Abstract

Purpose – The explosion of social media use such as Facebook among higher education students is deemed to have great potential in widely disseminating environmental sustainability awareness. The paper aims to capture, summarise, synthesise and comment on the role of social media to garner interest of students and staff on environmental sustainability issues.

Design/methodology/approach – Systematic literature review technique is adopted, and three selected online databases were searched for relevant papers for review. Specific data were extracted from each paper, and the discussion section was based on the developed research questions.

Findings – Higher education needs to fully leverage the ubiquity of social media to extend how environmental sustainability is viewed by the students and staff. Sustainability practices conducted at the university level such as recycling, reduction of electricity and water consumptions and paper reduction in classroom and used to engage students on environmental matters. For staff, social media can be leveraged as to convey the university policy and assist in their quest to become full-fledged green universities.

Research limitations/implications – Some of the limitations of this research include the lack of keyword search using synonyms or related terms equivalent to the term “awareness”, lack of forward and backward searches, and the papers were searched until end of 2013 only. Future research needs to take advantage of the current limitations to investigate this topic and be empirically supported by theories using quantitative, qualitative or mixed-method-based research. Future studies could also develop relevant frameworks to propose an effective use of social media for creating environmental sustainability awareness in higher education.

Practical implications – Propagations of environmental sustainability awareness in higher education would be more effective with the use of social media.

Social implications – In principle, the increase of environmental awareness level would increase the students’ good behavioural conduct on environmental sustainability.

Originality/value – While the broad topic of environmental sustainability in higher education is widely discussed, the role of social media in shaping environmental sustainability awareness is still under researched. This situation provides a significant potential for exploration by sustainability researchers to craft their investigation on the effective role of social media in creating environmental awareness in higher education.

Keywords Higher education, Literature review, Social media, Awareness, Environmental sustainability

Paper type Literature review

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Introduction

Environmental sustainability awareness is one of the prerequisites for environmental attitude and behavioural change in caring for the natural environment in the face of impending climate change and global warming. Higher education across the globe holds the responsibility for shaping students and staff in terms of environmental awareness and changing the attitude of future generations towards the importance of preserving the natural environment. In the current context of higher education, various faculty members are playing an active role in creating environmental sustainability awareness among the university students, such that any development and environmental degradation attributed to universities through their daily business activities is being minimised. Universities have the potential for educating the younger generations, particularly students towards environmental sustainability through their education system, curriculum, syllabus, practices and Green University vision. Towards this end, this paper posits that social media can be repurposed as a tool to convey environmental sustainability awareness to students and staff in higher education.

In terms of creating awareness for environmental sustainability, two perspectives were identified in relation to behavioural change. The first perspective assumes that changes in behaviour are brought about by increasing public knowledge through raising awareness regarding an issue and by fostering an appropriate attitude. The second perspective proposes that individuals systematically review their choices and then act in their economic self-interest without the need to have enough knowledge and awareness in the first place (McKenzie-Mohr, 2000). While it is acknowledged that the second perspective through programmes, such as community-based social marketing (McKenzie-Mohr, 2000), is quite effective at fostering sustainable behaviour, this research is in line with the first perspective. A number of theoretical and empirical studies have indeed confirmed that behavioural change may indeed be caused by activities with the objective of raising awareness. Theoretical studies, such as the transtheoretical model (Prochaska and Velicer, 1997; Horwath, 1999; Prochaska et al., 1994) and empirical research by Swaim et al. (2014) and Halady and Rao (2010), have confirmed our conjecture that increasing environmental sustainability awareness is one of the keys for behavioural change.

Pertaining to the use of social media, the use of such technology is attributed to its popularity and usefulness (Redecker, 2009; Schroeder et al., 2010; Hamid et al., 2014). In recent years, social media has been widely used in the social space to support human social interaction and collaboration (Boyd, 2007; Zeeng et al., 2009; Gulbahar, 2013). Social media, such as Facebook, Twitter and blogs, is the most used tool to facilitate fast and effective communication, as well as the medium for spreading information to a wider audience (Irwin et al., 2012; Merchant, 2012; Kimmons, 2014). Hence, the power of such social media could be further harnessed for the benefit of the natural environment. Therefore, higher education institutions have a significant role in shaping environmental awareness among the students, their academics and regular staff through various means including social media.

However, the role of social media to communicate the idea of environmental sustainability and its awareness is not well understood. This review paper intends to ascertain how social media can be used as an enabler for creating awareness in the context of higher education. A systematic literature review (SLR) was carried out to understand the topic and how social media is being used to create environmental sustainability awareness. An SLR is considered to be a powerful tool in the literature searching methodology that provides a focus for synthesising the results based on the defined protocols (Kitchenham, 2004). This method was...
adopted because of its capability for collecting, identifying and synthesising evidence and finding gaps in any particular research focus.

While there are a number of SLR methodologies available, such as an evidence-based guide to community preventive services (Briss et al., 2001), the EPPI Centre Guide (Oakley, 2003) and procedures for performing systematic reviews (Kitchenham, 2004), this paper adopts Kitchenham’s (2004) SLR procedures because of its widely accepted use in information systems (IS) research and the flexibility provided by this methodology to be adopted in other fields (Kitchenham, 2004). Even though this technique has the capability of making a methodologically rigorous review of the research results, it is not meant to simply provide summative information concerning the research results but rather to help researchers identify evidence based on the guidelines developed (Kitchenham et al., 2008). The step-by-step approach helps researchers to clearly depict the research results and findings.

Objective of this review
This study investigates the role of social media in higher education for environmental sustainability awareness. Based on the literature search, it was found that there is an absence of an SLR type of paper published with regard to the topic of the role of social media in environmental sustainability awareness in the context of higher education. Therefore, the objective of this paper is to capture, summarise, synthesise and critically comment on how higher education around the world addresses the issue of environmental sustainability and raising awareness among students and staff, either with or without the assistance of social media.

Methodology
To facilitate the objective attainment of this review, three research questions were constructed, as per SLR requirements:

RQ1. What is environmental sustainability and how is environmental sustainability awareness viewed in higher education?

RQ2. What types of social media are used in creating environmental sustainability awareness in higher education, and what is their role?

RQ3. What are the key lessons pertaining to environmental sustainability awareness in higher education?

Overall, these questions were formulated as the basis for gaining a deeper understanding of the concept of environmental sustainability awareness and the role of social media in spreading the awareness in the context of higher education.

Data source and search process
The search strategy for this review includes three online databases (ODB) selected because of the relevance and availability of the search terms. Only articles published from January 2000 until year 2013 were selected. Furthermore, papers published prior to year 2000 were excluded because of the absence of social media during the early years. Table I justifies the selection of the ODB.

The search processes used the following keywords: environmental awareness, higher education, social media, factors and benefits. However, during the search process, five combinations of the keywords were used as follows:
(1) **Combination of Keywords 1**: environmental awareness and higher education* (or university).

(2) **Combination of Keywords 2**: environmental** and higher education* (or university).

(3) **Combination of Keywords 3**: social media*** and environmental awareness and higher education (or university).

(4) **Combination of Keywords 4**: factors and environmental awareness and higher education (or university).

(5) **Combination of Keywords 5**: benefits and environmental awareness and higher education (or university). (Note: * the term university was also used to ensure equivalent terms are also covered; ** the term environmental was also used to ensure aspects of environmental attitudes are also covered; *** the term social media was also replaced with terms, such as social technology, social technologies, Facebook, Twitter and blog to include extensiveness).

The terms were used to reflect the objective of this research in exploring the state of environmental awareness in higher education, the use of social media in spreading environmental awareness in higher education as well as in understanding the key lessons on how higher education could spread environmental awareness.

**Table II** summarises the results from the unfiltered search process using the four combinations of the keywords. As shown in the table, the majority of the papers (94 per cent) were found in the ScienceDirect database with 4 per cent from Scopus and the remaining 2 per cent from the ISI Web of Science. This indicates that most of the research on environmental awareness in the context of higher education was (and is) published through journals included in ScienceDirect, whereas the remaining two ODBs were less popular concerning the topic of environmental awareness in higher education.

In terms of keyword combinations, the first keyword combination produced the most results (40.8 per cent), the third combination produced 31.8 per cent, the fourth keyword 26.8 per cent, whereas the second keyword had a small percentage of 0.6 per cent. The unfiltered

<table>
<thead>
<tr>
<th>Source</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISI Web of Science</td>
<td>Covers wide range of academic fields from sciences, social sciences, arts and</td>
</tr>
<tr>
<td>Scopus</td>
<td>Covers peer-reviewed journals in the scientific, technical, medical and social</td>
</tr>
<tr>
<td></td>
<td>sciences including arts and humanities (<a href="http://www.elsevier.com/online-tools/scopus/content-overview">www.elsevier.com/online-tools/scopus/ content-overview</a>)</td>
</tr>
<tr>
<td>ScienceDirect</td>
<td>Covers wide range of journals from academic field of physical sciences and</td>
</tr>
<tr>
<td></td>
<td>engineering, life sciences, health sciences and social sciences and humanities</td>
</tr>
<tr>
<td></td>
<td>(<a href="http://www.sciencedirect.com">www.sciencedirect.com</a>)</td>
</tr>
</tbody>
</table>

**Table I.**
Selected online databases

<table>
<thead>
<tr>
<th>Keyword (KW)</th>
<th>ISI Web of Science</th>
<th>Scopus</th>
<th>ScienceDirect</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>KW 1</td>
<td>13</td>
<td>28</td>
<td>343</td>
<td>384</td>
</tr>
<tr>
<td>KW 2</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>KW 3</td>
<td>4</td>
<td>6</td>
<td>289</td>
<td>299</td>
</tr>
<tr>
<td>KW 4</td>
<td>2</td>
<td>1</td>
<td>249</td>
<td>252</td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>35</td>
<td>887</td>
<td>941</td>
</tr>
</tbody>
</table>

**Table II.**
Summary of the search process
search results indicated that among the factors and benefits from environmental awareness the topic of environmental awareness in higher education was generally found in the discussion. However, very little research was either conducted and/or published on the topic of the role of social media for environmental awareness in higher education.

Because of the copious number of papers, a filtering process was conducted by the authors of this paper to enable manageability in reviewing the articles. Three cycles were adopted for the filtering process. The following explains the filtering cycles performed:

(1) Filtering Cycle 1:
- This includes removal of duplicate articles by going through each of the 941 citations retrieved from the search process.
- For this purpose, all the raw 941 citations were stored in EndNote, a reference manager software.
- Using EndNote, “peculiarities”, such as articles with missing author(s), year and title were removed.
- After removing the duplicate citations, 705 articles were considered for the next filtering cycle.

(2) Filtering Cycle 2:
- Using the remaining 705 articles from Cycle 1, the authors went through the title and abstract of the papers.
- Judging from the title and abstract of the papers, decisions were made to ensure whether the actual context of the paper was on environmental awareness in higher education or otherwise. If it was decided that the paper was relevant, it was retained, otherwise, it was removed.
- In this stage, a large number of articles were found to be irrelevant because of the titles and abstracts of the papers not being related to the research topic. A total of 623 papers were removed in this stage.
- At the end of Cycle 2, 82 papers were considered relevant for further analysis. The full versions of these 82 papers were downloaded from the relevant databases.

(3) Filtering Cycle 3:
- Using the remaining 82 articles from Cycle 2, the authors started to analyse the content.
- This cycle involved reading through the articles, mostly by scanning through the abstract and the detailed content of the papers.
- After consolidating all the analysis from the different group members, the authors then decided that all 82 papers were relevant to the topic.

Figure 1 graphically summarises the process of filtering the articles.

Inclusion and exclusion criteria
In setting the inclusion and exclusion criteria (Kitchenham, 2004; Kitchenham et al., 2008), only studies consisting of the pre-defined keywords were included. The limitations were generally set to full text peer-reviewed; must be either in article form or conference paper indexed by the ISI Web of Science, Scopus or ScienceDirect; and the articles must be in English. This study excluded studies from editorials, informal articles from company/organisation, book chapters, prefaces, article summaries, interviews, news, magazines, trade journals, correspondence, discussions, comments, reader’s letters and summaries of tutorials, meetings, workshops, panels and poster sessions.
Papers that did not contain environmental awareness in the context of higher education or at least mention higher education were also excluded. However, while most papers were not covering social media, analysis needed to be done to determine how social media could address the gaps in disseminating environmental awareness in higher education.

**Data analysis**

This section explains the method used to analyse data for this phase of the research. The use of thematic analysis was applied in the analysis of data, as it provides a structured way of understanding how to develop thematic codes and sense themes. Three stages are involved in the use of thematic analysis. Stage 1 involves deciding on the data and design issues, Stage 2 involves developing themes and codes and Stage 3 involves validating and using the codes (Boyatzis, 1998). Stage 1 was successfully carried out through the search of relevant databases and Stage 2 required specific decision-making on developing the themes. Adopting the prior research-driven approach in developing the themes, this approach allowed the use of existing concepts as a basis to replicate, extend or refute prior discoveries (Boyatzis, 1998). The papers were analysed according to the predefined concepts, such as environmental awareness, role of social media and context of study. The themes were then identified and grouped from the views of the authors according to the initial concepts.

**Findings**

From the initial concepts, emerging themes were discovered as sub-themes from the preliminary concepts, such as quality of life, sharing, practices, change, education, engagement, policy, evaluation and environmental awareness issues. The process of extraction also involved the use of social media, such as Facebook, Twitter and blogs, or non-social media, such as email, website, circulars or intranet, for environmental awareness implementation in universities.

The contents of the articles were further analysed and extracted pertaining to how the social media were being used (or not used) to create and communicate environmental awareness. The findings extracted from the papers were then categorised according to the initial concepts discussed above and later combined to fit the three research questions (refer to methodology section).

In Stage 3, validation of the codes was made using the collaborative checking technique, where data, analytic categories, interpretations and conclusions were tested with members of the research group (the authors of the paper) (Lincoln and Guba, 1985; Cutcliffe and
The following section analyses the results from the data synthesis in which the themes and codes were generated. The data synthesis based on the reviewed literature provides initial findings for the SLR process, as depicted in Table III. Themes and codes were generated out of the data synthesis process. To provide a structure to ease the data analysis and synthesis, three research questions were developed and discussed before a summative discussion around the role of social media in environmental awareness in higher education was concluded.

Discussion

In this section, discussion pertaining to the entire findings made out of the SLR process is presented. The discussion is geared towards understanding the role of social media in creating environmental sustainability awareness in higher education.

<table>
<thead>
<tr>
<th>Research question</th>
<th>Synthesis</th>
</tr>
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</table>
| **RQ1**. What is environmental sustainability and how environmental sustainability awareness is viewed in higher education? | The review of literature concerning this research question attempted at discerning what environmental sustainability and environmental sustainability awareness means to people and how environmental sustainability is viewed in higher education. Based on the data synthesis, the literature generally views the concept of environmental sustainability as follows:  
Concept of environmental sustainability: better quality of life  
How environmental sustainability awareness concept is viewed: sharing practices change education engagement policy evaluation issues |
| **RQ2**. What are the types and role of social media used in creating environmental sustainability awareness in higher education? | The review of literature concerning this research question attempted at knowing the types and role of social media being used by higher education in creating environmental sustainability awareness. Based on the data synthesis, the literature categorises the issue into:  
Types of technology: social media vs non-social media  
Role of social technology: as a tool to disseminate awareness as a tool to deliver environmental education |
| **RQ3**. What are the key lessons pertaining to environmental sustainability awareness in higher education? | Data synthesis was also carried out as to understand the key lessons pertaining to environmental awareness in higher education. The key lessons are: environmental awareness requires knowledge, derived from education (hence, education requires environmental issues to be included into the university curriculum) environmental awareness needs participation environmental awareness requires implementation programmes environmental awareness needs engagement environmental awareness requires systematic planning, implementation and evaluation |

Table III.
Data synthesis
Environmental sustainability concept and common views on environmental sustainability awareness in higher education

As a whole, one single concept that frequently appeared across the literature on environmental sustainability is about a better quality of life. The prominent theme on better quality of life is depicted in the literature when the impact of not caring or not sustaining the natural environment resulted in the degradation of the overall quality of life (Chenoweth et al., 2007; Alshuwaikhat and Abubakar, 2008; Ben-Zvi-Assaraf and Ayal, 2010; Chua and Oh, 2011; Abdul Aziz et al., 2012). This is through prolonged drought, extreme flooding, massive pollution causing extended period of heavy fog and haze or the causing of an epidemic, such as malaria, dengue and other diseases. In the articles reviewed, there was a lack of evidence showing the role of social media in facilitating the improvement in the quality of life, raising environmental sustainability awareness and, subsequently, affecting behavioural and attitude change.

In this context, social media, while not leveraged to this extent, should be seen as a new platform by higher education to create environmental sustainability awareness among students and staff. The variety of social media available in the technology scape provides options for higher education to choose the most suitable mechanism to convey a better quality of life message through the use of social media.

In relation to the common view on environmental sustainability awareness, the findings indicated that the sharing of information is important in disseminating awareness on environmental issues to the intended audience – staff, students or the general public (AlKuhaimi and AlMogait, 2012; Alwiet al., 2012; Sulaiman and Abdul Rahman, 2013). Furthermore, it takes various kinds of green practices adopted by higher education to create more awareness (Bergea et al., 2006; Eden and Eshet-Alkalai, 2013; Efthymiou et al., 2013; Figueredo and Tsarenko, 2013; Zhang et al., 2011), and it often involves a change in behaviour, attitude and value system of the individual, group and society (Zain et al., 2011, 2013; Sidiropoulos, 2014; Vicente-Molina et al., 2013).

Education is also found to have great importance in creating awareness, which is achieved by developing an appropriate curriculum, syllabus and training (Ferreira et al., 2006; Karol, 2006; Kaplowitz et al., 2009; Chang et al., 2011; Zain et al., 2011; Raivio, 2011; Evans and Graff, 2012; Barbalios et al., 2013; Geng et al., 2013; Yuksek, 2013). In addition, engagement with parties, both internal and external, is also vital to create more awareness and environmental citizenship (Stefanovic, 2008; de Carvalho Maffia et al., 2011). Researchers have argued that policies, such as vision, implementation of environmental management system and Green University ambitions are all done in the attempt to create more environmental sustainability awareness (Gao et al., 2006; Sammalisto and Brorson, 2008; Jinliang et al., 2010; Barata et al., 2011; Aklin et al., 2013; Jabbour et al., 2013; Yuan et al., 2013). To have effective awareness, sustainability audits and evaluation involving measurement, assessment and reporting are critical (Baboulet and Lenzen, 2010; Sulaiman and Abdul Rahman, 2013). Finally, it is a commonly held view that understanding the related issues such as challenges, barriers, benefits and driving/inhibiting factors are also important to ensure environmental awareness (Evangelinos et al., 2009; Yurttas and Sulun, 2010; Zhang et al., 2011; Yuan and Zuo, 2013).

This review suggests that higher education needs to fully leverage the ubiquity of social media to extend how environmental sustainability is viewed (particularly towards a more positive way forward) by the students and staff. This can be implemented by using social media, such as Facebook, Twitter, Instagram or YouTube, with contents relevant to environmental sustainability education taught to the students in any relevant course.
Social media can certainly be used to share information on environmental sustainability awareness (York et al., 2009; Hasan et al., 2012). Practices conducted at the university-level, such as recycling, reduction of electricity and water consumption, riding a bicycle on and to the campus and paper reduction comprised environmental sustainability practices that can be shared (Higgitt, 2006; Sobreiro and Jabbour, 2007; Barata et al., 2011; Zhang et al., 2011; Efthymiou et al., 2013; Pappas et al., 2013). The lessons learnt from these practices are able to trigger the intended lifestyle or behavioural change among students and staff. The use of social media for environmental sustainability can be seen as a form of educational tool to complement the teaching and learning in class, as well as to continuously engage the students in environmental causes (Hasan et al., 2012). For staff, the management of higher education can leverage social media to convey the university policy pertaining to greening their campus. University administrators are able to introduce a policy pertaining to paper reduction targets for each faculty and how each faculty would support the policy, such that evaluation can be made by the university administrators to determine how successful they have been in implementing the paper reduction initiatives. In addition, social media can be used to discuss issues faced by staff and students in their environmental practices for everyone else in the “university community” to help address the issue.

The types of social media used in creating environmental sustainability awareness in higher education and their role

It can be argued that there is limited discussion in the existing literature that specifically addresses the type and role of social media in propagating environmental sustainability awareness in the context of higher education. Only one article was found concerning the use of Facebook to create environmental awareness about the Green ICT concept and self-directed learning in a Malaysian university (Din et al., 2013). The authors claimed that the objective of the study was to study “How Facebook can be put to a good use specifically in raising the awareness to address issues of ecological imbalance and global climate change that are affecting many parts of the world” (Din et al., 2013, p. 465). Although their paper did not go into detail about how Facebook should be used to achieve the study’s objective, they later recommended that universities need “to initiate the usage of Online Social Networking (OSN) platforms as a mechanism to promote Green ICT” (Din et al., 2013, p. 472).

Another article described the use of non-social media, in particular, the use of e-desktop, email (albeit email is “social” in nature, however it is not considered as social media in this paper) and CD-ROM to deliver environmental education in distance learning and potentially life-long learning (Barratt, 2006). The other articles did not mention any use of technology for environmental awareness.

The lack of studies on the use of social media highlights the fact that environmental sustainability in higher education is not widely propagated to the students and staff through social media. The traditional means for internal communication about the issues of environmental sustainability awareness is still through email and other internal forms of communication such as newsletters. The use of websites is also arguably popular. However, such modes of information sharing are for one-way communication, whereby interactions are limited or almost non-existent. They are just being used to convey to the audience the university initiatives but are unable to obtain feedback.

Another possibility is that the use of social media for creating environmental sustainability awareness is still in the stage of infancy, whereby universities have only recently started to adopt and experiment with social media, and making publications of such research are still not widely available. The issue of using social media is also considered problematic because of the reduced “legitimacy” of social media, as it is perceived to be a
more “informal” form of communication (Sutton et al., 2008; Aula, 2010; Landsbergen, 2010; Du and Edward, 2012). Furthermore, the use of the sanctioned official website or email is easier to manage by the university in a more “formal” manner. The problem of getting staff to manage the official social media account of universities, such as Facebook and Twitter, is often for sharing a variety of news and not confined to only environmental awareness. It is becoming a trend for universities to use Facebook, Twitter and Instagram as alternative media to share official news or respond to questions from the public (Gilpin, 2010; Steiner et al., 2013). This includes promotional and marketing of the university itself, sharing of latest events organised by the university and informing students or potential students of the latest information on courses or programmes. However, the use of such social media tools for environmental sustainability awareness is seldom featured. Hence, it could be an advantage for higher education to create a dedicated social media account on Facebook or Twitter that is managed or administered by officers or voluntary students or staff focusing on environmental issues to provide full legitimacy to environmental sustainability awareness conducted by the university.

Based on the existing literature, technology, including social media, has two roles: to disseminate information and to deliver education about environmental awareness (Barratt, 2006; Din et al., 2013). However, the existing literature on sustainability in a wider context (not exclusive to higher education) argues that social media is also able to be used to:

- provide a platform for advocacy; and
- distribute and present transformation that can change behaviour (Hasan et al., 2012).

As a platform for the advocacy of sustainability, social media, such as Facebook, facilitates the formation of online groups in which opinions are expressed, images are captured, and audio and video are uploaded in real-time for public display through which information is spread rapidly across the world (Hamid et al., 2014). This has the potential to create awareness to the wider society concerning the initiatives taken by the organisation towards greening the community. Social media may also be used to change attitudes and behaviours through the information communicated. Thus, with the existence of green champions communicating their involvement using social media, the innovative use of social media could influence behaviour towards greener outcomes.

**Key lessons on environmental sustainability awareness in higher education**

From the reviewed literature and the synthesis of the findings, it can be argued that there are five top findings pertaining to environmental sustainability and awareness thereof in higher education. First, is that the knowledge about the environmental sustainability issue is created through the education system and that this is vital if the university is serious in implementing green initiatives (Bergea et al., 2006; Chuanhui and Hanwei, 2011; Taleghani et al., 2011; Abdul Aziz et al., 2012; Alwi et al., 2012; Basri et al., 2012; Sidiropoulos, 2014; Vicente-Molina et al., 2013). Education in this regard includes the revision/inclusion of the syllabus and curriculum to feature environmental sustainability elements and the development of teaching and learning materials (Aklin et al., 2013). Some universities are already integrating green elements into their architecture, computer science and IS and engineering curriculum (Abdul Aziz et al., 2012; Xiong et al., 2013). However, it is the belief of the authors that environmental sustainability elements need to be deeply integrated in all disciplines as the environmental issue is a relevant concern in generally all academic disciplines.

Second, environmental awareness requires participation from everybody in the higher education, where the initiative takes place to be effective (Sammalisto and Brorson, 2008;
Without sufficient participation as well as commitment, the initiative would fade away because of the absence of a champion to pursue the cause. Third, engagement with the staff, students and outside communities is important to ensure that the environmental sustainability initiative is updated, progressed and achieved the intended goals (Sobreiro and Jabbour, 2007; Alshuwaikhat and Abubakar, 2008; Chua and Oh, 2011).

Environmental sustainability awareness may also be propagated by having various kinds of implementation programmes targeted for everybody in higher education, particularly students (Haigh, 2006; Zhang et al., 2011; Din et al., 2013; Efthymiou et al., 2013). This aspect is highly related to the participation of all stakeholders. Any initiative or implementation programme with lukewarm reception or disinterested parties would risk the awareness programme and could face termination of the green initiatives. Hence, it is important for higher education to have champions for each of the implementation initiatives and keep the team committed to the programme while simultaneously influencing others, particularly staff and students to support the implementation programme.

The fourth lesson involves during the course of the implementation, where students need to be engaged in the topic to make environmental sustainability considerations penetrate their subconscious level and, hence, be able to transform the concept to their daily practices. This can be done by explaining the motives behind the implementation of green initiatives (Sobreiro and Jabbour, 2007; Stefanovic, 2008; Carleton-Hug and Hug, 2010; Yurttas and Sulun, 2010; Chua and Oh, 2011; Disterheft et al., 2012; Yuan et al., 2013). The goals, strategies and expected outcomes from the implementation need to be communicated to the students and staff to provide them with the motivation and understanding of why greening the environment is necessary. According to Melville's (2010) belief-action-outcome framework, belief formation is very important in which beliefs, desires and opportunities pertaining to greening initiatives must be communicated to the intended target of the initiatives. In the action aspect, the translation of the beliefs into a set of actions or tangible implementations, such as recycling activities, ride sharing or reductions of waste are the examples of such a translation. The outcome aspect includes the effect of the actions into actual daily behaviour change, improvement of green performance as well as the larger impact on the society in terms of a better quality of life (Melville, 2010).

Finally, environmental sustainability and its awareness activities via campaigns requires systematic planning, implementation and must be evaluated in respect of its the effectiveness (Chenoweth et al., 2007; Jinliang et al., 2010; Jones et al., 2012; Jabbour, 2013; Yuan and Zuo, 2013; Sulaiman and Abdul Rahman, 2013). The literature suggests that environmental sustainability is not a seasonal trend which is only highlighted as a short or medium-term initiative of the university. Typically, environmental sustainability is a long-term goal, which requires a direction, champion, financial means and support from the stakeholders over a period of time. Hence, careful planning needs to be conducted by outlining the vision and mission; strategic, tactical and operational strategies; as well as the evaluation of the outcomes at a reasonable interval. Benchmarking the green activities against those of other higher learning institutions is one of the ways the university can learn from others. This benchmarking can be done via partnering, site visits or the exchange of ideas in green summits or conferences. Universities are also able to use social media to “soft-benchmark” (i.e. by comparing) their own green initiatives against other universities and learn from the experience of other universities. For all these to materialise, the formation of a dedicated environmental sustainability team to oversee the whole implementation of green initiative should be given attention to by any higher learning institution intending to embark on a green journey.
Utilising the social media for environmental sustainability awareness and future research agenda

The first lesson stated above pertains to the integration of green elements into the course curriculum. Therefore, we propose that the use of social media as part of the teaching and learning technology would be useful in delivering environmental sustainability education to the students. For example, a Facebook group can be created for the course to identify how the course could contribute to environmental sustainability from the perspective of the said knowledge domain. Future research in this area is to follow through concerning whether the use of social media is effective in creating environmental sustainability awareness that really changes students’ behaviour. The second and third lesson indicated that social media could be used as an effective platform to create active participation and engagement, such as becoming environmental volunteers. Hence, environmental sustainability initiatives can be used to make students and staff actively participate in environmental sustainability practices that are conducted from time to time. Future research in this area should focus on investigating how social media can be leveraged to create effective and sustainable participation and engagement over a period of time.

The fourth lesson pertains to the use of social media that can be used as part of the course curriculum. For example, social media, such as YouTube, can be used in various ways, such as:

- to demonstrate how environmental sustainability initiatives are applicable in certain situations; and
- the students could carry out hands-on activities and record their environmental sustainability initiative, report the lessons learnt to the community at large using YouTube as a means of communication.

Future research can be conducted to quantitatively measure the effectiveness of social media in creating awareness that leads to actual behavioural change among students when they graduate and start working. The last lesson is especially for universities to possibly use social media to learn from other universities locally or abroad about the implementation of their environmental sustainability initiatives. The use of social media to conduct a benchmarking study is an opportunity that universities can consider, as it generally involves zero or minimal costs where lessons learnt are ripe for replication. In terms of future research agenda, researchers in the field may conduct studies concerning the effectiveness of social media-oriented benchmarking activities in producing environmental best practices that could be replicated from others who have successfully instilled environmental sustainability practices within the organisation.

Conclusion

In general, environmental sustainability awareness is not an entirely new topic in the literature. It has been heavily discussed in various academic publications, such as journals and conferences. However, the topic is multi-faceted as it is approached from various angles as discussed above. Environmental sustainability and its awareness is currently a global movement, and discussion of this topic does exist around the world. From Asia to Africa to Europe, North America and South America, the topic is of interest to higher education. The topics however revolve around a green curriculum, green syllabus, green lessons, green practices and even a green university. However, there is still a lack of studies on the use of technology of any kind highlighted as a means to disseminate the environmental awareness issue. More so, in the age of social media, very limited research deals with the use of social media, such as Facebook or Twitter to create awareness among students, staff and
administrators of higher education on environmental sustainability. This can be seen as an opportunity missed, where the pervasiveness of social media should actually be leveraged as the most effective medium to convey the message on environmental sustainability awareness. Therefore, there is a huge potential in this research area concerning how social media can be optimally leveraged to benefit environmental sustainability and the vision for sustainable development. Future research needs to take advantage of this current gap to investigate this topic and be empirically supported by theories using quantitative, qualitative or mixed-method-based research. Future studies could also develop relevant frameworks to propose an effective use of social media for creating environmental sustainability awareness in higher education.

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