

# Sustainable Development Goals Knowledge and Sustainability Behaviour: A Study of British and Malaysian Tertiary Students

Ronghui (Kevin) Zhou<sup>1</sup>, Nur Fadhlina Zainal Abedin<sup>2\*</sup>, Sheela Paramasivam<sup>3</sup>

<sup>1</sup>Department of Educational Studies, University of Warwick,  
Coventry CV4 7AL, United Kingdom  
r.zhou.6@warwick.ac.uk

<sup>2</sup>Faculty of Business Management, Universiti Teknologi MARA, Seremban Campus,  
70300 Seremban, Negeri Sembilan, Malaysia  
nurfadhlina@uitm.edu.my

<sup>3</sup>Academy of Language Studies, Universiti Teknologi MARA, Seremban Campus,  
70300 Seremban, Negeri Sembilan, Malaysia  
sheela@uitm.edu.my

\*Corresponding Author

<https://doi.org/10.24191/ajue.v18i2.17997>

*Received: 27 November 2021*

*Accepted: 27 March 2022*

*Date Published Online: 30 April 2022*

*Published: 30 April 2022*

**Abstract:** This paper explores Sustainable Development Goals (SDGs) knowledge and behavioural differences of university students in the United Kingdom and Malaysia. The researchers also explore gender as an indicator of students' SDG awareness and behaviours as few studies to date have explored this area. This study employed a sustainability consciousness questionnaire (SCQ) that was developed to measure SDG knowledge based on the UNESCO framework for sustainability behaviour. Questionnaires were distributed to 156 university students in the UK and Malaysia. Malaysian university students reported higher scores for understanding SDG content and scope and the specific SDGs of their country compared to British students, although British students have been receiving formal education on SDGs. University students in the UK were also unable to transform their SDG knowledge into sustainability behaviours, although they had a certain level of understanding of the topic covered by the SDGs. Malaysian university students exhibited a closer relationship between SDG knowledge and sustainable behaviours given the sufficient institutional and policy support and customised university programs. SDG knowledge and sustainability behaviours were the same for male and female students in both countries. In conclusion, integrating SDG knowledge into university education will inevitably lead students to work towards SDG goals in the future. This can be achieved with proper planning of the university curriculum and the enforcement of educational policies.

**Keywords:** gender, Malaysia, Sustainability Behaviour, SDGs Awareness, United Kingdom

## 1. Introduction

In recent years, universities across the globe have begun integrating aspects of sustainability into institution planning, including curriculum building, pedagogical teaching, campus constructions and infrastructure designs to attract better school intakes (Ragazzi & Ghidini, 2017). These developments of sustainability in higher education are answerable to the global agenda of sustainable development (SD) principles. Members of the United Nations have reached a consensus targeting the most urgent issues to build a sustainable future. Education for Sustainable Development (ESD) has been viewed as a common solution to foster sustainability knowledge, values and behaviours and, ultimately, promote social transformation (Zamora-Polo et al., 2019). Higher education thus becomes the natural

habitat to accommodate ESD and promote SD to the next generation. As such, ESD in higher education is growing significantly in many countries.

Since the early 20<sup>th</sup> century, many countries, such as the UK and Sweden, have established policies and initiatives to foster sustainability in school infrastructure building, energy-saving and academic research (Fiselier et al., 2017). For instance, the University of Plymouth was one of the first universities in the UK to create an SD research centre and initiated ESD research in 2005. Universities from other countries have also commenced ESD development and research. According to Holm et al. (2015), more than half of Chinese universities had implemented courses related to sustainability by the end of 2009. Given the many efforts to promote SD in higher education over the past few decades, UNESCO established a new SD agenda, incorporating the 17 Sustainable Development Goals (SDGs), in 2015. The newly established SDGs targeted updated urgent SD issues and countries aim to achieve these goals by 2030. As such, ESD is seen as crucial in promoting SDGs in higher education and universities have quickly reacted to this new agenda. Aside from building SD competence, awareness and values for students, knowledge related to SDGs has also been embedded into the university curriculum to shape students' SD behaviours (Zamora-Polo et al., 2019).

The success of ESD in higher education and the extent of university students' SDG knowledge and behaviours are yet to be determined. Thus, this study explores these topics. Taking the UK and Malaysia as examples, this research compares and contrasts the SDG knowledge and behaviours of university students from these two countries.

### **1.1 Higher Education for Sustainable Development (HESD) in U.K. universities**

Studies have reported that HESD did not meet intended outcomes despite many universities in the UK integrating ESD in managing school infrastructure and offering sustainability-related courses (Armstrong, 2011). At the policy level, government programmes and initiatives that support the development of HESD have lacked momentum (Armstrong, 2011). For instance, the Green Academy Programme by the Higher Education Academy (HEA) was unable to provide the necessary institutional support to accommodate ESD in universities (Fiselier et al., 2017). The Higher Education Funding Council For England (HEFCE) ceased producing programme evaluation reports in 2014, bringing uncertainty to the current status of the ESD programme in higher education. The Quality Agency for Higher Education (QAA) and HEA established ESD guidance for universities to integrate ESD into curricula and teaching pedagogies. However, only 16 out of 120 higher education institutions in the UK officially reported compliance with the ESD guidance; the detailed status of ESD development in the other 104 universities remained unknown (Fiselier & Longhurst, 2018).

For many universities in the UK, ESD begins and ends with improving the sustainability of their infrastructures and energy use, with less attention being paid to the curriculum (Fiselier et al., 2017). There has been little integration of ESD into the university curriculum (Cebrian et al., 2015; Tierney et al., 2015; Wyness & Sterling, 2014). As shown in a case study by Tierney et al. (2015) at the University of Bristol, the current curriculum showed limited integration of ESD with direct sustainability content. A case study by Wyness and Sterling (2014) displayed similar results in the University of Plymouth, where sustainability-related education was only delivered in a few modules. There was also a problem concerning imbalanced ESD content in the curriculum as these modules do not cover the full scope of the environmental, social, economic, and cultural pillars of ESD. Cebrian et al. (2015) summarised the difficulties in integrating ESD into the curriculum at Southampton University. They argued that a 'lack of time and financial resources, lack of deep understanding of sustainability, current curriculum structure and ways of delivery, academic pressures,... [and] lack of organizational support... block the [ESD] engagement [in the university] (Cebrian et al., 2015, pp. 79)'. In line with much of the literature, the current engagements of ESD in higher education institutions in the UK have faced obstacles and challenges to effectively achieve the intended outcomes of ESD for university students.

## **1.2 HESD in Malaysian universities**

Similar to the UK, Malaysia also responded to the sustainability agenda in the late 90s. Since then, policies, long-term planning and government visions, such as the National Education Development Plan 2001-2020 and National Education Blueprint (2006-2010) were initiated to promote ESD in the education system (Kanapathy et al., 2021). Research centres, ESD frameworks and sustainability networks were also sponsored and developed (Ariffin & Foo, 2019). Similar to higher education institutions in the UK, Malaysian universities attempted to construct green and sustainable infrastructures to meet sustainability demands (Ilham et al., 2020). A case study by Ilham et al. (2020) of three Malaysian universities demonstrated the positive influences of sustainable campuses in promoting a positive atmosphere and accommodating ESD in the curriculum. Similar results were reported by The & Koh (2019) who discovered significant improvements in stormwater, air and water quality at Universiti Sains Malaysia after the induction of sustainability measures on campus.

In addition, Malaysian universities have also embedded ESD into curricula and teaching (Wahid et al., 2020; Yahawa & Maaruf, 2019). A study by Kanapathy et al. (2021) examined ESD in the chemistry curriculum. Findings of this study revealed that education policy, stakeholders' awareness and engagement, curriculum and pedagogical enhancement, and school support have increased the viability of the SD concept in universities. Ilham et al. (2020) study argued that the localisation of the 17 SDGs has contributed to positive ESD outcomes in three universities in Malaysia. The three universities in the study claimed that SD projects related to the local contextual settings enhanced students' SD awareness and behaviours. Yet another study by Balakrishnan et al. (2021) confirmed the ESD accomplishments of a Malaysian university by comparing the perceptions of students from a university in Malaysia and a university in Japan. They found that Malaysian engineering undergraduates have positive attitudes towards the environmental aspects of SD issues, whereas Japanese undergraduates maintained positive attitudes towards social and environmental SD issues (Balakrishnan et al., 2021). The skewed attitudes towards SD issues were foreseen by Reza (2016), who identified the unbalanced ESD development in Malaysian universities. Environmental SD issues have commonly been reflected in ESD in higher education institutions. Conversely, the social, cultural and economic aspects of SD are often neglected in the actual ESD implementations (Reza, 2016).

## **1.3 SDGs Knowledge and Sustainability Behaviors**

Some studies have demonstrated the intimate connections between sustainability knowledge and behaviours. ESD and environmental education have proven that increasing learners' sustainability knowledge leads to the transformation of their behaviours (Alsaati et al., 2020). Stern et al. (2014) conducted a systematic review on articles related to the environmental education (EE) programme and found that the overall positive impacts of teaching environmental education in formal or informal settings improve learners' environmental awareness, skills, attitudes, and behaviours. However, lecturing on sustainability knowledge may not always lead to behavioural changes. The connections between knowledge and behaviours can be easily interrupted. Connell and Kozar (2012) investigated university students' purchasing behaviour changes after introducing sustainability in courses concerning the apparel and textile industry. They found that students' sustainability attitudes changed but there was no significant change in students' self-reported purchasing behaviours. This may be due to how the sustainability knowledge was instructed. Connell & Kozar (2012) argued for the necessity to improve curricula design. Contextual setting can also be an important factor that disconnects the relation between knowledge and behaviours (Emanuel & Adams, 2011). Emanuel and Adams (2011) investigated students' sustainability knowledge and behaviour changes on two campuses of the University of Alabama. Findings of their study revealed that although the university followed the same curriculum on both campuses, students' sustainability knowledge was increased but their sustainable commitments varied. This was largely due to the difference between the two campuses in promoting sustainability as one of the campuses highly promoted sustainability in the nearby communities.

Given the overall sustainability contextual settings of UK and Malaysian universities, the university students' awareness of SDGs is open to questioning. Existing literature has shown the success and failures of ESD development in higher education institutions between the two countries. However, the key stakeholder, the university students themselves, are commonly overlooked in

research focusing on the two countries. Literature often targets Science, Technology, Engineering, and Mathematics (STEM) students and their perceptions and behaviours related to SDGs whereby the general population of university students is usually disregarded. Furthermore, few studies have included gender as an indicator of students' SDG awareness and behaviours. Therefore, this study explores SDG knowledge and behavioural differences between the two countries and investigate university students' association between SDG awareness and behaviours. We aim to provide empirical evidence to address this research gap. Thus, our research objectives are (1) to examine the SDG knowledge and sustainability behavioural differences between male and female British and Malaysian tertiary students and (2) to determine the association between the SDG knowledge and sustainability behaviours of the students.

## 2. Methodology

This study used a sustainability consciousness questionnaire (SCQ) that was developed to measure SDG knowledge based on the UNESCO framework and sustainability behaviour. The starting point of the instrument used in SCQ was created by Michalos et al. (2012) before being adapted and expanded by others. This paper focuses on SDG knowledge and sustainability behaviour constructs. The SDG knowledge construct consisted of eight items adapted from Zamora-Polo et al. (2019) and the sustainability behaviour construct was derived from Gericke et al. (2019) and consisted of 17 items. These two questionnaire instruments provide excellent psychometric quality that allows us to explore the knowledge and behaviours of university students in this research. However, one item, '*I don't think about how my actions may damage the natural environment*', was edited to a positive statement. The questionnaire items are presented in the Appendix. All items used a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The ordinal score for each item was summed to obtain the scale value for further analysis.

**Table 1.** Respondent distribution according to countries and universities

| United Kingdom            |      |      | Malaysia                                  |      |      |
|---------------------------|------|------|-------------------------------------------|------|------|
| University                | Fre. | %    | University                                | Fre. | %    |
| Aston University          | 4    | 7.0  | International Islamic University Malaysia | 5    | 5.1  |
| Cranfield University      | 1    | 1.8  | Universiti Kebangsaan Malaysia            | 6    | 6.1  |
| Durham University         | 1    | 1.8  | Universiti Malaya                         | 17   | 17.1 |
| Swansea University        | 1    | 1.8  | Universiti Malaysia Pahang                | 6    | 6.1  |
| Teesside University       | 2    | 3.5  | Universiti Malaysia Perlis                | 17   | 17.2 |
| University College London | 7    | 12.3 | Universiti Malaysia Sarawak               | 2    | 2.0  |
| University of Birmingham  | 2    | 3.5  | Universiti Malaysia Terengganu            | 2    | 2.0  |
| University of Cambridge   | 1    | 1.8  | Universiti Putra Malaysia                 | 3    | 3.0  |
| University of Edinburgh   | 4    | 7.0  | Universiti Sains Malaysia                 | 8    | 8.1  |
| University of Leeds       | 2    | 3.5  | Universiti Teknologi Malaysia             | 9    | 9.1  |
| University of Manchester  | 3    | 5.3  | Universiti Teknologi MARA                 | 26   | 26.3 |
| University of Queensland  | 2    | 3.5  | Universiti Utara Malaysia                 | 2    | 2.0  |
| University of St. Andrews | 11   | 19.3 |                                           |      |      |
| University of Surrey      | 2    | 3.5  |                                           |      |      |
| University of Warwick     | 14   | 24.6 |                                           |      |      |

Fre = Frequency

The questionnaire was randomly distributed to university students in the UK and Malaysia. To access the reliability or consistency of the questionnaire, Cronbach's alpha was calculated for each construct. Cronbach's alphas for SDG knowledge and sustainability behaviour were 0.870 and 0.803, respectively. These values were greater than 0.7, which was considered desirable. The total number of respondents was 156 of which 57 (33.5%) of respondents were higher institution students in the UK

and 99 (58.2%) were students in Malaysia. Table 1 shows the sample distribution according to country and university. The respondents were aged between 18 and 45 years old. Most of them were aged 20 (35.9%) and 21 (21.8%). There were 51 (32.7%) male respondents and 105 (67.3%) female respondents.

A parametric approach was used. An independent sample t-test examined SDG knowledge and sustainability behaviour differences between countries and genders and determined the difference between the means of two independent groups inferentially. A standard 95% confidence interval was used. The null hypothesis for the independent sample t-test was that the two means group were equal. Other than normality, the equal variances between groups were assumed using Levene's test. In the case of unequal variances, SPSS software calculated a Welch-Satterthwaite test by default to reduce the Type I error rate. The Welch-Satterthwaite test corrected the homogeneity variance violation by adjusting the degree of freedom. The null hypothesis for both tests was the homogeneity of the group variances. To achieve the second objective, which was to measure the association between SDG knowledge and sustainability behaviour, the Pearson correlation coefficient was applied. Although the non-parametric approach was more suitable for ordinal data, the data for these two variables were transformed to scale data where the summation of the construct scores was considered.

The values of correlation coefficients ranged from  $-1$  to  $1$ . A positive correlation indicated that both variables' rankings were rising. A negative correlation indicated that as one variable rose, the other variable fell. The null hypothesis indicated no association between the variables and vice versa for the alternate hypothesis. The rule of thumb for the correlation coefficients was that those equal to or above  $+0.70$  or  $-0.70$  implied a strong relationship, those closer to  $+0.5$  and  $-0.5$  indicated a moderate relationship and those less than  $+0.5$  and  $-0.5$  indicated a weak relationship (Rumsey, 2009). However, there were slight differences among statisticians and researchers about the cut-off point of the interpretation. All the analyses were run using SPSS software version 20.

### 3. Results

Based on the results obtained, the overall mean scores for SDG knowledge and sustainability behaviour were 26.35 (sd. 6.50) and 64.17 (sd. 7.73), respectively, indicating an average level of understanding for SDG knowledge and sustainability behaviour. The total scores for SDG knowledge and sustainability behaviour were 40 and 85, respectively. The median was close to the mean, indicating that the data were less skewed. Standard deviations were low indicating a low dispersion from the mean and that data were less spread. There were significant gaps between the minimum and maximum scores of the SDG knowledge and sustainability behaviours of students.

**Table 2.** Overall descriptive statistics of the Knowledge & Sustainability Behaviour

| Statistics     | Construct      |                          |
|----------------|----------------|--------------------------|
|                | SDGs Knowledge | Sustainability Behaviour |
| Mean           | 26.35          | 64.17                    |
| Median         | 27.00          | 65.00                    |
| Variance       | 42.31          | 59.77                    |
| Std. Deviation | 6.50           | 7.73                     |
| Minimum        | 8              | 37                       |
| Maximum        | 40             | 83                       |

#### 3.1 SDGs Knowledge and Sustainability Behaviour between gender and countries

The mean scores for the UK and Malaysia for students' SDG knowledge were 26.05 (sd. 5.93) and 26.52 (6.84), respectively; no significant difference was found. For students' sustainability behaviour, the mean was 61.91 (sd. 7.83) for the UK and 65.47 (sd.7.40) for Malaysia. On average, students in Malaysia exhibited more sustainable behaviours compared to those in the UK. The mean

difference was 3.56. This was surprising as the initial predictions of the study was that students of a developed country would be more proactive towards sustainability than a developing country. However, the mean scores for gender were close to each other for both constructs. The SDG knowledge mean difference was 0.82 and the sustainability behaviour mean difference was 0.4. There was no difference in SDG knowledge and sustainability behaviour between males and females.

**Table 3.** Overall descriptive statistics of the Knowledge & Sustainability Behaviour

| Variables                | Country/Gender | N   | Mean  | Std. Deviation |
|--------------------------|----------------|-----|-------|----------------|
| SDGs Knowledge           | United Kingdom | 57  | 26.05 | 5.93           |
|                          | Malaysia       | 99  | 26.52 | 6.84           |
| Sustainability Behaviour | United Kingdom | 57  | 61.91 | 7.83           |
|                          | Malaysia       | 99  | 65.47 | 7.40           |
| SDGs Knowledge           | Male           | 51  | 26.90 | 6.57           |
|                          | Female         | 105 | 26.08 | 6.49           |
| Sustainability Behaviour | Male           | 51  | 63.92 | 7.53           |
|                          | Female         | 105 | 64.30 | 7.86           |

However, to determine whether differences between countries and gender were statistically significant, the t-statistics were calculated as shown in Table 4. Equal variances were assumed for all cases. Output by the independent sample t-test revealed that only country differences were statistically significant at the 5% level where  $t(154) = -2.834$  and  $p = 0.005$  as expected since the means difference between the two countries was 3.56 previously. Thus, it was statistically confirmed that, on average, there was a significant difference in sustainability behaviour between students in the UK and Malaysia. On the other hand, there were no significant differences in SDG knowledge between the two countries and SDG knowledge and sustainability behaviour between genders.

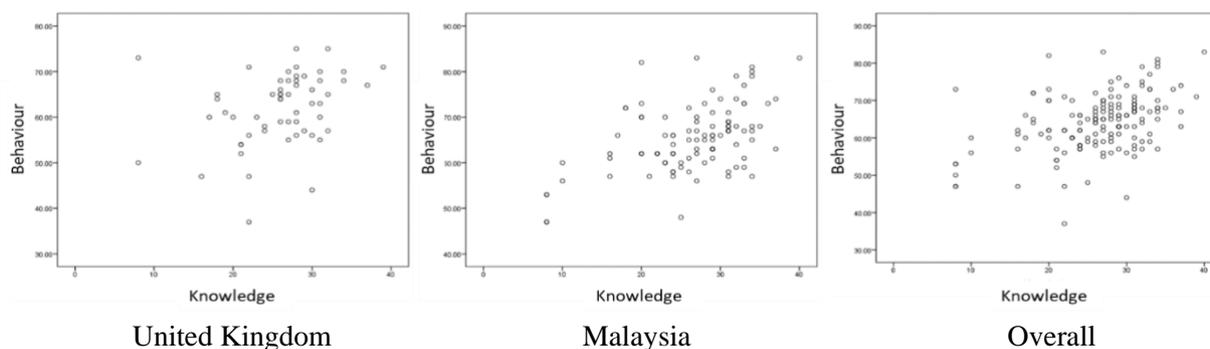
**Table 4.** Equality of Variances & Independent Samples t-test

| Variables                  | Equality of Variances |         | Independent Samples t-test |     |         |
|----------------------------|-----------------------|---------|----------------------------|-----|---------|
|                            | F                     | P-value | t                          | df  | p-value |
| <i>Country differences</i> |                       |         |                            |     |         |
| SDGs Knowledge             | 1.620                 | .205    | -.427                      | 154 | .670    |
| Sustainability Behaviour   | .504                  | .479    | -2.834                     | 154 | .005    |
| <i>Gender differences</i>  |                       |         |                            |     |         |
| SDGs Knowledge             | .026                  | .873    | .743                       | 154 | .459    |
| Sustainability Behaviour   | .030                  | .863    | -.282                      | 154 | .778    |

All equal variance assumed

### 3.2 Association between SDGs Knowledge and Sustainability Behaviour of the students

In this study, we analysed the association between SDG knowledge and sustainability behaviour for individual countries and the combination of both (overall). The association between these two constructs can be observed in the scatter plots displayed in Fig. 1. All three cases showed a possibility for a positive association between SDG knowledge and sustainability behaviour, as predicted. The more knowledge and awareness students possessed of SDGs, the more they would exhibit sustainability behaviours and vice versa. The Pearson correlation supported the hypothesis of a positive significant association at the 5% significance level in the UK ( $r = 0.324$ ,  $p = 0.014$ ) and Malaysia ( $r = 0.497$ ,  $p = 0.000$ ). Both countries obtained a moderate association based on the cut-off point by Rumsey (2009) but Malaysia reached a slightly higher correlation when the association was less scattered as shown in the diagram. A positive significant correlation was observed between SDG knowledge and sustainability behaviour when both countries were considered ( $r = 0.432$ ,  $p = 0.000$ ).



**Fig. 1** Distribution of Gender of the respondents based on country

#### 4. Discussion

In this research, we explored the SDG knowledge and sustainable behaviours of university students in Malaysia and the UK. Our findings suggest that the reception of SDG knowledge is at similar levels for both the British and Malaysian universities students. Our results indicate that students from both countries are familiar with SDG topics as the average score of students from the two countries is approximately 26 out of 40 (approximately 65 at a scale of 100). Despite averaging similar scores in the overall reception of SDG knowledge, students from Malaysian universities reported higher scores for knowledge of SDG content and scopes and specific SDGs of their country. With similar levels of SDG knowledge received from formal education and lower scores in the reception of SDG knowledge, our data suggest that there are obstacles to implementing designed ESD in British universities. As shown in the literature review, ESD has been gradually integrated into UK universities and most of the existing achievements are based on school infrastructures (Cebrian et al., 2015; Tierney et al., 2015). As a result, the interrupted integration of ESD into the curriculum in UK universities is reflected through students' reception of SDG knowledge. Although students receive formal education about SDG through the curriculum, our findings question the effectiveness and efficiency of integrated ESD in UK universities.

Students from both countries also showed a certain level of sustainability behaviour; the average scores from both countries surpassed 60 on a scale of 85. However, students from UK universities scored lower in sustainability behaviours as compared to Malaysian students. This disparity is significantly shown in Table 4. Our findings suggest that university students in the UK were unable to transform their SDG knowledge into sustainability behaviours. A potential reason for this is the current slow HESD development in UK universities (Fiselier & Longhurst, 2017). Given the current situations of HESD in UK universities, there are missing binding responsibilities for the universities to comply with the ESD requirements from the QAA (Fiselier & Longhurst, 2018). The lack of reinforcement at the university level created spaces for universities to compromise ESD development in curriculum and school regulations, which mitigated incentives from the student population to transform their SDG knowledge into sustainable behaviours. Malaysian universities, despite showing an unbalanced HESD development pattern according to multiple case studies, were forced to accommodate and implement sustainability policies by national regulations (Ilham et al., 2020). These ESD approaches, although mostly concentrated on the environmental aspect of SD, have shown positive contributions in transforming students' knowledge into behaviours. Additionally, policy orientations at the university level have led to positive outcomes in enhancing students' sustainability awareness and attitudes in Malaysian universities (Kanapathy et al., 2021).

This research also explored the impacts of gender on students' SDG knowledge and sustainability behaviours. The findings suggest that there are no significant differences between gender and SDG knowledge and sustainability behaviours. However, there is an ongoing debate over the impact of gender on SDG knowledge and sustainability behaviours. For example, Vicente-Monlina et al. (2017) demonstrated that, on average, male students' environmental knowledge was greater than that of female students in a Spanish university. However, Cifuentes-Faura et al. (2020) illustrated that female students in a Spanish school often had greater environmental knowledge and were more likely to commit to a sustainable lifestyle. In addition, women empowerment through university education were found to

positively contribute to their presence in socio-economic sustainability in Philippines (Montalbo et al., 2021). The ongoing discussion over the impact of gender on ESD generates space to further explore male and female preferences and adaptability when learning SDGs and transforming their behaviours. This study contributes to this aspect of ESD research and suggests future research should be conducted on gender and ESD in higher education.

The findings of this study also confirms the intimate relationship between SDG knowledge and sustainability behaviours. The analyses suggest that increases in the instruction of SDG knowledge for university students lead to an increase in their sustainability behaviours, which are in line with existing research (Alssati et al., 2020; Verla-Losada et al., 2015). However, a slightly weaker correlation between SDG knowledge and sustainability behaviours was found in universities from the UK compared to Malaysia. This correlation effect was mitigated given the existing HESD development, curriculum integration and ESD enforcement in UK universities. Institutional support, policy support, financial resources and better curriculum-change evaluation are needed to improve the outcomes of ESD promotion in higher education in the UK, which would ultimately tighten the connections between SDG knowledge and sustainability behaviours (Shiel et al., 2019). The stronger correlation between SDG knowledge and sustainability behaviours found in Malaysian university students reflects the ongoing emphasis of ESD in higher education in Malaysia. With sufficient institutional and policy support and customised university programmes and curriculums, students from Malaysian universities develop a closer relationship between SDG knowledge and sustainability behaviours. A complete ESD approach regarding accommodating social, economic and environmental aspects of SD through education will achieve significant education results to help learners promote a sustainable future by the existing and future generations in Malaysia.

## **5. Conclusion**

This paper has demonstrated a strong relationship between SDGs and sustainability behaviours among university students in British and Malaysian tertiary institutions. Our findings suggest that ESD lacks institutional and policy attention to be fully implemented in university curriculums in the UK, which has resulted in a lack of productivity concerning transforming SDG knowledge into behaviours. Meanwhile, Malaysian university students' receptions of ESD are focused on the environmental aspects of SDGs. Despite receiving fragmented ESD, students from Malaysian universities show a higher capacity to behave sustainably, which indicates the potential to promote social transformation and sustainability. As such, it is pertinent to continue promoting ESD in higher education in both countries with increased policy, institutional, financial and curriculum coordination support. Institutional policies such as the university vision statement should reflect the sustainability strategy being implemented as well as teaching and learning strategies. The ESD approach can be implemented either as a core topic in every course subject or as an additional subject. With proper guidance and policy implementation, integrating ESD can be achieved through curriculum integration, policy integration, co-curricular activities and increased staff training.

Having sound sustainable development knowledge and behaviour will encourage students to take responsibility for their lifestyle, build a harmonious society and be prepared to face challenges of the 21<sup>st</sup> century through sustainable living for a better future. However, there were limitations in this study. Firstly, the questionnaire instrument can be improved to further capture detailed connections between SDG knowledge and behaviours. It is also recommended that the sample size of students from the UK and Malaysia be increased so as to provide further comprehensive comparison. Therefore, future studies are needed to establish more detailed ESD instruments to address SDG knowledge and behaviours. Future studies could also compare higher education institution (HEI) curricula on ESD implementation across disciplines and gender differences and sustainability implementation in other fields such as urbanisation, solid waste management and smart cities.

## 6. References

- Alsaati, T., El-Nakla, S., & El-Nakla, D. (2020). Level of sustainability awareness among university students in the eastern province of Saudi Arabia. *Sustainability*, *12*, 3159-3174.
- Armstrong, C. (2011). Implementing education for sustainable development: the potential use of time-honoured pedagogical practice from the progressive era of education. *Journal of Sustainability Education*, *2*, 1-25.
- Ariffin, F., & Foo, T. (2019). Understanding and opinion on sustainable development among youths in higher educational institutions in Penang, Malaysia. *Social Indicators Research*, *147*, 421-437.
- Balakrishnan, B., Tochinai, F., Kanemitsu, H., & Al-Talbe, A. (2021). Education for sustainable development in Japan and Malaysia: a comparative study among engineering undergraduates. *International Journal of Sustainability in Higher Education*, *22*(4), 891-908
- Cifuentes-Faura, J., Faura-Martinez, U., & Lafuente-Lechuga, M. (2020). Assessment of sustainable development in secondary school economics students according to gender. *Sustainability*, *12*, 5353-5369.
- Connell, K., & Kozar, J. (2012). Sustainability knowledge and behaviors of apparel and textile undergraduates. *International Journal of Sustainability in Higher Education*, *13*(4), 394-407.
- Emanuel, R., & Adamns, J. (2011). College students' perceptions of campus sustainability. *International Journal of Sustainability in Higher Education*, *12*(1), 79-82.
- Fiselier, E., Longhurst, J., & Gough, G. (2017). Exploring the current position of ESD in UK higher education institutions. *International Journal of Sustainability in Higher Education*, *19*(2), 393-412.
- Fiselier, E., & Longhurst, J. (2018). A critical evaluation of the adoption and implementation of the QAA and HEA guidance for ESD by the UK higher education sector. In W. Leal (ED.), *Implementing Sustainability in the Curriculum* (pp.223-246). Springer International Publishing.
- Gericke, N., Boeve-de Pauw, J., Berglund, T., & Olsson, D. (2019). The Sustainability Consciousness Questionnaire: The theoretical development and empirical validation of an evaluation instrument for stakeholders working with sustainable development. *Sustainable Development*, *27*(1), 35-49.
- Holm, T., Sammalisto, K., & Vuorisalo, T. (2015). Education for sustainable development and quality assurance in universities in China and the Nordic countries: a comparative study. *Journal of Cleaner Production*, *107*, 529-537.
- Ilham, J., Zaihan, M., Hakimi, S., Ibrahim, M., & Shahrul, S. (2020). Mobilising the sustainable development goals through universities: Case studies of sustainable campuses in Malaysia. In W. Leal., A. Salvia., R. Pretorius., L. Brandli., E. Manolas., F. Alves., U. Azeiteiro., J. Rogers., C. Shiel., A. Paco (Eds.), *Universities as Living Labs for Sustainable Development* (pp.121-133). Switzerland: Springer Nature.
- Kanapathy, S., Lee, K., Mokhtar, M., Zakaria, S., & Sivapalan, S. (2021). A framework for integrating sustainable development concepts into the chemistry curriculum towards achieving education for sustainable development in Malaysia. *International Journal of Sustainability in Higher Education*, 1-29.
- Michalos, A. C., Creech, H., Swayze, N., Kahlke, M., Buckler, C., & Rempel, K. (2012). Measuring knowledge, attitudes and behaviors concerning sustainable development among tenth grade students in Manitoba. *Social Indicators Research*, *106*(2), 2013-2038.
- Montalbo, I., Alejandro, B., Baylan, S., Lacea, R., Pepito, G., Villarante, G. (2021). Sustaining women empowerment community extension project: A tri-focal partnership model. *Asian Journal of University Education*, *17*(3), 21-33.
- Varela-Losada, M., Vega-Marcote, P., Perez-Rodriguez, U., & Alvarez\_Lires, M. (2015). Going to action? A literature review on educational proposals in formal environmental education. *Environmental Education Research*, *22*(3), 390-421.
- Vicente-Monlina, M., Fernandez-Sainz, A., & Izagirre-Olaizola, J. (2017). Does gender make a difference in pro-environmental behaviour? The case of the Basque country university students. *Journal of Cleaner Production*, *176*, 89-98.
- Ragazzi, M., & Ghidini, F. (2017). Environmental sustainability of universities: critical analysis of a green ranking. *Energy Procedia*, *119*, 111-120.

- Shiel, C., Smith N., & Cantarello, E. (2019). Aligning campus strategy with the SDGs: An institutional case study. In Filho, W., Salvia, A., Pretorius, R., Brandli, L., Manolas, E., Alves, F., Azeiteiro, U., Rogers, J., Shiel, C., & Paco, A (Eds.), *Universities as Living Labs for Sustainable Development* (pp.11-27). Switzerland: Springer.
- The, S., & Koh, H. (2019). Education for sustainable development: the STEM approach in Universiti Sains Malaysia. In W. Leal., A. Salvia., R. Pretorius., L. Brandli., E. Manolas., F. Alves., U. Azeiteiro., J. Rogers., C. Shiel., A. Paco (Eds.), *Universities as Living Labs for Sustainable Development* (pp.567-587). Switzerland: Springer Nature.
- Wahid, M., Lee, W., & Baharudin, F. (2020). Implementing project-based learning for sustainability management course at postgraduate level. *Asian Journal of University Education*, 18(1), 84-92.
- Yahawa, N., & Maaruf, S. (2019). Creative knowledge transfer using junk art to promotes sustainable development goals. *Asian Journal of University Education*, 15(1), 1-13.
- Zamora-Polo, F., Sanchez\_martin, J., Corrales-Serrano, M., & Espejo-Antunez, L. (2019). What do university studentsk now about sustainable development goals? A realistic approach to the reception of this UN program amongst the youth population. *Sustainability*, 11, 3533-3552.

## Appendix

### SDG KNOWLEDGE

| No | Items                                                                                                                                                                   |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | I know what the Sustainable Development Goals are.                                                                                                                      |
| 2  | I know the countries to which the Sustainable Development Goals are addressed.                                                                                          |
| 3  | I know the time horizon for which the Sustainable Development Goals are designed.                                                                                       |
| 4  | I know the number of Sustainable Development Goals and could indicate one of their goals.                                                                               |
| 5  | I have received information about the Sustainable Development Goals by email and/or Social Networks.                                                                    |
| 6  | I have received information about the Sustainable Development Goals from the traditional media (press, radio and/or television).                                        |
| 7  | I have received information about Sustainable Development Goals in formal education (high school, university, etc.).                                                    |
| 8  | I have received information about the Sustainable Development Goals in informal training (e.g., workshops of NGOs, actions of the University Cooperation Office, etc.). |

### SUSTAINABILITY BEHAVIOUR

| No | Items                                                                                                                                     |
|----|-------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | Where possible, I choose to cycle or walk when I'm going somewhere, instead of travelling by motor vehicle.                               |
| 2  | I never waste water.                                                                                                                      |
| 3  | I recycle as much as I can.                                                                                                               |
| 4  | I pick up rubbish when I see it out in the countryside or in public places.                                                               |
| 5  | I do think about how my actions may damage the natural environment.                                                                       |
| 6  | I always separate food waste before putting out the rubbish when I have the chance.                                                       |
| 7  | I have changed my personal lifestyle in order to reduce waste (e.g., throwing away less food or not wasting materials).                   |
| 8  | When I use a computer or mobile to chat, to text, to play games and so on, I always treat others as respectfully as I would in real life. |
| 9  | I often make lifestyle choices which are not good for my health.                                                                          |
| 10 | I work on committees (e.g., the student council, my class committee, the cafeteria committee) at my school.                               |
| 11 | I treat everyone with the same respect, even if they have another cultural background than mine.                                          |
| 12 | I support an aid organization or environmental group.                                                                                     |
| 13 | I show the same respect to men and women, boys and girls.                                                                                 |
| 14 | I do things which help poor people.                                                                                                       |
| 15 | I often purchase second-hand goods over the internet or in a shop.                                                                        |

- 
- 16 I avoid buying goods from companies with a bad reputation for looking after their employees and the environment.
- 17 I watch news programs or read newspaper articles to do with the economy.
-