and above). Three categories which are low and unacceptable (less 0.6), acceptable (0.6-0.80) and good (0.80 and above).

Table 2 shows Cronbach's alpha value for the items in the questionnaires. Referring to Babbie [36], the value of Cronbach's alpha for the trainee teachers' knowledge in ESD was high, which is 0.928. When it comes to the trainee teachers' mastery of ESD, the value of Cronbach's alpha was also high at 0.878. Meanwhile, the Cronbach's alpha value for the ESD implementation in geography subjects by trainee teachers was high at 0.907. Therefore, all items in this questionnaire recorded high Cronbach's alpha values so this questionnaire highly reliable.

Validity serves to measure the significance level of the items. This study uses Pearson correlation method to see the significance level of the item at $p < 0.05$ level. The findings show that the independent variables are correlated with the dependent variables; the trainee teachers' level of knowledge and level of mastery in ESD with regards to the implementation of ESD in the geography subjects in Table 3. The table shows a significant relationship between trainee teachers' knowledge in ESD and ESD implementation in geography subjects, but the strength of this relationship is moderate with a value of $r = .375$. Same goes to the trainee teachers' level of mastery in ESD, its relationship with the implementation of ESD in geography subjects by trainee teachers is strong with a value of $r = .684$.

Table 2. Cronbach's alpha values for the research variables

Variables	Item ID	Total of item	Cronbach's alpha value
Trainee teachers' knowledge of ESD	B1-B11	11	0.928
Trainee teachers' mastery of ESD	C1-C10	10	0.878
ESD implementation in geography subject by trainee teachers	D1-D10	10	0.907

Table 3. Validity of the relationship between variables

		Knowledge	Mastery	Implementation
Knowledge	Pearson correlation	1	.614**	.375**
	Sig. (2-tailed)		.000	.000
	N	97	97	97
Mastery	Pearson correlation	.614**	1	.684**
	Sig. (2-tailed)	.000		.000
	N	97	97	97
Implementation	Pearson correlation	.375**	.684**	1
	Sig. (2-tailed)	.000	.000	
	N	97	97	97

**Correlation is significant at the 0.01 level (2-tailed)

3.4. Data collection procedures

Respondents involved in the study were notified online about the questionnaire that needs to be completed. Prior to completing the questionnaire, the respondents were first assured that this study aimed to obtain data related to their level of knowledge, mastery and practice of ESD in teaching and learning (T&L). Their personal information shall be kept confidential. The questionnaire was distributed online to the study respondents (geography students in semesters 7 and 8) and collected within two weeks.

3.5. Data analysis technique

Once all the required information was obtained from the questionnaire, the findings were reviewed to ensure that all questions were completed by the respondents. The data from the questionnaire were then analyzed using statistical package for the social sciences (SPSS) version 23. The data were processed using descriptive analysis for the purpose of determining frequency, percentage, mean and standard deviation.

4. RESULTS AND DISCUSSION

4.1. Trainee teachers' level of knowledge in ESD

The questionnaire aimed at investigating the trainee teachers' level of knowledge in ESD. Descriptive statistics (mean and standard deviation) are used in this study. The scores obtained are summed and averaged to produce the mean, the purpose is to produce valid and reliable findings. Based on the mean values, data is interpreted as low, medium and high as presented in Table 4.

Table 4. Mean score and data interpretation

Mean score	Interpretation
1.00–2.33	Low
2.34–3.66	Moderate
3.67–5.00	High

Figure 2 reveals that each item shows a high level of knowledge with a score of 3.67 to 5 between 9 and 10%. The highest scored item is 4.16 for level of knowledge, followed by 4.06 for SDG, 4.13 for purpose of SDG, 3.67 for SDG concept and 3.65 for SDG component. Meanwhile, the practice of implementing ESD in teaching shows the highest score at 4.15 for the implementation of sustainable development in T&L, 4.11 for the implementation of SDG values in T&L, and 4.15 for the use of SDG to give examples during the teaching of geography to students. The study findings show that “agree” is the highest scale being selected for the item ‘I know about SDG’, which is by 64.9% of the sample equivalent to 63 respondents. Meanwhile, “strongly agree” recorded 26.8%, which is equivalent to 26 respondents. This indicates most of the respondents know about SDG. By choosing “agree” and “strongly agree” options, it is deduced that the respondents know about the information related to the SDG. This is because UPSI students have been exposed to information related to SDG at the beginning of the semester via geography courses. Meanwhile, one respondent chose “strongly disagree”, which may due to the factor of interest. This item has a mean of 4.16, which is deemed as high. This proves that the trainee teachers are capable to justify the values related to the environment and sustainable development in SDG. They can relate to the SDG values and apply in T&L.

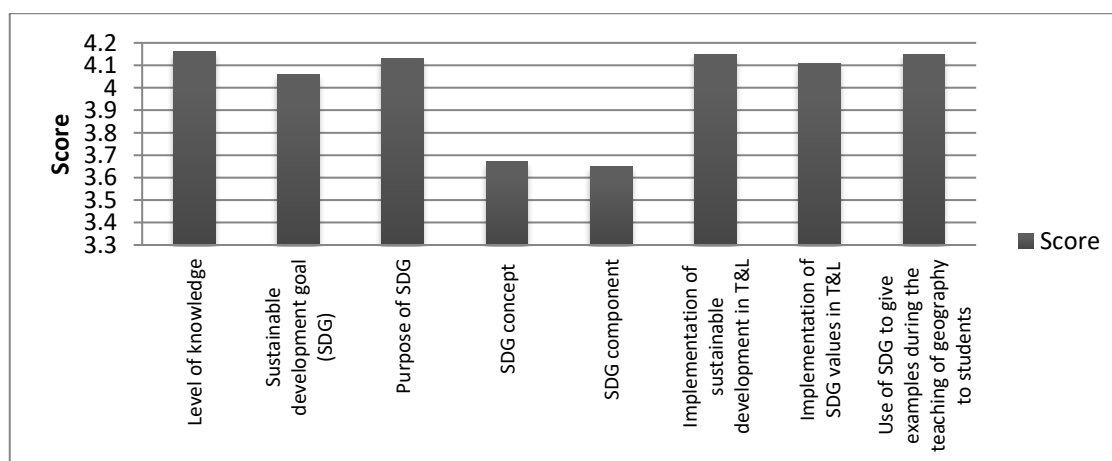


Figure 2. ESD elements in T&L for geography trainee teachers UPSI

4.2. ESD application in geography subjects

The practice of ESD has been reflected via the implementation of ESD elements in geography subjects according to the topics in the textbook; sustainable development in green technology, forest resources, recycling, water resources as well as some chapters in the teaching syllabus. Based on the findings, teachers use some methods in T&L to apply ESD values in Figure 3. The score obtained was 3.75, with 51 respondents using various methods in describing ESD elements to their students. Furthermore, teachers often ask students questions related to sustainable development. “agree” option set a record of 78.4%, which is equivalent to 76 respondents, whereas 15 respondents voted “strongly agree” which make up 15.5%. The mean for this item is 4.07 which is deemed as high.

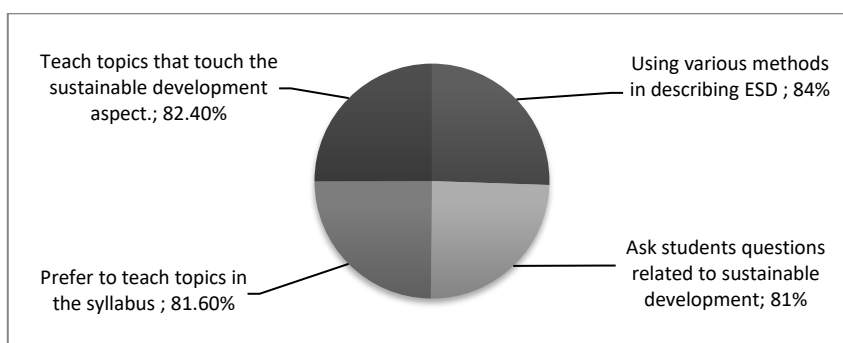


Figure 3. Implementation of ESD in geography subject by level of trainee teachers UPSI

Moreover, most teachers prefer to teach topics in the syllabus that involve the theme of sustainable development. Respondents who had chosen “agree” were the highest, with a percentage of 75.3% equivalent to 73 respondents. This proves that the trainee teachers like to teach topics that touch the sustainable development aspect. The mean for this item is 4.08. Based on the geography syllabus, there is the sustainable development value embedded in the chapter 12 of form 1 geography, the topic is about water resources. The choice of implementing ESD via this chapter recorded the highest percentage at 75.3%, equivalent to 73 respondents with a mean score of 4.04. In the topic of domestic waste, chapter 13 of form 1 geography, the ESD element was implemented via this chapter with a mean score of 4.12, made up of 75.3% which is equivalent to 73 respondents. Not only that, value of sustainable development is implemented via the topic of global warming, which is the chapter 9 of form 2 geography by 73.2% who voted “agree”, representing 71 respondents. Meanwhile 20 respondents voted “strongly agreed” which is 20.6% of the sample. This proves that most of the trainee teachers apply the value of sustainable development via the global warming topic.

There are many ESD studies has been done before, but from this study we found that ESD equips students of all ages with the knowledge, skills, values, and attitudes they need to solve the interconnected global challenges we face, such as climate change, environmental degradation, biodiversity loss, poverty, and inequality [37], [38]. Students and learners of all ages must be prepared to develop solutions to today's and tomorrow's difficulties. Education should be transformative, enabling us to make educated decisions and take individual and collective action to improve our societies and protect the environment [38], [39].

Geography, as the "science of sustainability," is playing an increasingly essential role in generating the knowledge and skills that will enable future generations to adapt to and mitigate potentially catastrophic global environmental change [40]. Geography attempts to integrate the study of both natural and human domains and their interactions, focusing on space, locations, and regions, and addressing and challenging both short-term and longer-term processes and their resulting patterns by spanning the scientific and social sciences and humanities [41]. A geographical approach to sustainability education is supplemented by its explicit spatiality, in which the ideas of place, space, and scale produce comparisons, similarities, and contrasts within and between locations, allowing for more easily engaged instruction [42]. A geographical perspective offers up new ways of thinking, makes it easier to consider alternate futures and what can be done to change them, and, most significantly, allows students to think beyond their own personal experiences [43]. There are also numerous chances to significantly expand education for sustainability by utilizing geospatial technologies, particularly remote sensing and GIS. Global environmental issues are spatial in nature, and GIS provides interactive geographic visualization and analysis approaches that are critical to their resolution. Geography education is critical to sustainability because it fosters the information, skills, attitudes, and behaviors that enable individuals to make more informed decisions about the environment [44].

5. CONCLUSION

The study confirmed that the level of knowledge, level of mastery and practice on ESD among the trainee teachers is moderate. This is because even the findings show high value of ESD implementation in geography subjects, there are a handful of trainee teachers who are still lacking in terms of knowledge, mastery and practice in ESD values. This shows that the efforts taken by the parties involved are not significantly impactful. However, there are many respondents among the trainee teachers who possess high knowledge, mastery and practice in implementing ESD via geography subjects. The knowledge is obtained from the mass media, that highlights the importance of ESD values. Besides, social media is used the reference to find relevant information. Although the data show that the level of knowledge in ESD among the trainee teachers is high, but there are some individuals who underestimate the value of ESD. This is because some trainee teachers do not apply ESD in teaching and learning.

It is important for the ESD values to be implemented, so that the younger generation will be more sensitive to environmental issues and they will better understand the importance of environmental care. Moreover, the data show there are many respondents who can master the components found in ESD, which is proven when a group of trainee teachers can explain the concepts and objectives of ESD well. A decent level of mastery in ESD can help a teacher apply the value of ESD via blended teaching and learning.

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