

THE MISSING PEDAGOGICAL LINK FOR MALAYSIAN ENVIRONMENTAL CITIZENSHIP: AN EMERGING MODEL OF INTERCONNECTEDNESS OF KNOWLEDGE DOMAINS AND VALUES MEDIATION

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Abstract: *In Malaysian education, an approach to inculcate Environmental Citizenship (EC) comprising positive attitudes and pro-environmental behaviour is to try and improve Sustainable Development (SD) awareness based upon knowledge of the environment, social, cultural, and economic domains. However, will the increase of knowledge of these domains suffice for enhancing EC? The paper discusses a 2019-2020 nationwide survey conducted to determine the EC status and SD awareness. The study had 1976 respondents, and statistical analysis revealed that the overall self-perceived EC and SD awareness levels were high among Malaysians. However, correlational analysis between the EC and the SD knowledge component domains revealed low associations indicating a lack of interconnectedness between the domains. Environmental values, investigated as an exploratory variable in the study, appeared to have a mediating role between the EC and SD awareness component domains. Further analysis using PLS-SEM software revealed that values did play a mediating role. Based on these findings, the paper argues for an emerging model for a missing pedagogical link in transforming Malaysian EC through SD awareness education for pro-environmental behaviour. Implications for an education policy are discussed.*

Keywords: *Environmental Citizenship; Sustainable Development Awareness; Attitudes; Pro-Environmental Behaviour; Values*

Introduction

We live in precarious times. Although humans have long been identified as significant contributors to environmental degradation, global reports such as the Intergovernmental Panel on Climate Change (a UN body) and Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services have reiterated the role of humans in environmental destruction and paved the way for firm global commitments. The United Nation's Sustainable Development Goals, the Paris Climate Agreement (by UN Framework Convention on Climate Change) and the Post-2020 Biological Diversity Framework

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(by UN Biodiversity Convention) reflect the dire need for critical global interventions to manage world human activities in a collective and holistic approach.

Agenda 2030, also known as the United Nations Sustainable Development Goals (SDGs), was adopted by member states in 2015 and formalised in Jan 2016. The SDGs are a - “blueprint to achieve a better and more sustainable future for all. They address the global challenges we face, including those related to poverty, inequality, climate change, environmental degradation, peace and justice” (United Nations, 2020). With a total of 17 goals and 169 targets, the SDGs are indeed ambitious in wanting to create a more secure world for mankind and all living beings. However, the actualisation of these goals and targets will involve addressing the interactions between biophysical, social, economic, and governance issues or components that underlie these goals and targets and should not be compartmentalised (Lim, Jørgensen & Wyborn, 2018). There must be an element of balance and interactions between these components (Zenelaj, 2013; Šulc et al., 2020) to ensure the SDGs’ transformations are projected for sustainable development (Ban, 2014).

Education is vital in translating the vision of the SDGs in a balanced manner (Zenelaj, 2013). SDG4 (Quality Education) has played a major role in infusing EC into Malaysian education. Besides formal and non-formal environmental education (EE), Mohamad Saifudin et al. (2018) revealed that in Malaysia, EE is also to a great extent facilitated by the media and environmental non-governmental organisations (NGOs) to enhance SD awareness. Quality Education, imbued within the philosophies and practices of education for sustainable development, has set forth significant targets to ensure the generations of the future continue to flourish within more sustainable environmental, economic, social, and cultural ecosystems (Frank, Fischer & Wamsler, 2019). To this end, many international and local initiatives have been envisioned and conducted to promote greater awareness and accountability to sustainable development. Among these initiatives is developing EC through enhancing SD awareness within the education ecosystem.

Environmental Citizenship (EC) and Sustainability Development (SD) Awareness

In the late 1980s, the vision for sustainable development was three dimensions: economic growth, social inclusion, and environmental balance. The Brundtland Report (1987) enshrined these three dimensions as the pattern used in local, national, and global strategies for development. Today, the concept of sustainable development has become prominent in dialogues of social and economic development and for environmental protection since the Rio Declaration on Environment and Development (UNCED, 1992) and the Millennium Development Goals (United Nations, 2020). In April 2010, the Executive Bureau of United Cities and Local Governments (UCLG) agreed to mandate Culture as the Fourth Pillar of Sustainable Development at its meeting in Chicago.

EC is defined as when pro-environmental behaviour is practised both in public and private spheres, based upon a belief that active participation of citizens is necessary for trying to achieve sustainability (Dobson, 2010; Hadjichambis et al., 2020). Thus, it can be said that a society steeped in EC is when values, attitudes and pro-environmental behaviour are transformed, as individuals view themselves as being part of the global environment (Barry, 2006). Such could be developed through SD awareness where the knowledge domains of the environment, economy, social and culture are expounded effectively.

As noted by Common and Stagl (2005), the study of EC has a lot to do with sustainability since EC must be understood to maintain the capacity of the joint economy-environment system to continue to satisfy the needs and desires of humans for a long time into the future (Dobson, 2010). In EC and SD, awareness, interconnection, partnerships, and interdependence at a global scale, unbounded by boundaries, is essential and needs to be prioritized (Beck, 2010). The key document – Transforming our World – the 2030 Agenda for Sustainable Development, focuses on five main issues, namely people, planet, prosperity, peace, and partnership which pushes for sustainability and EC for citizens to act as agents of change (ENEC, 2018; Kaputa, Lapin, Leregger & Gekic, 2020).

In building EC through SD awareness, EE has been considered an essential pathway that can bring behavioural changes (Gunningham, Kagan & Thornton, 2004; Dietz & Stern, 2002). In times of a changing climate, EE can hope to strengthen EC to bring solutions to environmental problems (Huckle, 2014). EE's goal should be to translate the knowledge of the various pillars of environment, economy, social, and culture into the cultivation of positive pro-environmental attitudes and behaviour. It should be about scaffolding a critical change in the intellectual mindset for an environmentally responsible individual in society (Goldman et al., 2020). Environmental education is a learning process that increases people's knowledge, and awareness about the environment and associated challenges develops the necessary skills and expertise to address the challenges and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action (Linke 1980, pp. 26-27; Gillett 1977). The EE story continued to the next significant development with the establishment of the UN Decade of Education for Sustainable Development (DESD) from 2005 to 2015, and the Agenda 2030 from 2015-2030 with 17 Sustainable Development Goals. Each member country was encouraged to incorporate Education for Sustainable Development (ESD) into all relevant subjects in their formal education systems and to develop policies and practices to achieve this. ESD enhances the cognitive, social, emotional, and behavioural dimensions of learning. ESD is recognized as a key enabler of all Sustainable Development Goals and achieves its purpose by transforming society. ESD empowers people of all genders, ages, present and future generations while respecting cultural diversity (UNESCO, 2021). Furthermore, Šulc et al. (2020) think that education for sustainability (EFS) promotes three interconnected pillars, i.e., environmental, social, and economic sustainability, that should be considered in many educational systems. Nonetheless, the debate between EE, EFS and ESD is that EE has a narrow focus on "... the natural environment without considering the needs and rights of human populations as an integral part of the ecosystem" (Sauvé 1996, p.8) in comparison to ESD.

To counter this perception, Sauvé (1996) discussed the concept of environmental education for sustainable development (EEFSD). The conceptions within this concept include, 'Environment as nature - to be appreciated, respected, preserved'; 'Environment as a resource - to be managed'; 'Environment as a problem - to be solved'; 'Environment as a "place to live" - to know and learn about, to plan for to take care of'; 'Environment as the biosphere - in which we all live together, into the future' and 'Environment as a community project - in which to get involved (Sauve 1996, pp.10-12). Nonetheless, Koprina (2014) points out that,

"...while multiple perspectives on (education for) sustainable development are possible and perhaps desirable, they should not obscure the original aim of environmental education in fostering a citizenry that, in the words of the Belgrade Charter (1976), is 'aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones' (p. 74).

Therefore, there is a broad characterisation of EE, and in delivering EE, the 'environment' must be addressed in its totality, i.e., natural, social, economic, political, cultural, and historical (Sabo, 2011), all of which the present study is cognizant.

Pro-Environmental Behaviour and Environmental Value Orientations

Behaviour towards the environment has been investigated from many angles. The mediating effect of intention is significant in pro-environmental behaviour among Malaysian public employees (Mohamad Fazli, Norjumaaton & Wijekoon, 2019). In contrast, in investigating the environmental values-behaviour gap, it was found that good intentions do not necessarily translate into environmentally supportive behaviour (Kennedy, Beckly, McFarlane, & Nadeau, 2009). Chin, De Pretto, Thuppil and Ashfold (2019) found that public perceptions and support for environmental protection

were high, but many did not want to take on actions that involved individual effort. Factors such as environmental knowledge, motivation (Vicente-Molina, Fernandez-Sainz & Izagirre-Olaizola, 2013), cognitive knowledge and values (Schneiderhan-Opel & Bogner, 2020) have been found to influence pro-environmental attitudes and promote suitable environmental behaviour. Other studies include Leiserowitz, Kates and Parris (2006), who reviewed multinational and global trends in sustainability values, attitudes, and behaviours, while Kollmuss and Agyeman (2002) investigated barriers to pro-environmental behaviour. Hence, many studies have investigated numerous constructs about pro-environmental behaviour in many ways and approaches, with contrasting results. Overall, Liobikiene and Poškus (2019) found that the interplay between external factors such as environmental knowledge and internal factors such as environmental concern affect public and private behaviours and, ultimately, EC.

The sophistication and complexity of human behaviour are context-specific. Research shows a gap between having environmental knowledge and demonstrating environmentally friendly attitudes and pro-environmental behaviour (UNCED, 1992). The right kind of knowledge of the environment is essential for pro-environmental behaviour and, therefore, for EC, was argued by Smederevac-Lalic M. et al. (2020). However, knowledge such as environmental systems knowledge and action related knowledge must be linked to values and real life. To be an environmental citizen, fundamental and holistic knowledge of the relationships and interactions of living and non-living things are required (Hay, 2002). However, this knowledge must be linked to actions for sustainability (Ergen & Ergen, 2011). Mensah and Casadevall (2019) caution that the pillars of environment, economy, social and culture are interconnected and have complex relationships which can influence and lead to responsible human behaviour. Bascopé, Perasso and Reiss (2019) state that ESD activities must start at an early childhood stage and be value-oriented.

Rokeach (1973) defined the concept of value as "...an enduring belief that a specific mode of conduct or end-state of existence is personally or socially preferable..." (p. 5). Rokeach stated that three important characteristics are found in the value concept, namely, (Rokeach 1973, p. 5-7),

- (1) it is cognition about what is desirable;
- (2) it is affective, with associated emotions; and
- (3) it has a behavioural component that leads to action when activated.

A general classification of 56 values representing ten universal value types found across cultures was put forward by Schwartz (1994). Research since the 90s' has shown an association between these values and environmental behaviour (Gutiérrez, 1996; Thøgersen & Grunert-Beckmann, 1997; van Riper & Kyle, 2014). Studies have also sought to see a link between values and attitudes (Grunert & Juhl, 1995; Nordlund & Garvill, 2002; Schultz & Zelezny, 2003). Generally, the findings from previous studies suggest that values underlie environmental attitudes and behaviour (Schultz et al., 2005; Corraliza & Berenguer, 2000).

Values are also considered multidimensional constructs acting as guiding principles that reach across different situations and influence decision-making (van Riper et al., 2020). Furthermore, values are a basis for many psychological processes and thus are considered critical in behavioural change (van Riper & Kyle, 2014; Wynveen, Wynveen, & Sutton, 2015; Jones, Shaw, Ross, Witt, & Pinner, 2016). Dietz, Fitzgerald and Shwom (2005) concluded that values are stable in a person's life. Hitlin (2011) added that values create an internal compass that individuals navigate actions through life's experiences.

Related to pro-environmental behaviour, four underlying environmental value dimensions thought to influence behaviours are the biospheric (concern for the environment), altruistic (concern for others), egoistic (concern for personal resources) and the hedonic (concern for pleasure and comfort) dimensions (Bouman, Steg & Kiers 2018). The intersection between values and behaviour appears complex (Steg & Vlek, 2009). It has been found that these multi-faceted dimensions of values have different effects on behaviour (Manfredo et al., 2017). Biospheric and altruistic values are closely related to pro-environmental actions (Balunde, Perlaviciute & Steg, 2019; Steg & De Groot

2012; van Riper & Kyle, 2014; Unal, Steg & Gorsira, 2017). Egoistic values have been associated with negative environmental behaviour (De Groot & Steg, 2010; Hurst, Dittmar, Bond, & Kasser, 2013).

In the present study, two types of values were the focus, biospheric and altruistic values. Biospheric values are defined as "...a value orientation in which "people judge phenomena on the basis of costs or benefits to ecosystems or the biosphere" (Stern & Dietz 1994, p. 70). Biospheric values do not have a clear link to human welfare but show concern with the quality of nature and the environment for its own sake (Steg & De Groot, 2012). Martin & Czellar (2017) stated that biospheric values mediate the relationship between self-nature connection and environmentally friendly behaviour. Altruistic values reflect a concern for the welfare of other human beings (Steg & De Groot, 2012). Welfare includes equal opportunities for all, social justice, caring for the weak and free of war (Dietz, Fitzgerald & Shwom, 2005)

The biospheric and altruistic dimensions are also categorized as self-transcendence and the egoistic dimension as self-enhancement (Schwartz, 2012). Biospheric and altruistic values are good predictors of pro-environmental behaviour and therefore should be promoted and strengthened in pedagogical aspects of interventions or activities to enhance pro-environmental behaviour (De Groot & Steg, 2010; Steg & De Groot 2012). Thus, much research has been conducted into the complex association between values and behaviour involving factors such as attitudes, intent, beliefs, motivations, and emotions which can guide EE (Gifford & Nilsson, 2014; van Riper et al., 2018). Closer to home, Choy and Onuma (2021) identified a spectrum of values in the Heart of Borneo (an area demarcated in East Malaysia, Indonesia, and Brunei, in the island of Borneo), which play an essential role in complex decision making related to environmental policy and natural resource management for environmental conservation.

Malaysian Environmental Citizenship (EC) and Pro-Environmental Behaviour

In 1995, the Malaysian Economic Planning Unit (EPU) investigated environmental awareness among Malaysians. The national survey involved 3,564 persons in both urban and rural areas in Malaysia and covered 15 years and above. Among the findings that emerged were that only 37% have an adequate understanding of the word "environment", 34% have some idea, while 29% declare ignorance of the word's meaning. Soon after this, in 1998, the Ministry of Education rolled out instructions for EE infusion in all subjects (cited in WWF-M, 2009).

The World Wildlife Fund for Nature (WWF) conducted the next extensive nationwide survey in Malaysia among 6090 respondents in 2007. In addition to determining the level of EC in Malaysia at 57.1%, knowledge of the environment, the perceived levels of positive attitude towards the environment and pro-environmental behaviour were 57.7%, 71% and 47.1%, respectively (WWF-M, 2009). Although perceived attitude levels were high, and knowledge of the environment was moderate, this did not appear to translate into a high level of pro-environmental behaviour. These findings spurred WWF-M and many other agencies to increase and expand their efforts in improving the level of SD awareness to bring about the transformation of EC. Some of these efforts include the Eco-School and Eco-Campus programmes. Eco-conferences and seminars are also organised yearly nationwide. These efforts have been influenced by the United Nations Sustainable Development Goals (2015-2030), which replaced the Millennium Development Goals (2000- 2014).

During the above-mentioned ongoing efforts to enhance EC through SD awareness, numerous studies have investigated the various domains involved. A six-year longitudinal study (2008 -2013) by WWF-M, where modules prepared for the subjects of Science, Mathematics, Geography and Language with various pedagogical interventions were utilised for EE in selected schools, indicated that an increase in SD knowledge does not necessarily translate into transformational pro-environmental behaviour (WWF-M, 2013). The issue of food waste in Malaysia was studied in relation to SD knowledge and pro-environmental attitude by Muhammad 'Arif et al. (2018), and it was found that a strong SD awareness level does not necessarily indicate a higher pro-environmental behaviour level.

In contrast, research focusing on young consumers in a local university revealed that the higher the level of knowledge in environmental issues, the higher the association with perceived pro-environmental behaviour (Siti et al., 2010). SD awareness and behaviour was found to be positively correlated by Neo, Choong and Rahmalan (2017). Saripah et al. (2013), in their study of five major urban locations in Malaysia, reported that environmental knowledge affects the inculcation of environmental values among the residents of urban areas, which in turn affects their pro-environmental behaviour. The constructs of environmental commitment, environmental consciousness, green lifestyle, and green self-efficacy were investigated by Yusliza et al. (2020) and found to positively influence pro-environmental behaviour among a selected group of students from a training centre in Malaysia. The above studies have revealed contrasting results in the investigation of pro-environmental behaviour.

Although much work has been done and is still being done to bring about changes in pro-environmental behaviour (11th Malaysia Plan, 2016-2020), newspaper reports before and during the Covid-19 pandemic lockdown exposed unchecked disposal of waste in several Malaysian rivers (e.g., Selangor River, Langat River) (Chen, 2019; The STAR, 2020; Bernama, 2021). Despite numerous activities and campaigns related to SD awareness and EC by various NGOs and government organisations, actual pro-environmental behaviour appears to lag, although perceived levels of self-action are high.

Existing Models for Pro-Environmental Behaviour

What influences pro-environmental behaviour? According to Kollmuss and Agyeman (2002), this complex question has been investigated for almost half a century. It is accepted that positive changes in pro-environmental behaviour are essential for the continued progress of EC. For this to happen, changes in attitudes must also occur (Dobson, 2007).

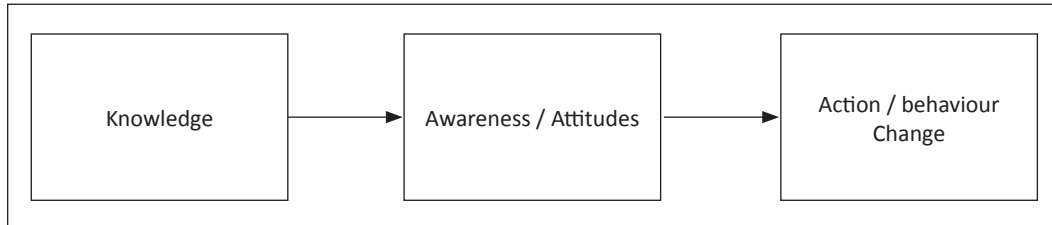


Figure 1: Early Behavioural Change Model

Source: modified from Akintunde (2012)

Figure 1 shows the early behavioural change model of the 1970s, which implies that a pedagogy steeped in knowledge of the environment would build environmentally favourable attitudes, which eventually develops responsible environmental actions. However, this linear model is now too simplistic to explain the development of pro-environmental behaviour.

Since the 1970s, various models have been put forward, namely, the model of reasoned action (Ajzen & Fishbein, 1980), model of ecological behaviour, models of predictors of environmental behaviour (Hines, Hungerford & Tomera, 1986–87). and barriers between environmental concern and action (Blake, 1999). Blake (1999), in his model, highlighted the attitude–behaviour gap as the value–action gap. Blake based the model upon Redclift and Benton’s belief that values are “negotiated, transitory, and sometimes contradictory” (as quoted in Blake 1999, pp. 7-8). Kollmuss and Agyeman (2002) went on to categorise factors influencing pro-environmental behaviour into internal factors (e.g., motivation, environmental knowledge, awareness, values, attitudes, emotion, locus of control, responsibilities, and priorities) and external factors (e.g., institutional, economic, social, and cultural factors). Chen and Martin (2015) also highlight how Kollmuss and Agyeman group environmental

knowledge, values, attitudes and emotional involvement as ‘pro-environmental consciousness’, a complex factor that is shaped by personality and external factors (Figure 2).

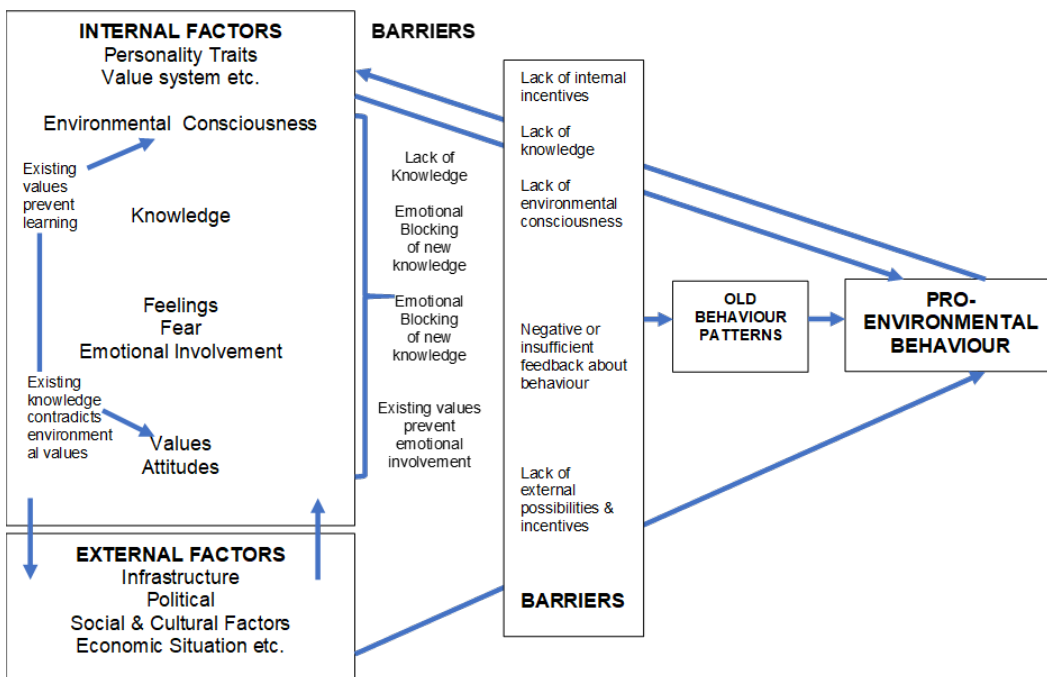


Figure 2: Model for Pro-Environmental Behaviour

Source: modified from Kollmuss & Agyeman (2002)

With numerous factors to consider, this study investigated EC (environment, attitudes, and behaviour domains perspectives), SD awareness (environment, economy, social and culture domains perspectives).

Objectives of the Study

The objectives of the present study were fourfold, (i) to determine the current level of EC and SD awareness; (ii) to examine the associations between the SD knowledge domains and the EC affective domains; (iii) to explore the role of the values domain in EC and SD awareness, and (iv) to put forward pedagogical implications for EC education.

Methodology

A Quantitative Survey approach was adopted for the study. This section will discuss the Research Instrument, the Pilot Study and the Respondents involved in the actual study.

The Survey Research Instrument

A literature review of previous studies was carried out in which the domains for SD and EC were investigated. Several surveys and their items were scrutinised, such as the Effective practice for SD in Ireland Schools (2010) survey, Effectiveness of education for SD, University of South Carolina (2014) survey, Education for Sustainable Development (ESD) in the Western Balkans survey and Effects of ESD implementation in Swedish Schools survey to name a few. The researchers drafted out items (in English) for all the knowledge domains of environment, social, economy, culture, and the affective

domains of attitudes, values, and behaviour in the first version of the survey, which consisted of 100 items. The items were then back-translated into Bahasa Malaysia (BM- the national language of Malaysia) by two language experts. The researchers (subject matter experts) and the language experts then vetted the items again in both languages. The survey was tested for face validity and content validity for both languages by a group of seven local experts in environmental sustainability education. The bilingual survey was pilot tested with 683 volunteer student respondents from a local university, a secondary and a primary school.

Pilot Study

The feedback given by many of the respondents was that there were too many items in the survey and that it took a long time to complete the survey. Such could cause the number of respondents participating in the actual study to be low. Therefore, the researchers re-examined the items again, vetted them, and reduced them to 50. In addition, several group discussions were held together with the language and the environmental sustainability experts in the field in vetting the items.

The final survey was then placed online on the WWF-M website and announced on the various social media platforms between September 2019 to January 2020 for nationwide research. The link was sent to all partners associated with WWF-M nationwide, eco-schools and eco-campus throughout the nation under the purview of WWF-M. The Alpha reliability coefficient of the instrument was found to be $r=0.925$.

Respondents of the Study

A total of 1976 respondents took part in the actual survey. The essential demographics of the sample are shown in Table 1.

Table 1: Respondent Demographics

	Categories	No.	%
Gender	Male	1492	75.51
	Female	484	24.49
	Total	1976	100
Students	Public schools	533	26.97
	Private Schools	234	11.84
	Other types of schools	26	1.32
Non-Students	From Various Industries*	1183	59.87
	Total	1976	100

*NGOs, Forestry, Banking, Health Care, Arts & Entertainment, Legal, Finance, Advertising, Fashion, Architect, Retiree, Insurance, etc.

Explanation of Main Constructs and Components

The two important constructs in the study are SD and EC and their components, which were investigated through the Likert Scale survey. These constructs and their component domains from the literature have been discussed above. The specific aspects of these constructs investigated in the present study are explained below.

(a) Sustainable Development (SD): This study looks at the comprehension of four component domains or pillars within SD Awareness: environment, economy, economy, and culture.

Environment: The study focused on the interdependence of living things, renewable natural resources, and biological biodiversity. Six items in the survey measured this aspect.

Item example: The interdependence of living things in an environment must be preserved for sustainable development

[Strongly Agree (SA), Agree (A), Don't Know (DK), Disagree (DA), Strongly Disagree (SD)]

Economy: The study focused on preserving biodiversity, land conservation and reducing poverty versus development for economic welfare. Seven items in the survey measured this aspect.

Item example: Poverty levels directly affect the potential for a sustainable society.

[Strongly Agree (SA), Agree (A), Don't Know (DK), Disagree (DA), Strongly Disagree (SD)]

Social: The study focused on the link between local and global issues related to health, degradation of the environment and peace. Six items in the survey measured this aspect.

Item example: Improving people's health and opportunities for a good life contributes to sustainable development.

[Strongly Agree (SA), Agree (A), Don't Know (DK), Disagree (DA), Strongly Disagree (SD)]

Culture: The study focused on respect for different cultures, gender equality and interaction between different cultures. Six items in the survey measured this aspect.

Item example: All people must be treated with the same respect whatever their cultural backgrounds

[Strongly Agree (SA), Agree (A), Don't Know (DK), Disagree (DA), Strongly Disagree (SD)]

(b) Environmental Citizenship: This study investigated the levels of three-component domains within the EC - environment, attitudes, and behaviour. There is an overlap for the environmental domain with SD awareness.

Environment: Already explained above

Attitudes: The study focused on sustainable lifestyles, state of the environment, laws to protect the environment, decision-making for development activities. Eight items in the survey measured this aspect.

Item example: All people must be treated with the same respect whatever their cultural backgrounds

[Strongly Agree (SA), Agree (A), Don't Know (DK), Disagree (DA), Strongly Disagree (SD)]

Behaviour: The study focused on personal actions (recycling, etc.), being involved in group activities to protect the environment. Nine items in the survey measured this aspect.

Item Example: I join in my community clean-up efforts.

[Strongly Agree (SA), Agree (A), Don't Know (DK), Disagree (DA), Strongly Disagree (SD)]

Values: The study focused on personal sacrifices, taking responsibility, the value of all life on earth. Eight items in the survey measured this aspect.

Item example: In my opinion, all life on Earth has the right to exist no matter what is their value to humans.

[Strongly Agree (SA), Agree (A), Don't Know (DK), Disagree (DA), Strongly Disagree (SD)]

Data Analysis

The survey instrument utilised for the study was a Likert Scale Survey. Individual items of the scale had a response continuum in a linear scale, which indicates the extent to which respondents agree or disagree with the item. At this point, Jamieson's (2004) argument, "The response categories in Likert scales have a rank order, but the intervals between values cannot be presumed equal" (p.1217), needs to be addressed. Much has been written about parametric tests in analysing ordinal data. On the other side of the fence, Norman (2010), an expert in medical education research methodology, argued with actual examples that parametric tests could be used to analyse ordinal data. This is because they are sufficiently robust to yield largely unbiased answers that are acceptably close to "the truth" when analysing Likert scale responses. Warmbrod (2014) discussed two basic concepts which can point to the rationale behind reporting and interpreting average scores when using Likert scales to quantify educational constructs. The first is that the construct is not measured by a single item but a multiple-item scale. This leads to the second, which is scores from Likert scales are derived from a composite of responses to multiple items. This reasoning was originally used by Likert (1932), whose monograph explained, ". . . that the quantification of the construct is a summated score for each individual calculated by summing an individual's responses for each item comprising the scale" (Warmbrod 2014, p.31). Norman (2010) concluded that his findings are consistent with empirical literature dating back nearly 80 years. Nevertheless, the arguments for and against the use of parametric tests continues.

The survey used in the present study had seven domains. The items in each domain were combined into a single composite score/variable during the data analysis process to provide a quantitative measure of each domain (Boone & Boone, 2012). Rhemtulla, Brosseau-Liard and Savalei (2012) argued that reliance on continuous ordinal data methodology would produce acceptable results when the number of categories is five or higher. In educational research, the existence of underlying continuous variables is a common assumption when analysing categorical variables, and this is the paradigm adopted in the present article (Rhemtulla, Brosseau-Liard & Savalei, 2012).

Results and Findings

This section will discuss the levels of EC and SD awareness, the correlations between the various component domains of EC and SD awareness, the possible role of the values domain and the pedagogical implications.

Perceived Levels of EC and SD Awareness

The perceived levels for the environment, attitudes and behaviour component domains are as shown in Table 2 for EC. The overall level for EC is at mean (M) = 4.35 with standard deviation (*sd*) = 0.327. The attitudes domain is at M = 4.14 and *sd* = 0.369; the behaviour domain is at M = 4.23 and *sd* = 0.542; and the environment domain is at M = 4.68 with *sd* = 0.362.

Table 2: Levels of EC and its Component Domains

	Mean	Median	Standard Deviation
Environment	4.6789	4.8000	.36216
Attitudes	4.1422	4.2000	.36910
Behaviour	4.2278	4.2200	.54237
Overall EC	4.3496	4.3667	.32665

The perceived levels for the SD awareness component domains are shown in Table 3. The overall SD Awareness level is at M =4.23 with *sd* = 0.312. Results for the component domains of

SD awareness are environment at $M = 4.68$ with $sd = 0.362$; economy at $M = 3.87$ with $sd = 0.593$, social at $M = 3.96$ with $sd = 0.423$, and culture at $M = 4.41$ with $sd = 0.398$.

Table 3: Levels of SD Awareness and its Domains

	Mean	Median	Standard Deviation
Environment	4.6789	4.8000	.36216
Economy	3.8688	3.8600	.59258
Social	3.9585	3.8600	.42289
Culture	4.4059	4.4300	.39803
Overall SD Awareness	4.2280	4.2500	.31233

The perceived levels of the EC and SD awareness domains are high.

Associations between EC and SD Awareness Component Domains

Table 4 shows the associations between all the component domains. All the associations were found to be positive, although mostly weak. The correlation coefficient between the environment and economy domains is $r_s=0.332$ (weak and significant), between the environment and social domains is $r_s=0.342$ (weak and significant), and between the environment and culture domains is $r_s=0.386$ (weak and significant). The correlation coefficient between the economy and social domain is $r_s=0.303$ (weak) and between the economy and culture is $r_s=0.279$ (negligible). The correlation coefficient ($r_s =0.334$) between the social and the culture domains is weak, positive, and significant. These weak positive correlation coefficient values imply that increases in one domain are not correlated strongly with increases in the related domain.

Table 4: Correlations between SD and EC dimensions

		Env	Eco	Soc	Cul	Att	Beh
Env	Spearman 's Rho	1	.332**	.342**	.386**	.421**	.336**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
Eco	Spearman 's Rho	.332**	1	.303**	.279*	.380**	.294**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
Soc	Spearman 's Rho	.342**	.303**	1	.334**	.372**	.204**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
Cul	Spearman 's Rho	.386**	.279**	.334**	1	.465**	.306**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
Att	Spearman 's Rho	.421**	.380**	.372**	.465**	1	.435**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
Beh	Spearman 's Rho	.336**	.294**	.204**	.306**	.435**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	

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

The results also show that knowledge about the SD awareness component domains have weak to low correlations with attitudes (environment and attitude is $r_s = .421$; social and attitude is $r_s = .372$; culture and attitude is $r_s = .465$) and have negligible to weak correlations with behaviour (economy and behaviour is $r_s = .294$; social and behaviour is $r_s = .204$; culture and behaviour is $r_s = .306$). The association between economy and attitude is $r_s = .380$ (weak) and between environment

and behaviour is $r_s = .336$ (weak). The correlation coefficient between attitude and behaviour is $r_s = 0.435$ (low). Thus, this suggests that even as the knowledge of the environment, economy, social and culture component domains increase, this will not be correlated strongly with an increase in pro-environmental behaviour.

Possible Role of the Values Domain in EC, SD Awareness and Pro-Environmental Behavior

Value is a domain that cannot be excluded in all decision making, whereby it is an integral part of EC and SD awareness in everyday living. Values underpin behavioural choices and the formation of attitudes towards emerging environmental, social, economic, and cultural issues (Jagers & Simon Matti, 2010). The values domain in the study was treated independently (explanatory variable) of the other domains (response variables) and was included in the study to explore the relationship of values with EC, SD awareness and their components.

Table 5: Correlations between Values, and the component domains of EC, SD Awareness.

		Env	Eco	Soc	Cul	SD
Spearman 's Rho	Values	.426**	.371**	.375**	.441**	.562**
Sig. (2-tailed)		.000	.000	.000	.000	.000
		Env	Att	Beh	EC	
Spearman 's Rho	Values	.426**	.542**	.428**	.587**	
Sig. (2-tailed)		.000	.000	.000	.000	.000

Table 5 shows the correlation coefficients. The association between values and the various component domains of EC and SD awareness is generally higher than the associations between the SD and EC component domains alone. In particular, the overall relationship between values and the SD awareness ($r_s = .562$) and EC ($r_s = .587$) constructs are moderately associated. This suggests that an increase in the values dimension will be correlated higher with SD awareness and EC.

As for the relationship between values and the environment domain ($r_s = .426$), it is low. The correlations between values and the economy ($r_s = .371$), values and social ($r_s = .375$), values and EC ($r_s = .587$), values and attitudes ($r_s = .542$) and values and behaviour ($r_s = .428$) can be considered as weak to moderate. These correlations indicate that an increase in the values domain could be accompanied by higher correlations with the associated domains. Thus, to further understand the mediating role of the values domain, the following hypotheses were put forward and tested using the PLS-SEM software.

Hypothesis

1. The relationship between the SD knowledge domains (environment, social, cultural, and economy) and pro-environmental behaviour is positively mediated by the values domain.
2. The relationship between the attitude domain and pro-environmental behaviour is positively mediated by the values domain.

Results of PLS-SEM

Mediating analysis of Values (VAL) was performed on the linkage between the SD domains (Independent Variables) of Environment (ENV), Social (SOC), Economy (ECO) and Culture (CUL) and Behaviour (BEH) which was taken as the Dependent Variable. The results revealed that the Total Effect of ENV on BEH was significant (H1: $\beta = 0.097$, $t = 3.643$, $p < 0.000$). With the inclusion of the mediating variable (VAL), the impact of ENV on BEH remains significant (H1: $\beta = 0.054$, $t = 2.059$,

$p=0.040$). Furthermore, the indirect effect of ENV on BEH through VAL was also found to be significant ($H1: \beta=0.043, t=5.701, p<0.000$). This shows that VAL partially mediates the relationship between ENV and BEH.

The results revealed that the Total Effect of ATT on BEH was significant ($H1: \beta=0.288, t=9.786, p<0.000$). With the inclusion of the mediating variable (VAL), the impact of ATT on BEH remains significant ($H1: \beta=0.170, t=5.424, p<0.000$). The indirect effect of ATT on BEH through VAL was also found to be significant ($H1: \beta=0.117, t=7.264, p<0.000$). This shows that VAL partially mediates the relationship between ATT and BEH.

The results revealed that the Total Effect of CUL on BEH was significant ($H1: \beta=0.054, t=2.029, p=0.042$). With the inclusion of the mediating variable (VAL), the impact of CUL on BEH became insignificant ($H1: \beta=0.001, t=0.038, p=0.970$). The indirect effect of CUL on BEH through VAL was also significant ($H1: \beta=0.033, t=4.927, p<0.000$). This shows that VAL fully mediates the relationship between CUL and BEH.

The results revealed that the Total Effect of SOC on BEH was insignificant ($H1: \beta=0.036, t=1.303, p=0.193$). With the inclusion of the mediating variable (VAL), the impact of SOC on BEH remains insignificant ($H1: \beta=0.015, t=0.579, p=0.583$). The indirect effect of SOC on BEH through VAL was significant ($H1: \beta=0.053, t=6.054, p<0.000$). This shows that VAL fully mediates the relationship between SOC and BEH.

The results revealed that the Total Effect of ECO on BEH was significant ($H1: \beta=0.109, t=4.445, p<0.000$). With the inclusion of the mediating variable (VAL), the impact of ECO on BEH became insignificant ($H1: \beta=0.016, t=3.091, p=0.002$). The indirect effect of ECO on BEH through VAL was also found to be significant ($H1: \beta=0.117, t=9.264, p<0.000$). This shows that VAL fully mediates the relationship between BEH. Based on the results above, Hypothesis 1 and 2 can be accepted.

The Emergent Model to Transform EC

The graphic representation in Figure 3 highlights the interplay of the four SD knowledge domains underpinned by values, which mediates the relationship between attitudes and pro-environmental behaviour. Such was also reported by Felixdóttir (2017), Saripah et al., (2013), Chen & Martin (2015) and Schneiderhan-Opel & Bogner (2020). If a transformed EC is an aim through SD, the education of the concepts within component domains of SD must be taught interconnectedly and underpinned by values. The model put forward is shown in Figure 3.

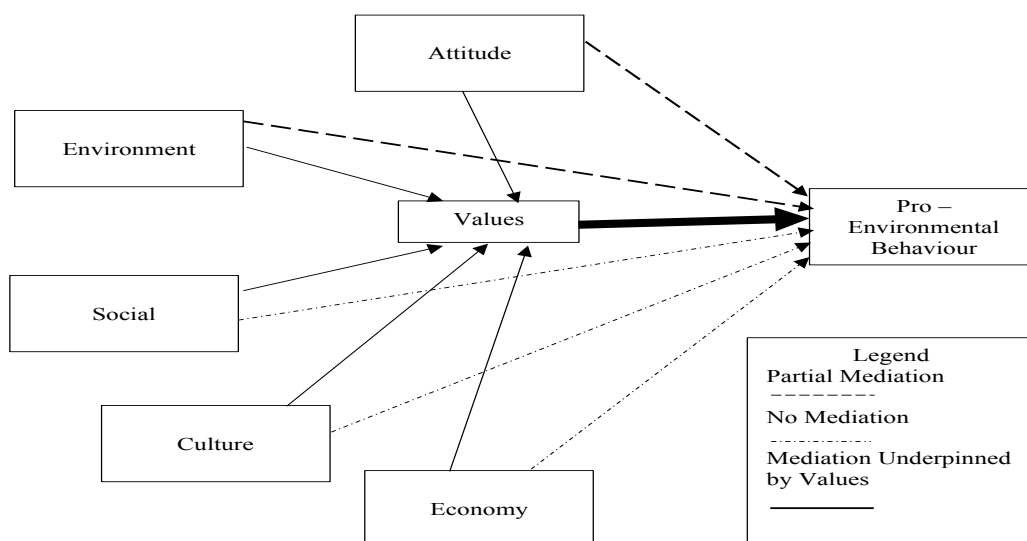


Figure 3: Emergent Model for EC Transformation

The Missing Pedagogical Link

The 2019-2020 national survey results revealed that self-perceived levels of SD and EC are high. However, the associations between component domains range from weak to low relationships, indicating that increases in one domain may not correlate strongly with increases in another. Ban (2014) and Lim et al. (2018) emphasised that the realisation of the SDGs and their targets for global transformation depends upon the interactions and integration between the various goals and targets, which cannot be addressed independently. Mensah and Casadevall (2019) state that the sustainable development pillars of environment, social, economy and culture are multifaceted.

The first pedagogical implication here is that the SD knowledge domains should not be compartmentalised and taught separately if EC is to be transformed. At present, these domains are mostly compartmentalised when taught. The concrete to abstract concepts embedded within the SD component knowledge domains of environment, economy, social and culture must be interlinked for deeper understanding. A scarcity of strong interconnected cognitive and metacognitive links between the knowledge domains will hinder the transformation of EC.

The values dimension, taken as an explanatory variable in the study, showed a higher association with all the response variables, hinting that values could be the mediating factor to enhance the associations between the SD awareness and EC components. Blake's (1999) model of the value-action gap explains the disparity between values placed upon an environmental sustainability or citizenship issue, and the translation into the required level of action taken to address the issue supports the findings of this study. Thus, the missing link in our Malaysian education points to the disconnectedness between the knowledge domains discussed in the study. Furthermore, the explicit and implicit underpinning of values in the teaching process must also be integrated.

Pedagogical Implications for Instruction

The guidelines provided by the Malaysian Ministry of Education in 1998 for EE infusion for every subject leave it to the subject teachers to implement as they see fit, and no evaluation has been done. Based on the present study findings, the authors will discuss this from two aspects, i.e., interdisciplinary approach and values infusion.

Interdisciplinary Approach

A four-step module writing mode is proposed here, (i) Mapping concepts across subjects, (ii) Mapping with SD awareness domains, (iii) Match with SDGs, and (iv) Pedagogical Plan and Design. The present study indicates that a more interdisciplinary instructional approach is needed to bring out the flavour of interconnectedness between SD knowledge domains to address the complexity of transforming EC. Educators of all subjects must come together and map out how the different subject matter concepts can be related to the SD domains for students to realise the overall picture of how a small change in the environmental, social, cultural, or economic domains can bring about substantial changes in another. These concepts can then be matched to the SDGs. Finally, pedagogical approaches for transforming EC can be designed. Doğru et al. (2015) also stated that understanding many scientific concepts together would contribute to better sustainability education and can be applied in problem-solving real-world challenges. For example, the interconnection between varying sectors such as renewable energy sectors, local forestry and fishing sectors was investigated by Mammadova (2017). In addition, a study by Tan and Hyo-Jeong So (2018) demonstrated that outdoor environmental interactions promote interdisciplinary thinking among Singapore students.

The Ministry of Education Malaysia (MOE) has stated that although there is no formal 'global curriculum' covering global citizenship elements (GCE) for Malaysian schools, a guidebook has been developed for teachers to integrate GCE in their teaching and learning process across the curriculum. The Global Citizenship Elements aimed to enhance environmental citizenship towards sustainable development. Local studies have shown that Global Citizenship elements towards sustainable

development are embedded indirectly across the Malaysian Primary Core Subjects (Malay Language, English Language, Science, History, Islamic Education and Moral Education) Curricula (Sharifah et al., 2021). Another initiative is integrating STEM (Science, Technology, Engineering and Mathematics) Education. Ideally, STEM is interdisciplinary, with connections to all four disciplines. However, studies have shown that the primary focus is mainly on Science and Mathematics, with a sprinkling of computer and internet elements. The possibilities of a GREEN STEM approach are being explored, but although "... infusing natural and socio-cultural environments into STEM is a good move, surface inclusion of the relevant themes would not address the root cause of the current environmental crisis" (Aai & Suzieleez 2021, p. 22). Other programmes such as the IGCSE curriculum for the O level Cambridge certificates normally offered in the International schools also provide Global Perspectives in their curriculum, which is interdisciplinary and encompasses ESD related to the SDG goals. Many tertiary institutions have also begun to infuse sustainability elements within their curricula according to the SDGs. Nonetheless, educators could also creatively utilise the interdisciplinary approach within the existing curricula of the various subjects.

The delivery of these interdisciplinary instructional materials must also take on a pedagogically innovative, inquiry-based, experiential, hands-on and problem-solving approach, such that students can see the associations and connections between SD Awareness domains embedded within the various subject matter linked to real life and personal experiences. An interdisciplinary approach is a key to transformative, whether simulations, role-playing, self-reflections, case studies or fieldwork, which have already been proved valuable in driving sustainability philosophies and practices within classrooms of various levels (primary, secondary, and tertiary) EC. Karpan et al. (2020) viewed education for sustainable development as a harmonic connection between students and the great variety of content found in the world in general. Complex as it may sound, decompartmentalising fields of study could enhance deeper cognitive and metacognitive processing of subject matter and SD knowledge necessary for the realisation of pro-environmental behaviour and action to transform EC.

Besides the formal curriculum, the same principles of the interdisciplinary approach apply to informal EE activities in schools in societies or unformed bodies. In addition, the various non-formal EE activities organised by non-governmental organisations also need to link all the concepts and domains explicitly to help learners connect the dots between the different domains.

Second, the infusion of biocentric and altruistic values in teaching the various SD domains must be pedagogically well-planned to transform EC. The findings hint at this. The various pedagogical approaches and instructional materials must also include the implicit and explicit infusing of environmental values (Steg & De Groot, 2012; De Groot & Steg, 2010) to mediate further the connections between the domains for actual transformative pro-environmental decision making.

Educational Policy Implication

The findings of the study point to the need of revamping the various curricula to be connected to other national agendas, such as the development of creative and innovative citizens and moving towards the direction of involving other ministries. Additionally, the various departments within the Ministry of Education, such as the Teacher Education Division, the Education Planning and Research Division, and the Curriculum Development Division, must come together to reimagine EE. Malaysia already has an overall National Education Policy (NEP). What remains to be done is to bring about change in the NEP, where an EE policy statement needs to be included. This can be achieved through an advocacy exercise, which includes the report findings presentations on various national platforms and through workshops and a national conference.

Conclusion

The focus of this paper was a possible missing pedagogical link for strengthening EC, leading to actual pro-environmental behaviour, which involves decision making every day towards sustainable

living. What is being argued in this paper is not new, as numerous studies have tied interdisciplinary knowledge approaches and values mediated EE. The study points out that compartmentalizing knowledge without the implicit or explicit underpinning of values could limit a holistic view of EC and SD awareness in EE activities. How can this be addressed?

To decide upon responsible pro-environmental behaviour and action, which involves complex thought, knowledge of the environment, economy, social and culture dimensions must be precisely and deeply interrelated and associated with the subject matter being taught in the formal curriculum. These SD knowledge domains have many concepts that must be understood about one another and not in isolation.

Thus, this paper concludes that the interconnectedness of the knowledge domains, underpinned by values, which is absent in pedagogical approaches at present, in Malaysian classrooms and other informal and non-formal EE programmes, could be the missing link that can influence the decision-making process for actual pro-environmental behaviour to bring about greater impact on EC. Thus, to enhance pedagogical approaches, policy also needs to be reviewed and revised.

References

- Aai S. Y., & Suzieleez Syrene Abdul Rahim (2021). Greening STEM: A Theoretical exploration for the Malaysian context. *Journal of International and Comparative Education*, 10 (1), pp.19-32. <https://doi.org/10.14425/jice.2021.10.1.1205>
- Akintunde, E.A. (2012). Theories and concepts for human behaviour in environmental preservation. *Journal of Environmental Science and Public Health*, 1 (2), pp. 120-133. <https://doi.org/10.26502/jesph.96120012>
- Ajzen, I., & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behaviour*. Englewood Cliffs, NJ: Prentice-Hall.
- Balunde, A., Perlaviciute, G., & Steg, L. (2019). The relationship between people's environmental considerations and pro-environmental behaviour in Lithuania. *Frontiers in Psychology*, 10, (2319), pp. 1-10. <https://doi.org/10.3389/fpsyg.2019.02319>
- Ban, K. M. (2014). *The Road to Dignity by 2030: ending poverty, transforming all lives, and protecting the planet. Synthesis report of the Secretary-General on the Post-2015 Agenda*. Available at: https://www.un.org/disabilities/documents/reports/SG_Synthesis_Report_Road_to_Dignity
- Barry, J. (2006). Resistance is fertile: From environmental to sustainability citizenship. In A. Bascopé, M., Perasso, P. & Reiss, K. (2019). Systematic review of Education for Sustainable Development at an early stage: Cornerstones and pedagogical approaches for Teacher Professional Development. *Sustainability*, 11 (719), pp. 2-16. <https://doi.org/10.3390/su11030719>
- Beck, U. (2010). Remapping social inequalities in an age of climate change: For a cosmopolitan renewal of sociology. *Global Networks*, 10 (2), pp. 165-181. <https://doi.org/10.1111/j.1471-0374.2010.00281.x>
- Bernama (2021). *Perak Factory to Face Action Over River Pollution*. Available at: <https://www.freemalaysiatoday.com/category/nation/2021/01/04/perak-factory-to-face-action-over-river-pollution/> (Accessed 2 September 2021).
- Blake, J. (1999). Overcoming the 'value-action gap' in environmental policy: tensions between national policy and local experience. *Local Environment*, 4 (3), pp. 257-278. <https://doi.org/10.1080/13549839908725599>
- Boone, H.N., & Boone, D.A. (2012). Analysing Likert Data. *Journal of Extension*, 50 (2), pp. 1-5.
- Bouman, T., Steg, L., & Kiers, H. A. L. (2018). Measuring values in environmental research: A test of an environmental portrait value questionnaire. *Frontiers in Psychology*, 9(564), pp. 1-15. <https://doi.org/10.3389/fpsyg.2018.00564>
- Brundtland, G.H. (1987) *Our Common Future: Report of the World Commission on Environment and Development (A/42/427)*. <http://www.un-documents.net/ocf-ov.htm> (Accessed 10 July 2021).
- Chen H. (2019). *Pasir Gudang: How One Quiet Lorry Sparked a Toxic Waste Crisis* (BBC News). Available at: <https://www.bbc.com/news/world-asia-47607666> (Accessed 5 May 2021).

- Chen, J. C., & Martin, A. R. (2015). Role-play simulations as a transformative methodology in environmental education. *Journal of Transformative Education*, 13 (1), pp. 85-102. <https://doi.org/10.1177/1541344614560196>
- Chin, Y.S.J., De Pretto, L., Thuppil, V., & Ashfold, M.J. (2019) Public awareness and support for environmental protection-A focus on air pollution in peninsular Malaysia. *PLOS ONE* 14(3). <https://doi.org/10.1371/journal.pone.0212206>
- Choy, Y.C & Onuma, A. (2021). Transboundary ecological conservation, environmental value, and environmental sustainability: Lessons from the Heart of Borneo. *Sustainability* 13, 9727. <https://doi.org/10.3390/su13179727>
- Common, M., & Stagl, S. (2005). *Ecological Economics: An Introduction*. Cambridge: Cambridge University Press. <https://doi.org/10.1017/CBO9780511805547>
- Corraliza, J. A., & Berenguer, J. (2000). Environmental values, beliefs, and actions: A Situational Approach. *Environment and Behaviour*, 32 (6), pp. 832-848. <https://doi.org/10.1177/00139160021972829>
- De Groot J. I. M., Steg, L. (2010). Relationships between value orientations, self-determined motivational types, and pro-environmental behavioural intentions. *Journal of Environmental Psychology*, 30, pp. 368-78. <https://doi.org/10.1016/j.jenvp.2010.04.002>
- Dietz, T., Fitzgerald, A., & Shwom, R. (2005). Environmental values. *Annual Review of Environment and Resources*, 30, pp. 335-372. <https://doi.org/10.1146/annurev.energy.30.050504.144444>
- Dietz, T., & Stern, P.C. (2002). *New Tools for Environmental Protection Education, Information, and Voluntary Measures*. Washington: National Academies Press.
- Dobson, A. (2007). Environmental citizenship: Towards sustainable development. *Sustainable Development*, 15, pp. 276-285. <https://doi.org/10.1002/sd.344>
- Dobson, A. (2010). Environmental Citizenship and Pro-Environmental Behaviour: Rapid Research and Evidence Review. *Report for the Sustainable Development Research Network*, 1-86.
- Dobson & D. Bell (Eds.), *Environmental Citizenship*. Cambridge: MIT Press, pp. 21-48.
- Doğru, M., Güzeller, C.O., Gencosman, T., & Saka, D. (2015). Development of scale of attitude toward social sustainable development awareness. *European Journal of Sustainable Development*, 4 (3), pp. 23-32.
- Ergen, B., & Ergen, Z. (2011). How does education affect environmental knowledge: A survey in urban and regional planning education. *US-China Education Review*, B (7), pp. 924-931.
- European Network for Environmental Citizenship (ENEC). (2018). *Defining Environmental Citizenship*. Available at: <http://enec-cost.eu/our-approach/enec-environmental-citizenship> (Accessed 18 April 2021).
- Felixdóttir, S. S. (2017). *Values and Pro-Environmental Behaviour: The Role of Materialistic and Environmental Values in Predicting Daily Pro-Environmental Behaviour and Ethical Consumption among Young Icelanders*. Unpublished Masters Thesis, Sigillum Universitatis Islandiae.
- Frank, P., Fischer, D., & Wamsler, C. (2019). Mindfulness, education, and the Sustainable Development Goals. In W. Leal Filho, A. M. Azul, L. Brandli, P. G. Özuyar, & T. Wall (Eds.), *Quality Education*. Cham: Springer, pp1-10 https://doi.org/10.1007/978-3-319-69902-8_105-1
- Gifford, R., & Nilsson, A. (2014). Personal and social factors that influence pro environmental concern and behaviour: A review. *International Journal of Psychology*, 49, pp. 141-157. <https://doi.org/10.1002/ijop.12034>
- Gillett, M. (1977). The Tbilisi Declaration. *McGill Journal of Education / Revue Des Sciences De l'éducation De McGill*, 12(002). Available at: Retrieved from <https://mje.mcgill.ca/article/view/7156> (Accessed 31 October 2021).
- Goldman, D., Hansmann, R., Cincera, J., Radovic, V., Telesiene, A., Balzekiene, A., & Vavra, J. (2020). Education for Environmental Citizenship and Responsible Environmental Behaviour. In A. C. Hadjichambis et al. (Eds.) *Conceptualizing Environmental Citizenship for 21st Century Education*. Cham: Springer, pp. 115-137. https://doi.org/10.1007/978-3-030-20249-1_8

- Grunert, S., & Juhl, H. J. (1995). Values, environmental attitudes, and buying of organic foods. *Journal of Economic Psychology*, *16*, pp. 39-62. [https://doi.org/10.1016/0167-4870\(94\)00034-8](https://doi.org/10.1016/0167-4870(94)00034-8)
- Gunningham, N., Kagan, R. A., & Thornton, D. (2004). Social license and environmental protection: Why businesses go beyond compliance. *Law & Social Inquiry*, *29* (2), pp. 307-341. <https://doi.org/10.1111/j.1747-4469.2004.tb00338.x>
- Gutiérrez, D. (1996). Values and their effect on pro-environmental behaviour. *Environment and Behaviour*, *28*, pp. 111-133. <https://doi.org/10.1177/0013916596281006>
- Hadjichambis, A.C., Reis, P., Paraskeva-Hadjichambi, D., Činčera, J., Boeve-de Pauw, J., Gericke, N. & Knippels, M.C. (2020). *Conceptualizing Environmental Citizenship for 21st Century Education*. Cham: Springer <https://doi.org/10.1007/978-3-030-20249-1>
- Hay, P. R. (2002). *Main Currents in Western Environmental Thought*. Bloomington: Indiana University Press.
- Hines, J.M., Hungerford, H.R., & Tomera, A.N. (1986-87). Analysis and synthesis of research on responsible pro-environmental behaviour: a meta-analysis, *The Journal of Environmental Education*, *18* (2), pp. 1-8. <https://doi.org/10.1080/00958964.1987.9943482>
- Hitlin, S. (2011). Values, personal identity, and the moral self. In S. J. Schwartz, K. Luyckx, & V. L. Vignoles (Eds.), *Handbook of Identity Theory and Research*. New York, NY: Springer, pp. 515-529. https://doi.org/10.1007/978-1-4419-7988-9_20
- Huckle, J. (2014). Education for sustainable citizenship: An emerging focus for education for sustainability. In Huckle & S. Sterling (Eds.), *Education for Sustainability*. London: Routledge, pp. 228-243
- Hurst, M., Dittmar, H., Bond, R., & Kasser, T. (2013). The relationship between materialistic values and environmental attitudes and behaviours: A meta-analysis. *Journal of Environmental Psychology*, *36*, pp. 257-269. <https://doi.org/10.1016/j.jenvp.2013.09.003>
- Jagers, S.C., & Simon Matti, S. (2010). Ecological citizens: Identifying values and beliefs that support individual environmental responsibility among Swedes. *Sustainability*, *2*, pp. 1055-1079. <https://doi.org/10.3390/su2041055>
- Jamieson, S. (2004). Likert scales: how to (ab)use them. *Medical Education*, *38*, pp. 1212-1218. <https://doi.org/10.1111/j.1365-2929.2004.02012.x>
- Jones, N., Shaw, S., Ross, H., Witt, K., & Pinner, B. (2016). The study of human values in understanding and managing social-ecological systems. *Ecology and Society*, *21*(1), pp. 1-10. <https://doi.org/10.5751/ES-07977-210115>
- Kaputa, V., Lapin, K., Leregger, F., & Gekic, H. (2020). Economic dimensions of environmental citizenship. In A. C. Hadjichambis et al. (Eds.) *Conceptualizing Environmental Citizenship for 21st Century Education* Cham: Springer, pp. 29-48. https://doi.org/10.1007/978-3-030-20249-1_3
- Karpan, I., Chernikova, N., Motuz, T., Bratanich, B., & Lysokolenko, T. (2020). Conceptual principles of education for sustainable development. *European Journal of Sustainable Development* *9* (2), pp. 99-114. <https://doi.org/10.14207/ejsd.2020.v9n2p99>
- Kennedy, E.H., Beckly, T.M., McFarlane, B.L., & Nadeau, S (2009). Why we don't "Walk the Talk": Understanding the environmental values/behaviour gap in Canada. *Human Ecology Review*, *16*, (2), pp. 151-160.
- Kollmuss, A., & Agyeman, J. (2002) Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behaviour? *Environmental Education Research*, *8* (3), pp. 239-260. <https://doi.org/10.1080/13504620220145401>
- Kopnina, H. (2014), Revisiting Education for Sustainable Development (ESD): Examining Anthropocentric Bias Through the Transition of Environmental Education to ESD. *Sustainable Development*, *22*(2) pp. 73-83. <https://doi.org/10.1002/sd.529>
- Leiserowitz, A.A., Kates, R.W., & Parris, T. M. (2006). Sustainability values, attitudes, and behaviours: A review of multinational and global trends. *Annual Review of Environment and Resources* *31* (1), pp. 413-444. <https://doi.org/10.1146/annurev.energy.31.102505.133552>

- Likert, R. (1932). A technique for the measurement of attitudes. *Archives of Psychology*, 22(140), pp. 1-55.
- Linke, R.D. (1980). *Environmental Education in Australia*. Sydney: George Allen & Unwin.
- Lim, M.M.L., Jørgensen, P.S., & Wyborn, C.A. (2018). Reframing the sustainable development goals to achieve sustainable development in the Anthropocene—a systems approach. *Ecology and Society* 23 (3), pp. 1-19. <https://doi.org/10.5751/ES-10182-230322>
- Liobikiene, G., & Poškus, M.S. (2019). The importance of environmental knowledge for private and public sphere pro-environmental behaviour: Modifying the Value-Belief-Norm Theory. *Sustainability*, 11 (3324), pp.2-19. <https://doi.org/10.3390/su11123324>
- Mammadova, A. (2017). Sustainability lessons from Kanazawa City, Japan. *European Journal of Sustainable Development* 6 (2), pp. 233-239. <https://doi.org/10.14207/ejsd.2017.v6n2p233>
- Manfredo, M. J., Bruskotter, J. T., Teel, T. L., Fulton, D., Schwartz, S. H., Arlinghaus, R., & Sullivan, L. (2017). Why social values cannot be changed for the sake of conservation. *Conservation Biology*, 31 (4), pp. 772-780. <https://doi.org/10.1111/cobi.12855>
- Martin, C., & Czellar, S. (2017). Where do biospheric values come from? A connectedness to nature perspective. *Journal of Environmental Psychology* 52(12), pp. 56-68.
- Mensah, J., & Casadevall S.R., (2019) Sustainable development: Meaning, history, principles, pillars, and implications for human action: Literature review. *Cogent Social Sciences*, 5 (1). <https://doi.org/10.1080/23311886.2019.1653531>
- Mohamad, F.S., Norjumaaton, F.R. & Wijekoon, R., (2019). The mediation effect of intention in the pro-environmental workplace (PEW) behaviour of Malaysian public employees. *Management Science Letters* 9, pp. 1567-1576. <https://doi.org/10.5267/j.msl.2019.5.029>
- Mohamad Saifudin, M.S., Shaidatul, AAK, Balaraman, & Sharifah, NSM (2018). The current progress of Malaysian media and environmental Non-Governmental Organisations (ENGOS) in Environmental Education: An Evaluation. *Jurnal Komunikasi Borneo* 6 (Edisi Khas Konvokesyen UMS ke-20). <https://doi.org/10.51200/jkob.v0i0.1577>
- Muhammad 'Arif, A.B., Hairul Nizwan, A.M., Alden, S. M., Shahril, H. & Mohd Salehuddin, M.Z. (2018). The role of environmental knowledge and mediating effect of pro-environmental attitude towards food waste reduction. *International Journal of Academic Research in Business and Social Sciences*, 8 (17), pp.60-72.
- Neo, S.M., Choong, W.W., & Rahmalan, A. (2017). Public environmental awareness and behaviour in Malaysia. *Asian Journal of Quality of Life*, 2 (5), pp. 43-53. <https://doi.org/10.21834/ajqol.v2i5.10>
- Nordlund, A.M., & Garvill, J. (2002). Value structures behind pro-environmental behaviour. *Environment and Behaviour*, 34 (6), pp. 740-756. <https://doi.org/10.1177/001391602237244>
- Norman G. (2010). Likert scales, levels of measurement and the “laws” of statistics. *Advances in Health Sciences Education Theory and Practice*, 15(5), pp 625-632. <https://doi.org/10.1007/s10459-010-9222-y>
- Rhemtulla, M., Brosseau-Liard, P. E., & Savalei, V. (2012). When can categorical variables be treated as continuous? A comparison of robust continuous and categorical SEM Estimation Methods under suboptimal conditions. *Psychological Methods* 17 (3), pp. 354 -373. <https://doi.org/10.1037/a0029315>
- Rokeach, M. (1973). *The Nature of Human Values*. New York: Free Press.
- Sabo, H. M. (2011). Environmental Education and Sustainable Development - General Aspects. Available at: <http://www.ipedr.com/vol5/no2/2-H10061.pdf> (Accessed 4 January 2022).
- Saripah A.L., Mohd Shukri, O., Yeop, H.B., & Zainudin, A. (2013). Role of environmental knowledge in creating pro-environmental residents. *Procedia - Social and Behavioural Sciences* 105, pp. 866 - 874 <https://doi.org/10.1016/j.sbspro.2013.11.088>
- Sauvé, L. (1996). Environmental education and sustainable development: A further appraisal. *Canadian Journal of Environmental Education*, 1, pp.7-34.

- Schneiderhan-Opel, J. & Bogner, F.X. (2020). The relation between knowledge acquisition and environmental Values within the Scope of a Biodiversity Learning Module. *Sustainability*, 12 (2036), pp. 2-19. <https://doi.org/10.3390/su12052036>
- Schultz, P. W., Gouveia, V.V., Cameron, L. D., Tankha, G., Schmuck, P., & Franek, M. (2005). Values and their relationship to environmental concern and conservation behaviour. *Journal of Cross-Cultural Psychology*, 36, pp. 457-475. <https://doi.org/10.1177/0022022105275962>
- Schultz, P. W., & Zelezny, L. C. (2003). Reframing environmental messages to be congruent with American Values. *Human Ecology Review*, 10, pp. 126-136.
- Sharifah, Z., Syed, Z., Nur Mairah, R. & Abu Bakar. (2021). Global citizenship elements in Malaysian primary school curriculum towards sustainable development goals (SDGs). *Ecology, Environment and Conversation*, 27(1), pp. 178-186.
- Siti, NBA, Juhdi, N. & Shaikh A. & Azlina (2010). Examination of environmental knowledge and perceived pro-environmental behaviour among students of University Tun Abdul Razak, Malaysia. *International Journal of Multidisciplinary Thought*, 1 (1), pp. 328-342.
- Schneiderhan-Opel, J. & Bogner, F. X. (2020). The relation between knowledge acquisition and environmental values within the scope of a biodiversity learning module. *Sustainability*, 12, 2036. <https://doi.org/10.3390/su12052036>
- Schwartz, S. H. (1994). Are there universal aspects in the structure and contents of human values? *Journal of Social Issues*, 50, pp. 19-45. <https://doi.org/10.1111/j.1540-4560.1994.tb01196.x>
- Schwartz, S. H. (2012). An overview of the Schwartz theory of basic values. *Online Readings in Psychology and Culture*, 2 (1), pp. 1-20. <https://doi.org/10.9707/2307-0919.1116>
- Smederevac-Lalic M., Finger D., Kováč, I. Lenhardt, M. Petrovic, J., Djikanovic, V., Conti, D. & Boevde Pauwet, J. (2020). Knowledge and environmental citizenship. In: Hadjichambis A. et al. (eds.) *Conceptualizing Environmental Citizenship for 21st Century Education. Environmental Discourses in Science Education, Vol 4*. Cham: Springer, pp. 69-82. https://doi.org/10.1007/978-3-030-20249-1_5
- Steg, L., & De Groot, J. I. M. (2012). Environmental values. In S. Clayton (Ed.), *The Oxford Handbook of Environmental and Conservation Psychology*. New York: Oxford University Press, pp. 81-92. <https://doi.org/10.1093/oxfordhb/9780199733026.013.0005>
- Steg L, & Vlek C. 2009. Encouraging pro-environmental behaviour: an integrative review and research agenda. *Journal of Environmental Psychology*, 29, pp. 309-317. <https://doi.org/10.1016/j.jenvp.2008.10.004>
- Stern, P. C., & Dietz, T. (1994). The value basis of environmental concern. *Journal of Social Issues*, 50 (3), pp. 65 -84.
- Šulc, I., Morgado, S, Đorđević, Z., Gašparović, S., Radović, V., & Keranova, D. (2020). Societal issues and environmental citizenship. In A. C. Hadjichambis et al. (Eds.) *Conceptualizing environmental citizenship for 21st Century education*. Cham, Springer, pp. 49-66. https://doi.org/10.1007/978-3-030-20249-1_4
- Tan, E. & Hyo-Jeong So (2019) Role of environmental interaction in interdisciplinary thinking: from knowledge resources perspectives, *The Journal of Environmental Education*, 50 (2), pp. 113-130. <https://doi.org/10.1080/00958964.2018.1531280>
- The STAR (2020). *Watch Out for River Pollution (Letters to the Editor)*. Available at: <https://www.thestar.com.my/opinion/letters/2020/05/02/watch-out-for-river-pollution> (Accessed 23 May 2021).
- Thøgersen, J., & Grunert-Beckmann, S. C. (1997). Values and attitude formation towards emerging attitude objects: From recycling to general waste minimizing behaviour. *Advances in Consumer Research*, 24, pp. 182-189.
- Ünal, A. B., Steg, L., & Gorsira, M. (2017). Values versus environmental knowledge as triggers of a process of activation of personal norms for ecodriving. *Environment and Behaviour* 50 (10), pp. 1092-1118. <https://doi.org/10.1177/0013916517728991>

- UNCED (1992). *United Nations Conference on Environment and Development (UNCED), Earth Summit*. Available at: <https://sustainabledevelopment.un.org/milestones/unced> (Accessed 25 May 2021).
- UNESCO (2021). *What is Education for Sustainable Development*. Available at: <https://en.unesco.org/themes/education-sustainable-development/what-is-esd> (Accessed 26 February 2022)
- United Nations (2020). *About the Sustainable Development Goals*. Available at: <https://www.un.org/sustainabledevelopment/sustainable-development-goals/> (Accessed 17 April 2021).
- van Riper, C. J., & Kyle, G. T. (2014). Understanding the internal processes of behavioural engagement: A latent variable path analysis of the value-belief-norm theory. *Journal of Environmental Psychology, 38*, pp. 288-297. <https://doi.org/10.1016/j.jenvp.2014.03.002>
- van Riper, C. J., Lum, C., Kyle, G.T., Wallen, K.E., Absher, J., & Landon, A. C. (2020). Values, motivations, and intentions to engage in pro-environmental behaviour. *Environment and Behaviour, 52* (4), pp. 437-462. <https://doi.org/10.1177/0013916518807963>
- van Riper, C. J., Thiel, A., Penker, M., Braitto, M., Landon, A. C., Thomsen, J.M. & Tucker, C.M. (2018). Incorporating multilevel values into the social-ecological systems framework. *Ecology and Society 23*(3):25. <https://doi.org/10.5751/ES-10047-230325>
- Vicente-Molina M.A., Fernandez-Sainz A., & Izagirre-Olaizola J. (2013). Environmental knowledge and other variables affecting pro-environmental behaviour: comparison of university students from emerging and advanced countries, *Journal of Cleaner Production, 61*, pp. 130-138. <https://doi.org/10.1016/j.jclepro.2013.05.015>
- Warmbrod, J. R. (2014). Reporting and interpreting scores derived from Likert-type Scales. *Journal of Agricultural Education, 55*(5), pp. 30-47. <https://doi.org/10.5032/jae.2014.05030>
- World Wildlife Fund for Nature-M (WWF-M) (2009). *Environmental Citizenship: A Report on Emerging Perspectives in Malaysia*. Available at: <https://www.wwf.org.my/?9260/Environmental-Citizenship-Study-Report> (Accessed 13 March 2021).
- WWF-M. (2013). *Overall Report: Infusing environmental education in the existing national curriculum - A longitudinal study: results & trends*. Available at: <https://www.wwfmy-esd.com/research2> (Accessed 28 December 2021).
- Wynveen, C. J., Wynveen, B. J., & Sutton, S. G. (2015). Applying the value-belief norm theory to marine contexts: Implications for encouraging pro-environmental behaviour. *Coastal Management, 43*, pp. 84-103. <https://doi.org/10.1080/08920753.2014.989149>
- Yusliza, M. Y., Amirudin, A., Rahadi, R. A., Nik Sarah Athirah, N. A., Ramayah, T., Muhammad, Z., Dal Mas, F., Massaro, M., Saputra, J. & Mokhlis, S. (2020). An investigation of pro-environmental behaviour and sustainable development in Malaysia. *Sustainability, 12*, 7083. <https://doi.org/10.3390/su12177083>
- Zenelaj, E. (2013). Education for sustainable development. *European Journal of Sustainable Development, 2* (4), pp.227-232. <https://doi.org/10.14207/ejsd.2013.v2n4p227>

