How university students are taught about sustainability, and how they want to be taught, the importance of the hidden curriculum

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Abstract

Purpose

India is unique, having enshrined in law the teaching of sustainability education (SE) within all levels of formal education. The aims of this study were to examine the integration, and perceptions of sustainability education within the HE sector in India, and to identify any lessons that can be exported about the teaching of SE from the Indian HE environment.
Design/methodology/approach

Focusing on a science based teaching and research institute at a private university in India a quantitative, cross-sectional study examined the extent to which SE was integrated into the university and how it was perceived by students and staff. Data were collected though two online questionnaires administered to lecturers and undergraduate students during the 2017 academic year.

Findings

Most students reported that their university experiences, had contributed significantly to their knowledge about sustainability. Results also showed there was a positive association between the teaching and learning about sustainability, although staff and students reported that this could be improved by including more active, student-centred teaching and learning approaches. However, students felt that they had learnt the most about sustainability from the informal ‘hidden’ rather than the ‘formal’ curriculum. This suggests that research is now required into ways to capitalise on this as a medium to further develop, not just Indian, but students’ worldwide sustainability literacy.

Originality

This paper is the first to present a detailed study of the perceptions of the contribution of the ‘formal’ and the informal ‘hidden’ curriculum to SE by students and staff at an Indian university.

Keywords

Sustainability education; India; Environmental studies; Sustainable Development; Sustainability; Hidden Curriculum

Article classification

Research Paper
1. Introduction

1.1. The role of universities in responding to global sustainability challenges

Universities have been identified as key players in responding to global sustainability challenges, not only through traditional outputs such as innovation, design and problem solving, but also through the delivery of sustainability education (Sterling, 2010; Sterling et al., 2013) as advocated within the United Nation’s Sustainable Development Goal 4 (SDG4) - Quality Education (Target 4.7) (United Nations, 2015). There is a growing trend for this to be explicitly embedded across the curriculum (Dmochowski et al., 2016), in an increasing number of disciplines (Jones et al., 2010), as well as a ‘hidden’ curriculum. First defined by Jackson (1968) the ‘hidden’ curriculum describes the ‘divergence between what is overtly taught in educational institutions and what students actually learn’ (page 3, Winter and Cotton, 2012). Internationally, a growing number of universities have made increasing efforts to include sustainable practices into their campuses and extra-curricular activities (e.g. Finnveden et al., 2020; Hernández-Diaz et al., 2021; Jun and Moon, 2021; Levesque and Wake, 2021), with students often benefitting from this ‘hidden’ curriculum and citizenship initiatives whilst pursuing their studies (Lipscombe, 2008; Peterson and Warwick, 2015; Winter et al., 2015; Warwick, 2016). However, efforts to increase sustainability education in some higher education (HE) institutions have been met with indifference and/or resistance (Winter and Cotton, 2012), with staff citing time and financial pressures, as well as loss of academic freedom as their reasons for opposition (e.g. Knight, 2005). Nevertheless, whilst many countries have made commitments to improve sustainability education in HE, such as the UK, in which the government has published a series of reviews and action plans (e.g. HEFCE, 2008), ultimately these remain in the format of guidelines, rather than mandatory directives.

1.2. Sustainability education in India within HE

In many societies, issues surrounding sustainability are often considered modern concepts. This is not the case in India. The combination of traditional Hindu principles of awareness and respect for the natural world, Gandhi’s teachings to use the earth’s resources wisely together with a population that has only recently started to enjoy the trappings of a middle class lifestyle, have meant that sustainable practices in the business, education and home environment have long been present (Haydock and Srivastava, 2019). They have just not necessarily been labelled as such. Equally, whilst education, and specifically HE, has been
acknowledged as being integral to sustainable development in India, after nearly 60 years of independence the challenges of widespread poverty, economic disparity, religious strife and social inequality remained (Government of India, 1998). Therefore, in 2003 India took a unique approach, enshrining in law sustainability education within all levels of formal education, following a judgement to this effect handed down by the Supreme Court of India in 1991.

This culminated in a compulsory undergraduate course, ‘Environmental Studies’ with the syllabus and first textbook designed and commissioned by the University Grants Commission, a governmental initiative aiming to address SDG 4 in HE within India (National Coalition for Education India, 2019). Since then other organisations such as the non-governmental organisation, Centre for Environment Education (www.ceeindia.org) have also developed ‘Environmental Studies’ courses with associated textbooks and in some cases teacher training (e.g. Chhokar et al., 2004). These ‘Environmental Studies’ courses include units on environmental topics, but also social issues such as human rights and gender equality, and crucially the links between these (e.g. Bharucha, 2004). Recently though studies have highlighted difficulties in ensuring the quality and effectiveness of these compulsory undergraduate level sustainability education programmes (e.g. Chhokar, 2010), with perhaps the most serious challenge cited being lack of student engagement. This has been attributed to a combination of factors including, the fact that sustainability education as ‘Environmental Studies’ type courses, whilst compulsory, do not count towards degree grades. They are also not tailor-made to be discipline/degree programme specific, and commonly employ didactic pedagogies that do not engage students in their learning (Chhokar, 2010).

1.3. Challenges for the Indian HE sector and the delivery of sustainability education

India’s HE system is currently the third largest in the world and is predicted to produce 25% of all graduates globally by 2030 (Planning Commission Government of India, 2013). One of the Indian Government’s major aims is to continue to increase participation in all levels of education, including HE, recognising the importance of this to further drive development. Whilst increasing participation remains important, there is now also an increased focus on addressing the quality of HE teaching. The emphasis has been placed on research informed teaching supported by a high quality research environment (Planning Commission Government of India, 2013). As a result the Indian HE sector is going through a period of change, with a growing focus on research and privately funded HE providers, rather than
state/public institutes (British Council, 2014). These private universities are typically newly
built, modern campuses with sophisticated facilities. One of the planning features of nearly
all HE institutes in India (new and old) is that their design is often underpinned by a focus on
self-reliance and sustainability (Bantanur et al., 2015a,b). This, together with the fact that
there is compulsory delivery of Environmental Studies in India gives us therefore a unique
perspective to investigate the integration and perception of sustainability education in HE.
Thus, the aims of this study were to: examine (a) the integration and, (b) perceptions of
sustainability education within the HE sector in India, and to (c) identify any lessons that can
be exported from the Indian HE environment.

2. Materials and Methods

2.1. Research context

Nitte University, Mangalore, Karnataka, south-west India (nitte.edu.in) is an example of the
new tier of modern, private universities which have begun to reshape the Indian HE sector.
Following the national steer it has a focus on high-quality research driven education (British
Council, 2014) and is therefore an ideal model to frame the questions posed in this study.
Nitte University has faculties of medicine, dentistry, nursing, pharmacy, physiotherapy,
biosciences, architecture and communication. The research reported here was conducted in
the Faculty of Biosciences at the Nitte University Centre for Science Education and Research
(NUCSER). This is an interdisciplinary teaching and research institute with around 150
undergraduate and 100 postgraduate (taught and research) students in areas including
biomedical science, food safety, biotechnology, microbiology and marine biotechnology.

2.2. Research Design

As this was an exploratory study it adopted a cross-sectional research design to provide
insights and initial data from a specific point in time on which future work could be based
(Bryman, 2008). Related studies (e.g. Emmanuel & Adams, 2011; Kagawa, 2007) have
adopted a similar approach to gauge student opinion and inform strategies to promote student
engagement with sustainability. Specifically, they highlighted the value in adopting a cross
sectional approach in contexts where there is limited knowledge regarding student
perceptions of sustainability (Kagawa, 2007).

An online closed-question multiple-choice style questionnaire with Likert scale responses to
capture opinions from both students and staff at NUCSER was utilised. An online
questionnaire based methodology was chosen due to the advantages this can offer over traditional (offline) survey methods which were particularly relevant for this study, being conducted in a large educational institution in India, semi-remotely from the UK. Online questionnaires are widely used in educational research due to the recognised benefits in providing rapid, easy and affordable access to geographically dispersed populations (Gosling et al., 2004; Evans and Mathur, 2005; Tuten, 2010; Roberts & Allen, 2015). However, these gains are often framed with respect to the potential challenges associated with online questionnaires (e.g. low response rates, high-levels of item non-response, and reduced levels of experimenter control (Shih & Fan, 2008; Heerwegh & Loosvedlt, 2008; Stieger and Reips, 2010). It has to be noted that many of these challenges were documented when online questionnaires were a relatively new tool in pedagogic research. They are increasingly ubiquitous, used widely for student evaluations for example, demonstrating their value. Equally, researchers have highlighted the benefits of using incentives to promote response rates, as well as the positive impact faculty-led promotion can have upon student engagement with online questionnaires (Guder & Malliaris, 2013; Lipsey & Shepperd, 2021). Based on this, and their use in related contemporary work, online questionnaires were deemed an appropriate mechanism of data collection to use in this study.

Two online questionnaires were then developed; one staff facing and one for completion by students. The questionnaires were structured into four main sections: (a) prior knowledge/understanding of sustainable development/sustainability, to explore participants own interpretation of the topic rather than imposing a set definition, questions concerning participants’ (b) views and (c) experiences of sustainable development/sustainability teaching at university, and (d) personal perspectives of sustainable development/sustainability. Most questions also included an ‘other’ option allowing participants to add their own views/interpretations of each topic. Demographic data, e.g. gender, age, and prior education were also captured to allow the interpretation of participants’ answers in a wider context.

Colleagues at Nitte gave feedback on the initial questionnaire drafts to ensure local compatibility, e.g. use of terminology and language. This step was taken to mitigate further factors that may have affected the response rate, and was informed by recommendations presented in Bryman (2008). The questionnaires were administered using BOS (www.onlinesurveys.ac.uk). They were initially piloted with a subset of 45 students and 7 academic staff before being sent to all remaining students (undergrad, postgrad and PhD) (n=108) and academic staff (n=8) at NUCSER. Targeted distribution of the questionnaires
heeded the recommendations of Cummings (2017) in terms of maximising response rates from the respective sample populations. As an incentive (e.g. Kelly et al., 2017), respondents were offered the chance to be entered into a prize draw for a 3,000 INR (~£30) Amazon India voucher. Seventy-five days (18/05/2017-31/07/2017) were allowed for the questionnaires to be completed before it was closed and the data were analysed. Ethical approval was obtained from the Ethics Committee of the University of Plymouth Postgraduate Certificate in Academic Practice (PGCAP) programme, prior to commencing the study and informed consent was built into the administration of the questionnaires.

2.3. Data analysis

Nominal data generated from individual questions were analysed using non-parametric statistics in MS Excel and SPSS v. 22. Spearman’s Rank Order Correlation was used to test the association between the teaching and learning of sd/s at Nitte. Guided by the research aims, the analyses looked for convergences, differentiations and contradictions that emerged from a consideration of the questionnaire responses as a whole in order to examine the integration and perceptions of sustainability education offered at the study institution. The good response rates meant that there was a much lower chance of non-response bias in the conclusions that could be drawn from the questionnaire results (Nulty, 2008). However, it should be noted that only one institute at a single university was invited to take part in the research, so it is possible that the results might provide answers that can be mapped to disciplinary bias (Bantanur et al., 2015b). However, in designing, implementing and reporting this study, key features of the Pragmatic Pedagogic Research Framework development by Evans et al. (2020) were reflected upon. Using this the researchers were able to consider the factors such as the pedagogical clarity of the study, methodological transparency and methodological congruence, which are identified by Evans et al., (2020) as underpinning high quality pedagogic research.

3. Results

Both academic staff and students working at The Nitte University Centre for Science Education and Research (NUCESER) were invited to participate in the online questionnaire. The response rates were 47% (n=7) and 29% (n=45) (55% postgraduates (n=17) and 23% undergraduates (n=28)) respectively. Of the students who responded the majority were female with an average age of 20.9 years. The vast majority of respondents were undergraduate rather than postgraduate or PhD
students. Of the staff who responded the majority were male with an average age of 35.6 years. All staff held a postgraduate degree or PhD and most held a teaching qualification.

3.1. Prior knowledge/understanding of sustainable development/sustainability

There were some differences between what students and staff understood by the terms sustainable development/sustainability (sd/s) (Figure 1). For students the most popular responses were ‘interdependence – society, economy and government’, ‘needs and rights of future generations’, and ‘sustainable change – development and carrying capacity’, whereas for staff it was ‘quality of life, equity and justice’, ‘interdependence – society, economy and government’, ‘green economy’, and ‘sustainable change – development and carrying capacity’.

Figure 1. What students and staff at Nitte University understand by the terms sustainable development/sustainability.
For students, the internet, books, newspapers, and their UG university education played the most important roles in forming these views. For staff, their PG university education, upbringing, books, internet, and newspapers were the most important (Figure 2).

Figure 2. Where students and staff at Nitte University have obtained their previous knowledge about sustainable development/sustainability, e.g. before studying/working at Nitte University.

All students surveyed reported that they knew reasonably little about sd/s before they came to Nitte, with most of these knowing ‘not much’ or only ‘a little’. This was broadly the case, regardless of whether Nitte was the first university they have attended.

3.2. Views of sustainable development/sustainability teaching at university

All students and staff thought it moderately to very important for sd/s to be taught at university, and that this should be a compulsory part of the university curriculum. For the small number of respondents who disagreed that the teaching of sd/s should be compulsory, the reasons given were that ‘students could learn about these issues from other sources’, and
‘that there is not enough time in the course/year to cover this content’. Student respondents also cited that they thought it is ‘not the duty of universities to teach this subject’. In terms of the subjects that should be taught as part of sd/s at university, for students, the most important were perceived to be ‘waste, water, energy community resilience’, ‘natural resources management’, ‘responses to climate change’, ‘ecosystems and ecological principles’, and ‘biological diversity’. For staff, ‘natural resources management’, ‘ecosystems and ecological principles’, and ‘rural and urban development’ were the most important (Figure 3).

![Figure 3. Which subjects should be taught as part of sustainable development/sustainability at university?](image)

Regarding the teaching approaches that should be used to teach sd/s at university, students were overall more in favour of formal timetabled sessions, including in partnership with university campus initiatives and/or sports/arts events/societies/teams, compared to this subject being taught outside of formal timetabled sessions, e.g. through university campus initiatives and/or sports/arts events/societies/teams only. For staff, overwhelmingly the
opposite was true, with the majority favouring the teaching of sd/s outside of formal timetabled sessions. Some staff did favour the teaching of sd/s through a compulsory standalone module (rather than a specific component of a degree programme) e.g. as ‘Environmental Studies’ (ES), which was similar to the percentage of students who favoured this approach (Figure 4). Those students that preferred being taught sd/s through university campus initiatives and/or sports/arts events/societies/teams cited ‘minimising/banning single use plastic’, ‘reducing, reusing and recycling of waste available within the campus’, ‘water conservation practices’, ‘wastewater management practices’, and ‘campus greening/landscaping’ as the initiatives that should be used for this type of approach. For staff, there was no preference for any of the initiatives suggested (Figure 5).

Figure 4. How should sustainable development/sustainability be taught at university?
Figure 5. What types of non-formal teaching should be used to teach sustainable development/sustainability at university?

3.3. Experiences of sustainable development/sustainability teaching at university

3.3.1. Students

Just over half of students reported being taught about sd/s at Nitte, with the majority of these taught through some form of formal timetabled sessions rather than university campus initiatives and/or sports/arts events/societies/teams. There was a positive association between the teaching and learning of sd/s at Nitte (Spearman’s Rank Order Correlation; $r_s = 0.92$, d.f. $= 44$, $P < 0.001$). Several students who were not formally taught sd/s still reported learning about sd/s at Nitte. The majority of students reported learning about sd/s through some form of formal timetabled sessions with a large proportion of students referencing their ES module as an important medium for this (Figure 6). Interestingly, students felt that they had learnt the most about sd/s from ‘campus initiatives and/or sports/arts events/societies/teams’, ‘compulsory standalone modules taken as part of their course’ and ‘compulsory standalone modules not taken as part of their course, e.g. Environmental Studies’ (Figure 7).
Figure 6. Student perceptions of the contribution of different types of teaching approaches to their teaching and learning of sustainable development/sustainability at Nitte University.

Figure 7. Summary of student perceptions of the positive contribution of different types of teaching approaches to their learning of sustainable development/sustainability at Nitte University.
University. ‘Positive’ Likert scale responses include the ‘somewhat’, ‘much’ and ‘a great deal’ categories.

At Nitte, the vast majority of students surveyed studied ES with most finding it informative, covering the types of issues they were expecting. Areas such as ‘Environmental pollutions’, ‘Conservation and preservation of environment’, and ‘Gender equity - Women's status in India’ were identified as the most informative parts of the programme (Figure 8). Most students found their ES module engaging and that this module made a significant contribution to their degree.

**Figure 8.** Summary of student perceptions that their Environmental Studies module covered the types of issues they were expecting. ‘Positive’ Likert scale responses include the ‘somewhat’, ‘much’ and ‘a great deal’ categories.

The vast majority of students reported that the teaching of ES was in large classes, with lectures rather than project work or field visits the main pedagogic approach used. Just under half of the students surveyed felt that they were taught ES by experts in sd/s. Most students reported that social science approaches/examples were used, rather than ecological and natural science approaches/examples (Figure 9). Most students felt that they ‘had a voice’ about sd/s at Nitte and knew that Nitte had its own ‘Education for Sustainable Development’
policy. The vast majority of students knew that the Supreme Court of India has ruled that a course on ‘Environmental Studies’ be made compulsory as part of all UG programmes.

**Figure 9.** Summary of student perceptions of the use of different types of teaching approaches used in the teaching of their Environmental Studies module. ‘Positive’ Likert scale responses include the ‘somewhat’, ‘much’ and ‘a great deal’ categories.

Nearly all students felt that Nitte has a reputation for sd/s and most students reported that this influenced their decision to study there. They also reported that they were enthusiastic to learn more about sd/s. To enhance the teaching of sd/s at Nitte, students requested ‘more field visits’, increased use of ‘ecological and natural science examples/approaches’ and the integration of subjects such as ‘leadership, communication and management’. These responses were broadly in line with those improvements suggested by staff (Figure 10).
3.3.2. Staff

Just over a quarter of staff who responded taught sd/s at Nitte (n=2). They also taught biology. One of these staff members taught sd/s through ‘formal teaching, but in partnership with university campus initiatives and/or sports/arts events/societies/teams’, specifically as ‘continuing training programmes, seminars and informative courses on sustainability’ using ‘group work’ as the main teaching method. The other staff member taught sd/s through ‘university campus initiatives, e.g. in promoting the minimisation of single use plastic, energy saving measures, and sports/arts events/societies/teams’ using a mixture of ‘lectures’, ‘seminars’, ‘discussions’, and ‘independent study’. Both staff members reported that they used these teaching methods as they were the most effective. The member of staff who used ‘group work’ reported this was a methodology specific to their teaching of sd/s whereas this was not the case for the other staff member.
Both staff respondents reported that the reason they taught sd/s at Nitte were because they considered it ‘an important part of students’ education.’ Neither staff member had undergone any formal training to teach sd/s, but one staff member responded that they would like to undertake some. Neither staff member had encountered any barriers to their teaching of sd/s. Overall staff respondents felt that Nitte has a reputation for sd/s and the same proportion reported that this influenced their decision to work there, and most staff respondents felt that they ‘had a voice’ about sd/s at Nitte.

3.3.3. Personal perspectives on sustainability

The overwhelming majority of students and staff surveyed felt that it was at least ‘moderately important’ to live sustainably with the most important reasons being a combination of ‘moral duty’, ‘better for the environment’, and ‘better for society’ (Figure 11). Students and staff undertook similar personal ‘sustainable living’ behaviours (Figure 12).

**Figure 11.** Nitte University student and staff reasons for their decision to live sustainably.
Figure 12. ‘Sustainable living’ behaviours adopted by Nitte University students and staff.

Lessons learned about the teaching of sustainable development/sustainability

Table 1 summarises the lessons learned from this study about the teaching of sustainable development/sustainability.

Table 1. Lessons learned about the teaching of sustainable development/sustainability for students, staff and senior managers

<table>
<thead>
<tr>
<th><strong>Students</strong></th>
<th><strong>Staff</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Students are receptive to learning and engaging with sustainable development/sustainability from a number of perspectives.</td>
<td>Review and reflect on the methods used to teach sustainable development/sustainability and consider where active learning approaches, including group work, field work and project work could be integrated.</td>
</tr>
<tr>
<td>A range of teaching methods can be used to promote student learning about sustainable development/sustainability; these can be integrated into the formal curriculum, as well as exploring more innovative, informed approaches using the environment in which they are studying as well as the University campus.</td>
<td>Extend the breadth of examples used to support the teaching of sustainable development/sustainability to be inclusive of ecological and natural science perspectives. Potential to explore also interdisciplinary perspectives.</td>
</tr>
<tr>
<td>Engage in teaching-related continuing professional development.</td>
<td></td>
</tr>
</tbody>
</table>
• Review the teaching of sustainable development/sustainability; and reflect on the potential role of the ‘hidden curriculum’ to further engage students with sustainability education.

**Senior managers**

• Embed sustainability education within relevant institutional strategies.
• Dedicate resources to support the continuing professional development of those involved in teaching sustainable development/sustainability.

### 4. Discussion

Drawing on data captured through two online questionnaires this study considered the extent to which sustainability education is integrated, and how it is perceived, by students and staff at Nitte University. The results from these questionnaires revealed that there was broad support for the principles of sd/s and sd/s education by both students and staff, the vast majority of whom felt that sd/s should be a compulsory part of a university education. This supports the idea that there is a strong relationship between those individuals who have an appreciation of the natural sciences and those who are the most receptive to the fundamentals of sd/s. However, this is often biased towards environmental aspects (Bantanur et al., 2015b).

Encouragingly though, when asked to choose from a list of ‘curriculum entry points into sustainability’ (Ryan and Tilbury, 2011), the most popular topics that students and staff felt should be included in sd/s education programmes were a mixture of those with an environmental, economic and social focus. This was further reflected in the responses of both students and staff when asked to choose from a list of topics to define what they understood by sd/s (Cotton et al., 2007; Winter and Cotton, 2017). This was one of the opening questions in each questionnaire. It was designed to explore participants own interpretation of the topic, as the researchers felt it was important to avoid imposing a set definition of sd/s at the outset of the study. Taken together this suggests that amongst the students and staff surveyed there is an appreciation of the ‘gold standard’ tripartite model of sustainability, that draws from the three ‘pillars’ of the environmental, economic and social sciences (Schoolman et al., 2010). This has been highlighted as especially important to respond to the challenges of sd/s within the Indian context where there remains an ongoing need to link an understanding of the environment with human and social aspects of development issues (Chhokar, 2010). These results add to those of Bantanur et al., (2015b) (and references therein) who suggest that there is a greater level of understanding of sd/s amongst students in newly industrialised countries, such as India, who are faced with the multifaceted challenges of sustainable development compared to those in industrialised nations.
The majority of students reported that they felt they knew reasonably little about sd/s before they came to university and that their university experiences had contributed significantly to their knowledge. This was supported by the positive association between the teaching and learning of sd/s by students at Nitte (Spearman’s Rank Order Correlation; $r_s = 0.92, \text{d.f.} = 44, P < 0.001$). Several students who were not formally taught sd/s still reported learning about sd/s at Nitte, potentially highlighting the importance of the ‘hidden’ curriculum (Winter and Cotton, 2012; Cotton et al., 2013). However, the majority of students who completed the questionnaire reported being taught, and learning about sd/s through formal timetabled sessions with a large proportion of students referencing their ES module as an important medium for this. Again, students cited a mixture of environmental, economic and social science based topics as being the most informative, which also suggests a well-balanced and effective delivery by teaching staff. However overall, students felt that they had learnt the most about sd/s from ‘campus environment/initiatives’ e.g. not from formal timetabled sessions. This aligns with the practice of using the hidden curriculum to expose and educate students about sustainability and environmental issues, which has been identified as successful in other contexts (Winter and Cotton, 2012). This is an area that warrants further investigation to quantify and characterise the contribution of such activities to examine ways to capitalise on these to further develop students’ sustainability literacy, not just in India, but worldwide. It should be noted though, that regardless of the method (e.g. the formal vs hidden curriculum), the vast majority of the students surveyed felt they had gained knowledge about sd/s from being at Nitte.

Despite the perceived positive contribution of ES to their knowledge of sd/s, most students reported that the teaching of this was in large class sizes, with lectures the predominant teaching method. The teaching of sd/s particularly benefits from an interdisciplinary (Feng, 2012), but more importantly, an active teaching approach, including field visits and project work (Winter et al., 2015). Furthermore, these pedagogies have been shown to increase student engagement with sd/s, specifically with the social dimension of the subject, and were set out as ‘necessary’ methodologies for the teaching of sd/s when it was included into the curriculum in India (Chhokar, 2010). Indeed, the students requested ‘more field visits’ as a change they would like to see to the module. Thus at Nitte, there appears to be a mismatch between how students are taught sd/s and how they want to be taught sd/s. Though overall most students report a positive experience from their SE sessions, this would imply that with the incorporation of active teaching formats, e.g. ‘transformative pedagogies’ would benefit
students, and the knowledge gained could be even greater (Mintz and Tal, 2018). The
absence of active pedagogies was reported in the nationwide evaluation of sd/s education
three years after its introduction (Chhokar and Chandrasekharan, 2007). Here, a lack of
funding was cited as the main reason for the exclusion of these types of approaches. At Nitte,
the staff did not report that there were any significant barriers to the teaching of sd/s, so this
could be a recommendation for Nitte to take forward to improve their practice (Cotton et al.,
2007). If any changes are made to the module delivery of the sd/s course at Nitte it will be
beneficial to repeat the questionnaire used in this study to allow the impact of these changes
can be assessed.

The majority of students reported that they found their ES module engaging and a large
proportion felt they were taught by experts. This study did not examine a measure of
‘expertness’ to teach sd/s but it did record that staff taught this subject because they think it is
‘an important part of students’ education’ rather than purely being ‘part of my job’. As is the
case in most academic subjects, it has been shown that if sd/s is taught by motivated teachers
then this has a positive effect on student engagement, learning and practicing of sd/s
(Chhokar, 2010). Only one staff member had received specific training, though the other was
keen to engage in formal training. There is an ongoing debate within the teacher training
community in India as to whether this should be a compulsory part of the teacher training
curriculum (Ravindranath, 2007). A number of successful initiatives to support the
development of teachers to teach sd/d have been highlighted; these have including the
incorporation of sd/s community projects into the training curriculum, peer-to-peer mentoring
and networking schemes (Ravindranath, 2007). It is likely therefore, staff at Nitte who teach
sd/s would benefit from on-going development and training to support their practice, as it
may also lead to pedagogic innovation in the curriculum design of the sd/s programme at
Nitte. Staff could also be encouraged to explore models of co-curricular work with
undergraduate students, building on the principals of students as partners, to stimulate
pedagogic innovation as well as actively engage students with this agenda (e.g. Heron and
Reason, 2001; Summers and Turner, 2011; Angus-Cole et al., 2020).

Overall, it appears that Nitte is justified in its reputation for sd/s, as recently highlighted on its
website (nitte.edu.in/green-campus.php). The vast majority of students and staff agreed with
the statement ‘Nitte has a reputation for sustainable development/sustainability’ reporting that
this influenced their decision to study or work there. In terms of ownership, the majority of
students and staff felt that they ‘had a voice’ about sd/s at Nitte and knew that Nitte had its
own ‘Education for Sustainable Development’ policy. In terms of the wider picture, the vast majority of students knew that the Supreme Court of India has ruled that a course on ES is compulsory as part of all UG programmes. Nitte is an example of the new tier of modern, private universities which have begun to reshape the Indian HE sector with a focus on high-quality research driven education. Perhaps it is not surprising that a young, life sciences based, middle-class, well-educated cohort of students and staff should be fully supportive of sd/s and that they were enthusiastic to teach and/or learn more about this subject. It is clear that the ES programme at Nitte is delivering a non-biased gold standard’ tripartite model of sd/s education. However, care should also be taken during future curriculum design to continue to ensure that these life science students receive sessions at sufficient depth on the economic and social aspects of sd/s education as it is likely that their prior knowledge and understanding of such areas will be less than the environmental aspects.

This research was reliant on online questionnaire to generate empirical data. Whilst there are recognised challenges with online surveying, including in pedagogic research (Roberts and Allen, 2015), overall this study benefitted from the advantages of this methodology. This study also returned high response rates. This may have been a combination of the HE environment, and society in India which remains dominated by hierarchical discipline. An incentive was offered to complete the survey, an entry into a prize draw. Careful consideration of the ethical implications of this was carried out, namely to ensure that the prize draw actually took place and promptly, and that the size of the incentive offered was proportional to avoid bias (Cobanoglu and Cobanoglu, 2003).

This research was focussed on one institution at Nitte, the NUCSER. From the responses of the staff and students, it was clear that to some extent there was a bias towards the environmental aspects of sd/s. However, when the questionnaire responses were considered overall, it is clear that the teaching of sd/s and ES is delivering a non-biased gold standard’ tripartite model of sd/s with a focus on both environmental and societal aspects. Another area for further study would be to extend the questionnaire to the entire university to compare the situation across disciplines, and also to other institutions in India, integrating a range of state and private providers within the sample.

5. Conclusions

Although conducted at a single university department, this study highlights the lessons that can be learnt from India, especially surrounding the disconnect between student and staff
perceptions of sustainability theory, education and practice, suggesting that the results from
this study have the potential to make an important contribution to our knowledge of
sustainability education in India. It is known that there is often a departmental/disciplinary
bias in the questions asked and pedagogies surrounding the teaching of sd/s at university
(Aznar Minguet et al., 2011). At present only one department, the Nitte University Institute
of Architecture explicitly emphasises that sustainability underpins their teaching and
research. However, this is not captured by any kind of formal strategy. Thus the results of
this study will now be used to start to formulate a global sd/s education strategy for Nitte
University. To achieve this support will be required from senior managers to allow educators
to make the curriculum innovations that they need to address this. At the same time, this
study has highlighted where some improvements can be made in the delivery of sd/s
education at Nitte, namely the incorporation of field trips and group work into the
programme. These changes would ensure the next generation of Nitte students are fully sd/s
literate and able to contribute to the challenge of sd/s within India.

In recent years, work has been done to assess the environmental literacy of university
students, in short to ascertain the effectiveness of sd/s education programmes (Shephard et
al., 2014). This study highlights the importance of effective sd/s education for the future of
India. Given the ultimate aim for the Indian HE system is to produce graduates that live,
work and do business in a sustainable fashion, it would appear work still needs to be done to
achieve this ambitious goal.

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teaching qualification.

7. Declaration of interest statement

The authors have no competing interests to declare.

8. Data availability statement

The data that support the findings of this study are available from the corresponding author,
(LMT), upon reasonable request.
9. References


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**Biographies**

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Smitha Hegde is a Professor of Plant Biology at the Nitte University Centre for Science Education and Research. Her background is in plant biotechnology and she has worked extensively on tissue culture, conservation, biodiversity and molecular markers of tree and fern species. At Nitte she has championed a number of campus sustainability outreach initiatives including cataloguing via QR code, and calculating the carbon sequestration of all campus trees.

Indrani Karunasagar is a Director of the Nitte University Centre for Science Education and Research. She is a Professor of Microbiology with research interests in medical microbiology, fisheries and marine microbiology, biotechnology and food safety. She has promoted greening of the Nitte University Paneer campus where she is based, including implementing rainwater harvesting and water recycling facilities.

Rebecca Turner is an Educational Developer at the University of Plymouth and recognised as a Principal Fellow of the Higher Education Academy. Rebecca's research addresses themes included the professionalisation of higher education practice, learning gain and student transitions through higher education.