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ANALYSIS

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Learning sustainability at the Barefoot College: local and global community values in action

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Abstract This article investigates learning sustainability at the Barefoot College, identifying potential replicability and relevance for other contexts.

Background Government statistics in India, suggest that some 32 million children have no access to education, especially in rural areas. Despite initiatives, 80% mainly from lower castes and deprived backgrounds, have never attended school. Operating across many villages, the 'Barefoot College' (BFC) is a mature non-government organisation (NGO) centred on Tilonia, in Northern Rajasthan. Here, poverty is so extreme that children can be sold into textile factories because parents cannot afford to feed them. However, skills learned at BFC such as conserving fossil fuels and water, how to vote, literacy and health practices, improve local lives immeasurably and benefit the planet. The research question (RQ) examines the key characteristics and impact of learning sustainability in this environment. The lead author was astonished by the depth and beauty of how teachings of semi-literate women, teachers and children have generated a living, breathing sustainable community.

Method This research used an education case study methodology comprising multiple nested cases. Narratives of three key BFC project cases, the solar panel mamas, the Barefoot health and social workers and the children's Night Schools, contextualise participant interviews that enable individual voices and experiences to emerge. Strategies aligned with a feminist standpoint approach enhance rigour and trustworthiness, systematically comparing qualitative data initiated in 2012 across semi-structured interviews, observations, and photographs. We found two key themes: dealing with on-the-ground inequality and practices of teaching and learning, together with five subthemes. These are in turn examined within a global sustainability-based framework to evaluate and characterise of BFC learning sustainability and sustainable leadership.

Results The research finds that learning sustainability at BFC contains novel key elements that are scalable and transferable. Meticulous joined-up-thinking underpins the BFC projects. Participants' words confirm local and global relevance. Mapping learning sustainability in practice confirms individual self-actualisation and community agency through transformative education with impact. Individual and organisational adaptability are evidenced through individuals' transformation into community leaders.

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Conclusion The Global North has a lot to learn from the BFC, where learning sustainability is deeply embedded in belonging to the community. Bottom-up leadership through active participation and democracy empowers all community members, instilling pride in the Barefoot ethos. In this difficult environment, locally rooted projects nurture the ecological commons including rainwater harvesting and reducing fossil fuels. Projects enable traditions and clean technologies to flourish, whilst strengthening individual and community belonging and identity.

Keywords Learning sustainability, Barefoot College, Leadership, UN SDGs, Sustainable community, Global citizenship, Informal learning

Introduction: context, research question and frames of reference

This article offers a unique insight into a world-leading community of practice that expresses its agency and democracy. The results of the Barefoot College's impact and success are self-evident, win numerous awards and are published in the international media. Yet, despite BFC willingness to teach and promote what they do, surprisingly little independent academic research has been undertaken to recognise or detail its work. Indeed, the BFC is wary of academic research, coming from theoretical perspectives incompatible with their ethos. While academic thinking and global communities can learn valuable lessons from BFC practices, BFC expertise is grounded in experience that requires granular detailing and analysis for its practical lessons to be transferrable. The article aims to untangle and address this dynamic by making both the investigative lens and the evaluative framework transparent. To facilitate this aim, the research question (RQ) asks, *what are the defining characteristics and impact of learning sustainability at the BFC?*

Our research is important and unique as it clarifies what learning sustainability looks like in practice at BFC, how the experiential processes involved in learning sustainability developed, and whether these can be applied elsewhere. BFC organisational sustainability forms the wider context for considering what learning sustainability means on the ground to those involved and is outlined below. Taking account of this context, we developed a framework to evaluate whether the learning taking place at the Barefoot College [BFC] in Northern Rajasthan, India, can more widely be defined as learning sustainability. This enabled us to clarify relevance and whether it can be transferred elsewhere. The evaluation framework is outlined in the methodology section, prior to analysis and discussion.

Both the lens used in this article to investigate sustainability at BFC, and the evaluation framework have evolved over time. They originated in the lead author's teaching and learning of sustainability in UK Higher Education (HE) at the University of Greenwich from 2009. This led to the development of innovative co-constructed learning and teaching that contributed to the university's first place in the 2012 Green People and Planet University Awards.

For the UK university students taught by the lead researcher, learning sustainability evolved through co-constructed projects in diverse and complex communities. Sources included Sterling's HE 'Future Fit Framework'[1] and texts exploring related concepts including awareness that small is beautiful and economic growth can be horizontal rather than vertical (Schumacher) [1]. Students initially worked with and then critiqued the Three Pillars definition outlined in the United Nations 1987 document 'Our Common Future', otherwise known as the Brundtland Report (Fig. 1) [2].

Experience taught us that student agency linked the pillars. Our collective experience of the three pillars in practice, developed as learning-in-action, highlighted the importance and need for this fourth, missing element, one that students named 'personal' to describe their engagement [3]. This equates with learning sustainability as described in Crookall's call for this Special Issue of Sustainable Earth.[2] The early finding is illustrated below (Fig. 2). This article therefore adapts awareness of Brundtland's limitations [4] including its economics of growth, grounded in practice of learning and teaching, and in the relationship between project design and context discussed elsewhere with reference to Situationism and sustainable city living [5].

As educators, we concur with Wals' definition of learning sustainability as emancipatory learning that builds critical thinking and capabilities rather than simply aiming to change behaviours [6]. Such learning is socially transformative and transdisciplinary. It differs from the traditional study-based academic learning founded in the acquisition and assessment of knowledge. In this article, the active personal element of learning sustainability is defined through the quality of transcendence. On the ground, a process of transition takes place when an individual 'moves beyond' (or transcends) what is known, into a new awareness of the connections between things and how they relate to one another (systems thinking), or

[1] Stephen Sterling's work can be found here: https://www.plymouth.ac.uk/staff/stephen-sterling.

[2] Crookall's call inspired revisiting these data to focus on learning sustainability. It is available here: https://e4l-jrnl.weebly.com/cfp-se-long.html.

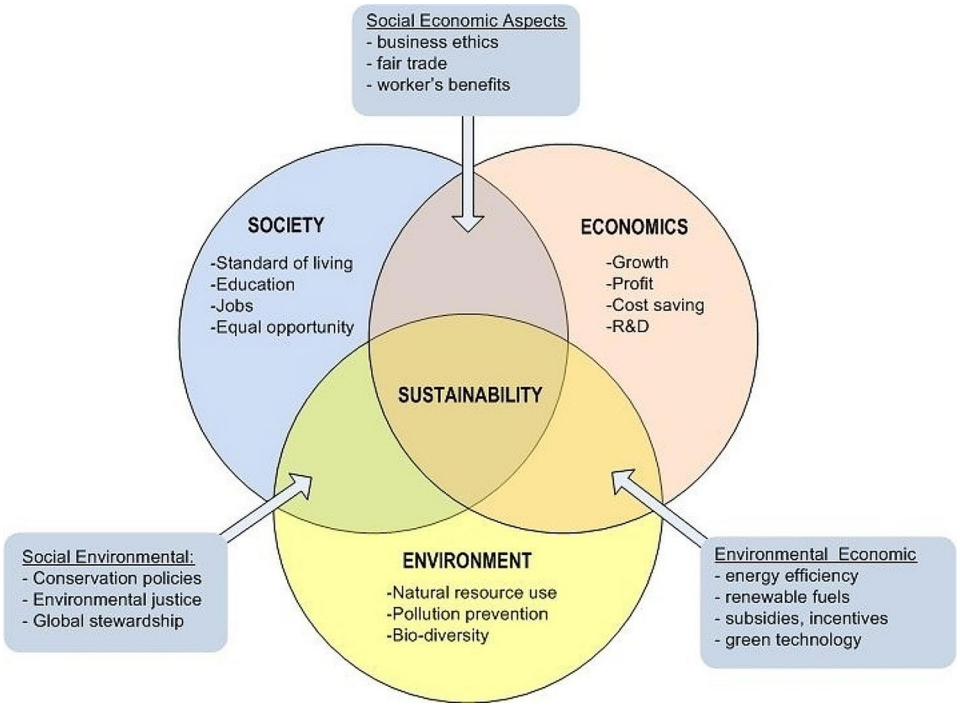

Fig. 1 The 3 pillars of sustainability—the Brundtland definition, updated by Dalton. Dalton's (2022) updated Brundtland diagram can be found here: https://utopia-the-edit.ie/2022/02/01/u-n-brundtland-commission-report-1987/)

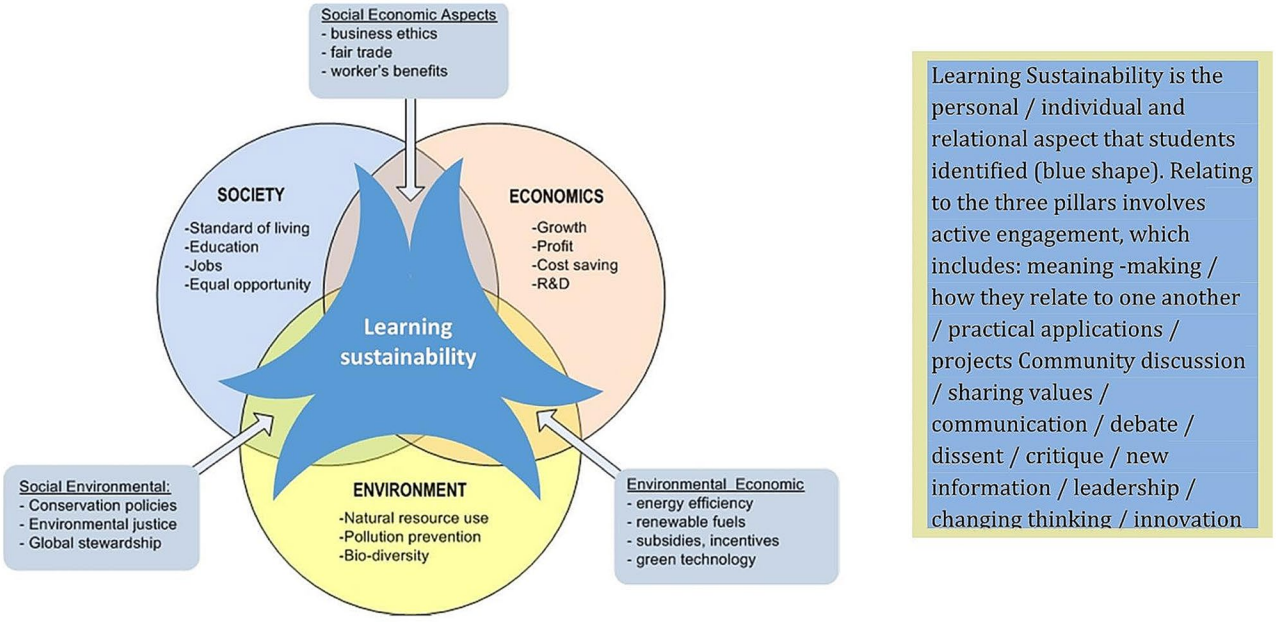

Fig. 2 Learning sustainability: The personal aspect of engagement through community-based projects, suggests that learning sustainability as a process (blue shape) brings a different dimension to the 3 pillars by engaging with actions, experiences, thinking and new meaning-making (adapted from Fig. 1)

Table 1 Knowledge-making framework used in Table 2 analysis of BFC projects

	Head	Hands	Heart	Transcendence
Knowledge Making	Thinking; concepts; ideas; invention; (systems and futures, problem solving)	Doing; practices; making; trying out	Being; beliefs; values; feelings; associating	**Reflection and metacognition: personal, individual evidence** knowinglycombining knowledge-making beyond the immediate environment

from a (known) problem to a sustainable solution. The word 'transcendence' gestures to the transdisciplinary educational nature of sustainability as an academic subject. Today, transcendence is a perspective needed to overcome complex entangled real-world problems, sometimes known as "wicked problems", such as climate change and social change [7].

Other facets of this lens evolved from research and learning at Schumacher College[3] in the UK and a conference that I convened at the University of Greenwich called 'Ways of Knowing: Head, Hands and Heart' (2012). As a concept, different ways of knowing[4] has a long history in equality and values-based education. The head, hands, heart framework facilitates the critique of knowledge-making located in the personal domain (learning, Fig. 2) in this article. It also offers a means of re-valuing everyday labour by combining other forms of knowledge-making (Table 1).

All of the qualitative data collected at BFC was viewed through the lens of definitions of sustainability that evolved from this UK teaching context. An outline of the BFC organisation and literature is followed by methodological considerations. The results are organised into BFC projects in the findings section where photographs, observations and narrative provide context for the interviews that follow. Two overarching themes of inequality and teaching and learning emerging from the analysis of interviews are then explored through the meanings and words of participants. These are followed by the evaluation and discussion.

BFC context

From its origins in 1972, the BFC determined to break a cycle of rural and urban poverty arising from rural depopulation by improving peoples' living conditions in resource-poor areas of semi-arid desert and salt flats[5] [8]. Its infrastructure and projects now cover a large area of many small villages. Originally named the Social Work and Research Centre (SWRC), it developed over the past 50 years under the leadership of Bunker Roy. It began with an ethos of listening to locals to improve rainwater capture and water conservation, evolving gradually into a mature Third sector or Non-Governmental Organisation (NGO).

The SWRC involved learning and encompassed a way of life inspired by the thinking of Mahatma Gandhi.[6] It was "developed by the poor for the poor"[7] and quickly became known as the 'Barefoot' College. It is recognised as "the only college in India that follows the lifestyle and work style of Gandhi" [9]. While addressing prevailing educational inequality, the BFC is not in any sense a formal educational college but offers an alternative in practical and applied learning [10]. The most well-known project is the 'solar panel grandmothers' project, now named the 'solar panel mamas' project. During the first 25 years the BFC moved from employing externally qualified individuals, to mainly employing the village inhabitants it supports. As early as 1997, it was recognised as a leader in sustainability, with a short UNESCO documentary presenting its work on informal education [11]. The BFC has won prestigious sustainability awards for its projects and its leadership.[8] Serving the extensive local community effectively, BFC international reach has been scaling up.

After starting with a traditional hierarchical staffing structure, the BFC rapidly transformed into a collaborative learning organisation with a broad and complex organic structure. It employs local people, valuing the relevance of their knowledge and expertise as leaders working within the community. This flexibility, together with Roy's charismatic leadership, continued to attract funding from Indian and other governments. The BFC sits within the Indian NGO context in the Global South, amid a continuum of tensions [12]. At BFC, community networking and project variety supports multiple

[3] Time spent at Schumacher College (https://campus.dartington.org/schumacher-college/) helped formulate these ideas. The Ways of Knowing Conference at the University of Greenwich was convened in 2012 and included a keynote by Stephan Harding https://humansandnature.org/stephan-harding/.

[4] Various sources, see for example Orr, D. *Ecological literacy: Education for a postmodern world.* Albany, NY: State University of New York, 1992.

[5] Roy and Hartigan (2008) give the SWRC registration date as February 1971. On the Barefoot website and elsewhere the starting date is given as 1972.

[6] A general overview of Gandhi's economic theory is available at https://www.mkgandhi.org/articles/empowerment-of-the-rural-poor.html. The link between Gandhi and the BFC is well known: https://www.nytimes.com/2023/03/22/opinion/india-barefoot-college.html. The BFC state this on various pages of their website: https://www.barefootcollege.org/about/.

[7] For further details see the Barefoot College website, which is frequently updated. https://www.barefootcollege.org/about/.

[8] The UNESCO film referenced below is accessible here: https://unesdoc.unesco.org/ark:/48223/pf0000187333 and Bunker Roy's Ted Talk is available here: https://www.ted.com/talks/bunker_roy_learning_from_a_barefoot_movement.

interventions that help offset dependency on donations, a major problem for other NGOs. From a World Bank perspective, most NGOs rely on project-based external funding, which mainly creates unsustainable project results because of short time frames, so these need to learn from grass roots innovation[9] [13, 14]. Moreover, alternative visions of NGOs must cater to the requirements of mainstream funders. Impact and performance become framed by dynamic interactions and by tensions between external influences and internal organisational strategies and culture. Economic transparency is often an issue in the sector. The BFC enacts principles of procedural justice, holding an annual 'transparency *mela*' where income and outgoings are painted on large cotton sheets like a gigantic PowerPoint for everyone to read. Since 2020 with Roy's recent retirement, it has developed a strategic international leadership to extend the ethos globally.

BFC literature

The BFC's international acclaim is evidenced better online than through its academic literature trail, indicating an academic lack of recognition in Higher Education Institutions (HEIs) incompatible with its awards and recent online and media presence. Searching for "Barefoot College" in EBSCOhost databases brought up 23 international magazine and periodical articles but only six academic journal articles. This article aims to add to this gap in knowledge of BFC practices. Google Scholar added O'Brien's 1996 thesis on education and sustainable communities [15] and several solutions-orientated texts with information on the BFC approach, authored or co-authored by Bunker Roy.

Of the few academic articles, some use theoretical frameworks to examine the Barefoot College's success, necessary for translating alternative worldviews into academic spaces. Others provide useful reference for the projects examined here, contributing to the reliability of information: solar panel projects [14, 16] night schools [17]; community midwives and social workers [18]. Two articles demonstrate a detailed study of women's empowerment and self-actualisation through solar panel training [16] and employment [18]. One examines silence on menstruation [19] and another forms of knowledge-making as process in relation to architecture [20].

Research by Joshi and Yenneti [14] presents the BFC leadership in grassroots solar innovation, comparing three case studies using different business models. These are defined according to grassroots innovations theory, with community ownership bringing systemic transformation. They found that socio-cultural values embedded at the centre of grassroots innovation had shifted into long-term sustainable practices.

Azher [18] investigated traditional midwifery (*dai*) practices that survive in Tilonia but have disappeared elsewhere. She interviewed many participants in the local health infrastructure, establishing that for mainly illiterate women *dai* practices are vital for improving women's lives and birth mortality rates. Local women shun modern health culture. Many *dai* midwives also teach about menstrual cloths, like Barefoot health workers. Anand [19] carried out a menstruation intervention case study using comic-making near Tilonia with local young women. She identified innovative aspects of working with traditional and religious cultures that challenge mainstream female health practices. This respectful intervention used an appropriate innovative method to discuss the taboo subject of menstruation. However, it expressed some problematic sanitisation norms.

Three articles are particularly relevant for this study, in terms of education and knowledge-making. Mininni [16] used a mixed-methods feminist approach to research an arm of the solar panel project, interviewing 33 participants, who were teachers and solar panel engineers. Her detailed research identifies why women become involved in the project and discusses unequal economic resource distribution and high gender discrimination norms in Rajasthan. It concludes that access to salaries and resources does not guarantee empowerment. However, the process of becoming a Barefoot engineer fosters positive development and changing practices in women's empowerment and self-actualisation. Szekely and Mason's research [17] discusses how the solar-powered night schools demonstrate a redistribution of power in an educational context. They build a complexity model to show that power and resource distribution (as opposed to centralisation) promotes individual and organisational learning. Differently and in relation to knowledge, Allen's [20] 2014 article focuses on the disputed Aga Khan architectural prize and considers the conflicting narratives arising between local and professional claims around the design and building of the new campus at Tilonia. The methodology is problematic, as it uses a range of anthropological and process-based perspectives to highlight and dominate tensions emerging from local and formally educated ways of thinking about claims to knowledge and indeed authority and ownership.

No independent academic research has interviewed participants across the BFC community to examine teaching and learning sustainability in detail. The unique access given to the principal researcher, the methodology employed, and the findings presented in this study, contribute significantly towards this gap in knowledge and understanding. Indeed, Higher Education Institutions struggle to embed Community Service Learning

[9] Townsend and Porter cite Edwardes of the World Bank.

and problem-based experiential learning and have much to learn therefore from the sustained experiences of the BFC in this regard [21]. Further, the qualitative methodology used here supports the argument that the external academic community needs to listen to local leaders on the ground, who are the experts in resource-poor settings. It models how analysis (synthesizing and extrapolating) can ethically support transfer of learning sustainability to other places. However, to transfer the learning elsewhere, requires an understanding of why what is taking place on the ground at BFC is working so well. Consequently, it positions participants' voices in the foreground as sources of knowledge to offer a new perspective. In so doing, it demands that real-world expertise is valued as an equal form of knowledge-making for creating pragmatic solutions.

Methodology and methods

The lead author was given access to the BFC through an introduction by third sector connections in India, offering an opportunity to experience BFC learning practices and analyse learning sustainability. The research was not prompted or driven by the gap in literature, strengthening the rationale for the inductive approach [22] and speculative nature [23] of the research question that asks, *what are the defining characteristics and impact of learning sustainability at the BFC?* It uses a case study method [24] as appropriate for investigating how learning at the BFC is articulated by examining teaching and learning in the lived experiences of members of the community. This situates and highlights the Barefoot approach as a system of knowledge that is *contextually produced,* i.e., created through experience of the lived environment and further supports the speculative nature of the research question. The concept of contextual production, bears a direct relationship to the natural and community environment, placing this research within the social constructionist paradigm commonly associated with Education [25]. Collection of qualitative data in social sciences, especially interviews, is the most suitable method for the purpose of listening to experiences [25]. It is also more ethically desirable for such voices to be quoted rather than interpreted this requires contextualisation, which case study offers. However, qualitative methodologies come with recognised complexity of design, where planning and implementation involve repetition of synchronous steps and researcher flexibility [26]. Historical debates originating in quantitative perspectives have been met by qualitative research with critical consideration of the concept of rigour intersecting with that of subjectivity informed by trustworthiness [26]. Such debates and criteria originating in social sciences [22, 26] frame practice [25] and ethics [27] in educational research and informed carrying out the research and the processes discussed below. Awareness of these practices and using qualitative data collection [22] enabled me to listen to eight participants as the experts in their environment, whose conversations characterise the identity of that environment "in its own terms" [24]. Further, as a Feminist researcher, I acknowledge the influence of standpoint theory [23] in respect of addressing a logic of discovery that makes space for the social inescapability of the BFC situation. Therefore, both the lens and evaluation framework are clarified in acknowledgement of my research journey at BFC.

Methods

Visits to workshops, the school, the hospital at Tilonia as well as off-site night schools and a satellite project at Manthan permitted collection of photographs and observations. Information from the BFC website and informal conversations helped organise and verify contextual data for generating project narratives that provided the case study information and context for eight semi-structured interviews.

The BFC independently selected seven participants with teaching and learning roles across the community. The time and place of interviews was chosen by the BFC. All interviews followed the same format, repeatedly using the same script of semi-structured questions to enhance rigour and reliability [26]. Questions asked about interviewees' roles, successes, teaching and relationships with students and the environment. The researcher purposively requested an eighth.

All participants came from Tilonia and the surrounding villages, except for the acupuncture teacher. Most had been involved with the night schools, some having attended as students. Several had worked on many BFC projects. The eighth supported some interviews, acting as translator where necessary and cross-checking understandings across languages and cultures. At the researcher's request they became a participant so their views and experience could be included as part of the research process.

Participants interviewed:

1. Solar Panel teacher
2. Govt School teacher
3. Night School teacher
4. President of Night Schools
5. First BFC teacher
6. Senior teacher (involved since 1970s)
7. English Acupuncture teacher (volunteer)
8. Senior teacher and BFC education lead

The lead author, Patterson, a white female university educated researcher, carried out the research with permission from the BFC, informed by ethical guidance for educational research [27]. In line with UK university

research ethics, permissions included project information, the indicative transcript, data protection, the right to anonymity and the right to withdraw. Full permissions were given, including taking and use of photographs.

Complex issues of power, translation bias and perspective[10] are acknowledged. Efforts were made to mitigate these during data collection through a range of strategies comprising interviewee advance permissions and consent; selection of interviewees by the community; member of the community always present; lead researcher staying at the college and eating food communally; availability and locations determined by participants; checking meanings; thanking participants; use of photographs, observations, and materials; use of substantive quotation.

Project analysis

Observations and analysis were informed through the lens of the researcher's background in sustainability education clarified in the introduction. Data was organised across the following three key projects that share underlying characteristics to facilitate analysis and comparison:

1. Solar Panel Mamas
2. The Night Schools
3. Social Care Workers—Social and Community health and Wellbeing

Qualitative data analysed and presented as narratives tells the story of each project, with thick description verified across different data sources, followed by short synopses of observations. Similarities across the three projects confirm the ethos of the college, addressing different facets of the wider environment. Interview transcripts were individually analysed forming multiple case studies. Understanding each as a specific entity or case, emphasises the individuality of participant experience in line with the ethics of the study. Like individuals within the organisation, these multiple cases interact with, and derive meaning from, the three project cases that build on each other offering understandings of the overarching system that comprises the BFC case study focussed on teaching and learning [28]. Thematic analysis of participant interviews was conducted using Braun and Clarke's six-step deductive approach to data [29]. Two overarching themes, social inequality and teaching and learning and five sub-themes emerged. Thematic analysis offers space for individual participant voices to be heard within the confines of translation, so it is the best way of presenting these data [29]. Themes were selected and commented on by JP and verified and edited by FK.

[10] Country combinations and numbers of women vary by cohort. One website photograph shows 32 women from 11 different countries. Participants come from countries ranging from Liberia and Somalia to Sri Lanka and Bhutan.

Evaluation analysis

To translate and evaluate whether what was taking place on the ground at BFC related to wider global principles of sustainability and, to evaluate whether BFC learning sustainability that could be applied elsewhere, we needed to scrutinise our data differently. This led to a secondary analysis.

Our evaluation framework consists of three different aspects. The basic sustainability-in-action lens was updated and given a global focus, drawing on principles from the collaborative 2017 United Nations Sustainable Development Goals[11] (17 UN SDGs). Notwithstanding their problematic development agenda [30] we have used them as a reference point for defining sustainability throughout the evaluation. At BFC, different forms of knowing at community level include working with what exists to enable people to remain in the area and live improved lives. However, the journey through learning sustainability was also demonstrated by a shift in perceptions from a localised experience to being part of a wider global world. We needed to evaluate what different ways of knowing meant to clarify learning. As educationalists, we knew we needed to consider models of learning attributes and competencies as well as a novice to expert model to analyse what learning was taking place. We also needed to consider transformative learning. These evaluations are presented in the discussion and evaluation section. Therefore, during the physical research process, my researcher experience evolved further as I learned from participants, adding phenomenological depth to the frameworks used in our analyses as I thought through what I saw in action at BFC.

Presentation of findings

Project narratives are presented first, forming the context for themed BFC voices that follow.

Three projects

Solar panel mamas

Communities in different countries[12] across the world choose women who are struggling to make ends meet to become solar panel engineers. They are mothers and widows whose husbands have died or been killed. They

[11] UNSDGs: 1. No Poverty; 2. Zero Hunger; 3. Good Health and Well-being; 4. Quality Education; 5. Gender Equality; 6. Clean Water and Sanitation; 7. Affordable and Clean Energy; 8. Decent Work and Economic Growth; 9. Industry, Innovation and Infrastructure; 10. Reducing Inequality; 11. Sustainable Cities and Communities; 12 Responsible Consumption and Production; 13 Climate Action; 14 Life Below Water; 15 Life on Land; 16 Peace, Justice and Strong Institutions; 17 Partnerships for the Goals. Available at https://sdgs.un.org/goals.

[12] Country combinations and numbers of women vary by cohort. One website photograph shows 32 women from 11 different countries. Participants come from countries ranging from Liberia and Somalia to Sri Lanka and Bhutan.

arrive in Tilonia in pairs and spend six months at the BFC learning how to make and repair solar panels. Most have never previously travelled outside of the small villages where they live. On their return, each woman supplies and maintains up to 200 units providing lighting and cooking for their communities. While they are away, the home community builds them a workshop. Monies previously spent on fossil fuels such as paraffin, are collected to become their living wage.

Renewable light permits more schooling and activities, supporting future income generation. With its global and local sustainability advantages, solar fuel affords a living to poorer people within impoverished communities, which promotes a sustainable circular economy. This is a flagship project. It began in 2005 and is sponsored by the Government of India and other governments. Women taking part have been named the "Barefoot Mamas" (Fig. 3).

The project has created a significant improvement for rural communities. Kummitha [31] confirms that the initiative has been highly successful in its aims of providing renewable energy and systemic bottom-up community change through empowering women in need, except where provision of grid-based electricity has become a subsequent option.

Observations

It is dark coming into the room from the bright sunlight outside. Around 20 women from several countries sit at long workbenches in a large room, making small electronic parts. They are building solar panel kits here, in Northern Rajasthan, and learning to be engineers. Hands are busy. Many of the women smile and gesture as they invite me to see what they are doing, but there is little conversation. They sit in small groups or pairs and are clearly at ease. Despite no common spoken language, laughter emerges through shared making; curiosity and questioning through gesture. This is clearly learning by doing, with problem solving and scaffolding in action. The teacher moves around the room, checking what has been done, demonstrating, helping. Some of the women also move around. They proudly show me the parts they are making. Wires and electronics are everywhere. They point to a diagram in a notebook, nodding. One indicates a small pile to show how they do this over and over again. Very few of these women are young. All have a notebook to draw in and personalise. Verbal and written instructions are not useful among so many languages and with most women illiterate or semi-literate. Here they are testing out and making parts to create their own manuals. Here they are, putting things together as they go.

The night schools

The Barefoot College covers an extended area of many small villages. Social and environmental conditions are hard, comprising semi-desert (Fig. 4) and salt flats where encroaching salination is causing water and agriculture issues (Fig. 5). Poverty is endemic. Children are needed

Fig. 3 Women working with solar panels outdoors (courtesy, Jennifer Patterson)

Fig. 4 Barefoot College environment (courtesy, Jennifer Patterson)

Fig. 5 Barefoot College environment (courtesy, Jennifer Patterson)

to work outdoors in the fields with their families during the day. Illiteracy is common. For an education initiative to work alongside these demands, the Barefoot College established the Night Schools in 1975. This began as a government sponsored project with day and night schools.

One teacher clarified why day schools did not work: *night-time coming children only; daytime for parents help, agriculture* and *the grazing for animals*. During the day the children's parents needed them to help with the farming chores. Going to school during the day meant there was nobody to help produce food on the land. The need for schooling was also clear. The teacher said when schooling began at night, 117 children attended in just one village. So, when the night schools closed at the end of the initial project, many children could no longer attend school. He affirmed: *this is how the Barefoot College began the night schools*

Numbers have grown. Currently some 7000 children aged between six and 14 attend the Night Schools that take place in whatever buildings are available: small sheds and even cattle sheds, an unused room[13,14] (Fig. 6). The schools foster agency and democracy. Teachers come from the villages. It is the children who choose their teachers and who can also dismiss them. The children determine the need and viability for opening a new school by taking this forward to their parliament. The responsibility is not taken lightly. The Children's Parliament is an offshoot of the Night Schools and an elected body. Voting takes place every two years.

Observations

i. In a small shed, several children are doing maths, counting out loud. An older boy helps. The older child has come because his sister is here, and they do homework. They use rhythmic song patterns, chanting as they count. They ask many questions, crowding around, very excited to have a visitor. They ask if I have children. I say I have a son who is around their age. Their teacher is a shoemaker, a man who works with leather and does not speak much

[13] The Barefoot College website gives the overall cumulative education impact as 700 night schools; 75,000 children; 14,000 teachers in government schools.

[14] Barefoot College. Impact Figures. https://www.barefootcollege.org/solution/education/. Accessed 8th June 2020.

Fig. 6 A Barefoot College night school (courtesy, Jennifer Patterson)

English. The children giggle and want to show what they know. They show me books. I am told "they are writing stories about their lives". Among the younger children, I notice some older girls. I understand in the villages and outlying areas, girls often do not ordinarily go to school and are kept at home more than boys of the same age, looking after younger children and animals.

ii. In Tilonia I see objects being made for use in the Night Schools. Most are made of recycled materials, such as a toothpaste tube man. Many are instructive such as numbers cut out of used rubber flipflop soles. Some are also toys, frequently ingenious, involving rudimentary physics. The spring of an origami frog leads to spinning mechanisms using rubber bands and a mini artesian well with workings to lower a bucket. Writing books are made here, and high on a shelf I see rows of colourful voting boxes for the parliamentary elections (Fig. 7).

iii. The puppet makers have just returned from a visit to the Eden Project in the UK. They are constructing large puppets with bamboo, a new technique. They show me the fenugreek paste puppets they use in the theatre. This cast of characters represents everyone in the village; a typical community (Fig. 8). One puppet comes alive as he tells me he used to be a political newspaper and had not quite finished talking about what was going on, so he became a puppet to continue telling his stories. The puppet villagers enact plays about daily life. They sometimes act out scenarios, modelling behaviours to raise discussions that otherwise could be difficult or upsetting. This theatre is a tool that makes space for discussing everyday problems, stimulating conversations about reality as well as wider politics, ethics and morals.

iv. A primary school building at the centre of the Barefoot College in Tilonia is designed to conserve every drop of water that falls (Fig. 9). Roofs and surfaces tilt inwards. Channels run to huge underground tanks, blending modern and ancient water conservation practices. Crossing the school playground, I consider how the sloping roofs and ways in which all the water that falls is directed under the ground to minimize evaporation. I see a world map indicating the spread of peace: it highlights centres of hope and peace (Fig. 10).

Peace and justice are crucial in learning sustainability. Clearly integral to the lives of school children, they have been maturing here for some time. Details surprise. The key to the map in the playground (Fig. 11) brings in global relations, linking the BFC with other peace initiatives.

Social care workers—social and community health and wellbeing

A system of social care exists in this community, where in India this is not the norm. The social workers are

Fig. 7 Voting Boxes used in the Children's Parliament elections (courtesy, Jennifer Patterson)

Fig. 8 Characters of the village (courtesy, Jennifer Patterson)

hygienists and are almost all females. Some are disabled. They have studied with the doctor. They show young girls how to use and wash menstruation cloths. At breakfast while we eat together, they talk proudly about their role in their communities. Volunteer Italian dentists have taught some of them basic dental care. Many are studying acupuncture. I am invited to watch the dentists and observe an acupuncture lesson. Acupuncture involves

Fig. 9 Water conservation is built into the architectural design of the school (courtesy, Jennifer Patterson)

Fig. 10 Peace-map mural on the wall of the school (courtesy, Jennifer Patterson)

learning and practising on each other for six months. It offers basic understandings with a slow hands-on development of skills and a focus on common ailments. Later the teacher tells me:

> *…some of them have only got to standard eight in their education, which is quite low, I think that's twelve, fourteen, at school. And they've been trained, mostly by the doctors here, but actually [they] do it damn well, they really do. I've seen them do a class and they do it fantastically, they give information, and the students are really rapt. They are taking it all in. But it's basic healthcare really, and it's learning to identify. They know when somebody needs to be hospitalised…it's very much first line, but very basic healthcare…and they are in very tiny, very impoverished villages.*

Observations

i. Acupuncture: In a building in the old tuberculosis sanatorium, the door opens into a medium-sized room. The walls are painted yellow. A dozen women are sitting on the floor. Half have clothes pulled up and bare legs stretched out and the rest are looking for a point. It is fun. Learning generates a buzz of excitement, chatting, talking. Clearly everyone is curious, engaged and seems to be hugely enjoying what they are doing. A couple of men stand by a window. The teacher sits at one end. She claps her hands, and everyone listens. She is talking about acupuncture points, pointing with fingers on the leg, showing meridians. One of the men moves forward and translates. Then she gets up moving to a small group at the front, checking what they are doing, placing her hands lower on the leg, indicating finger widths above a hollow space, demonstrating. When she gets to the other side of the room, I realise both men are translators. They communicate and convey information differently. I notice a variable precision on positioning the point; a more didactic attitude towards the women. It's a feeling I decide to ask about later. The excited curiosity of earlier becomes

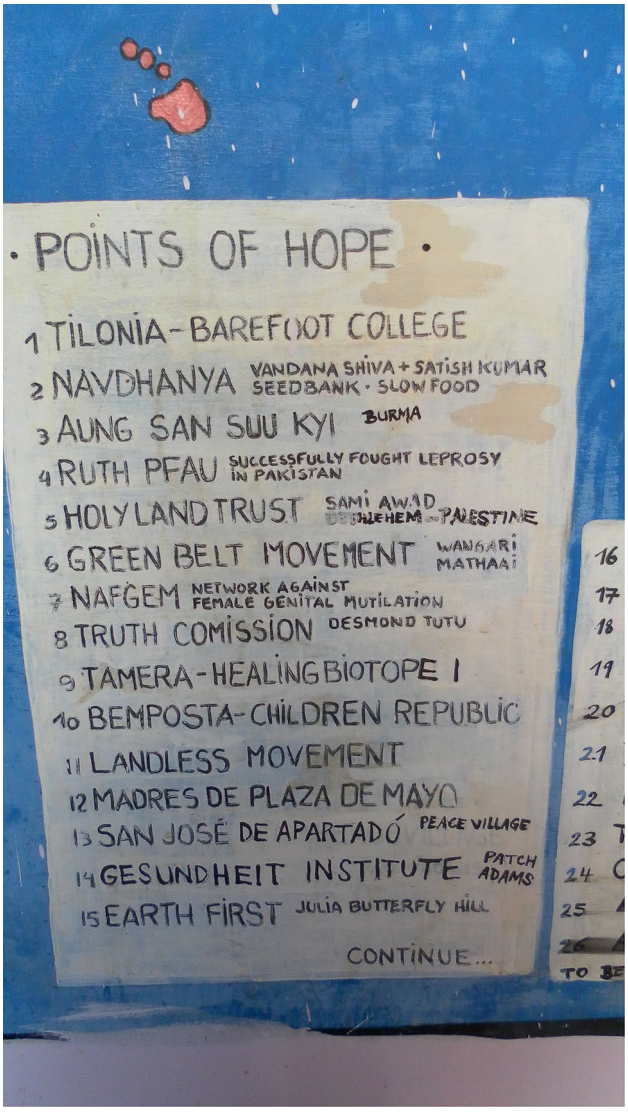

Fig. 11 Close up of key to map (courtesy, Jennifer Patterson)

Fig. 12 A social worker assists with tooth extraction (courtesy, Jennifer Patterson)

calm concentration. The students seem to mirror the confident movements of their teacher as she demonstrates what she wants them to know.

ii. Dentists: Three Italians have arrived, two male dentists and a female dental nurse who is the wife of one of the men. Chatting, they tell me that they are volunteers and trained the social workers a few years ago in basic dental hygiene, learning to recognise and treat small problems; simple procedures. They come back every year for difficult cases.

Later I check in and briefly observe a local woman who must have a tooth removed (Fig. 12). The tooth is black. She is a villager, in a lot of pain. I feel terrified for her, but she nods and smiles and does not complain. One of the social workers and the nurse assist. The dentist demonstrates and shows everything he is doing. This is a careful procedure.

iii. Breakfast: I see several women heading for the hospital. I recognise some of the social workers from the acupuncture class and breakfast. I ask the social workers what is happening. They tell me, these women are going for sterilisation. I ask why not the men? They tell me the men refuse to have an operation, so the women want to because they have enough children. Women are worn down by frequent pregnancies here; life expectancy is low; deaths in childbirth not unusual. Months later a scandal breaks out in the media about 'forced sterilisation in this region'. Without enough details to be certain, the only clear truth is that insider and outsider perspectives

> are very different. Against a reality of exhaustion, damage, and the dangers of continual pregnancies, this may seem a pragmatic choice especially given the Night Schools' Prime Minister's assertion that if I lived here then by my age, I would be a grandmother. I think this might also be my choice, faced with ill health and a shorter than average lifespan. Fertility is not private. It has become subject to a government population initiative, which pays for the operations. Population control is a global sustainability issue. I have no idea what sort of informed consent took place.

Interviews, themes and components across projects

First person narratives appear in *italics,* to highlight participant voices. They are knitted into the themes, describing relationships among teachers, students and within the community. These begin with gender and powerlessness, as participants discuss reframing local inequalities and reconceiving environmental expertise as knowledge. Next come key principles of teaching and of learning: practical applications, respect, and democracy in action.

Theme 1: dealing with on-the-ground inequality

Reframing power: gender, caste and child marriage

Gender inequality is a norm in villages served by the Night Schools where many women are illiterate. Girls are kept at home from an earlier age than boys and frequently do not attend government schools that operate in the daytime. This theme offers detailed consideration of ethics in relation to valuing children and how social issues such as child marriage are talked about and taught.

The local leader and teacher described the gender education challenges they experienced on becoming a teacher: *at that time there were sixty children in my school, night school, and maybe fifty were the girls.* In a separate interview, the teenage elected Prime Minister explains further: *Here in India, there are many illiterate women, and we have a problem.* What she has achieved during her presidency is remarkable. The parliament has: *started having classes for all the girls in more than twenty villages. Now they are going because it's nearby. And the second thing is that they open the more than fifty schools, the new schools…*She says there is a need for safe places where young children can ask questions and discuss issues that affect them: *I'm trying to give the chance [to] all the children of the member of the parliament, they can learn about the democracy, about the world in small age, so I call…a meeting, because they can discuss, they can be open in the meeting*. The Prime Minister is proud that her Parliament has declared *a child protection policy* and that making the child protection policy is a step so that *all the children… don't go in a factory or do any kind of drugs.*

The children who attend the Night Schools are among the poorest children in the world. In reply to a question about parents on drugs, slavery and child labour, the local leader and teacher commented: *Yes, here we are working with these kinds of children. I think they are very, very behind. Yes, but they have a strong tradition… [and this is] knowledge. So, we never reject what they are. We are trying to include… when they start in school, we will never reject or say, "you do this," never. They are very poor, they are very rude, they are not clean, … but they have something [to offer]. So, we respect them, what they have.*

Since everyone is an expert about how to survive in such a resource-poor environment, those in power need to respect the knowledge others have. The local leader and teacher explained: *in general, and in the outlying villages… there are many women in the village, and they are very strong.* [They say] *'we want to learn from you,' and 'you should see what we are doing here.' We want your suggestion [show]…do this thing, this thing, then we can learn with you.*

Another problem is caste. For one Night School teacher (himself a leatherworker and *dalit*[15]) caste was a critical aspect of teaching and learning. As he explained: *best teaching is—in Rajasthan there is a lot of caste "talking about caste".* A senior Night School teacher explained separately how BFC schools embeds positive changes: [In India] *we have too many caste system, but…in our school, children are sitting together, and they learn together, no caste system…in our school. So, if children are not coming in the school we can talking, talking, talking, about caste, but nobody's… learning. But…in our school, everybody's sitting together. So everybody's come together, sit together.* In other words, children are learning by doing; when they attend school and sit together, they are changing the caste system.

The puppeteers demonstrated a short piece on child marriage that they perform in villages and Night Schools. Understanding that children could be married from a very young age, it was clear how easily judgemental words such as "problems, issues" could cloud conversations. Towards the end of the interview, I asked the local leader and teacher how they approached a topic such as child marriage and he was pragmatic: [What we say is] *… you use this. I use this. And* [if] *you are to tell me that [child marriage is] … wrong…then I say you are wrong… If [someone] said that [child marriage] is wrong, they can't accept. If [the idea is] in the environment, then slowly they come and maybe accept.* It follows that the puppets can discuss the issue, in less confrontational ways and it may slowly be accepted. This strategy was clearly

[15] Dalit is a discriminatory term for people previously called 'untouchables' and classed as the very lowest outsiders beyond the four main Hindu castes, an outlawed system of hierarchical inequalities that despite political efforts still functions in rural areas.

communicated by one of the long-term Night School teachers: *[in] our school, we are talk about* [how] *children is marry in child days, but that children will grow, and he can* [choose]*not doing child marriage for his or her children… It's a very long time… still* [the child has] *strong feelings… Because him or herself is not [able to] reduce the system, because it depends on parents…Yes, so not appropriate, but* [we say to them, for] *your children, you can do it.* The hard truth is the children cannot change what they do not have the power to change until they become adults and can choose differently for their children.

The examples offer insights into the lives of the children attending the Night Schools. Understanding different perceptions is critical. The key point is that sometimes the teachers' expertise means not confronting existing practices. Instead, sometimes learning for change needs a longer-term view, so it doesn't damage the lives of those who are already especially vulnerable.

Gender appropriate criteria are embedded in teaching behaviours in the solar panel project. Women participants have been through wars, experienced rape, kidnappings, loss of family and husbands.

Balancing tensions: knowledge exchange in real lives–the uphill work of teaching new ideas

Understanding what reality looks like at BFC (especially for children) is critical for considering how projects work. All learning has been co-constructed with practices to strengthen and sustain knowledge-making in this community. Practices such as access to education, affordable energy, innovative provision and collection of fresh water, democracy in action through elections to the children's parliament, the promotion of peace, reduction of inequality of caste and gender, job creation in the villages and the overarching wider community of the BFC, have contributed to making life better in this area for over 40 years.

Some discussion of teaching differentiated BFC from government education norms. One teacher commented on how academic subjects become barriers unless they relate directly to students' lives. The Prime Minister of the Night Schools explained why this was important: *if we don't know about the air, clean, dirty, then we can't live our life… so we should know about it, yes, to know about the land… because it's very important, because we are from the farmers…, so it is very important to know about the agriculture, because this land is more productive, this land is less, this land* [is better for] *which kind of crops, so it is very important for us.* For the Night School-educated teacher, external knowledge is problematic from both learner and teacher perspective: *most important is their lives and their home lives… I am from the village, they are from the village…who will know more about the village, the animals* [than I?] *…Other teachers* [in government schools] *…they are different… they do not know more than us…*

One of the first teachers discussed how his father who had little formal learning used to teach many subjects including those he had never studied: *my father before teaching…Maths, language and… some subjects, social study, geography… …my father is only [government schooled up to] fourth class.* Yet he taught local children many subjects: *Many, many subjects come from the family, and society… arts… architecture.* His point is that academic subjects originate and are entwined with human life and culture.

Highlighting another aspect, the solar panel teacher similarly explained: *I'm not good in study. I… Yeah, but I am very good at doing.* Indeed, a western knowledge-based curriculum is challenged in a world that refers only to lived experience. Another long-term teacher explained the dilemma: *I do not believe the earth is round.* [If] *teacher is saying the earth is round, that time I am silent… I can't say to my children, 'the earth is round.' I understand that* [this is because] *we are not seeing* [this], *so I not believe in my heart.* She explains that truth matters, therefore she can only teach what she knows from life experience: *They [children] are not artificial. So, it is very, very, jealous* [precious] *thing to work with children, because you shouldn't be, you should never be artificial otherwise you can't [work] with the children.* This is existential view is quite different to Western mainstream educational thinking.

Another area of tension centres on different forms of education and their value to the community. A long-term teacher said: *…they* [the govt] *think the untrained teacher is not able to teach*. She perceives an underlying attitude toward BFC schooling as substandard. Interviews also implied formal education was not only different and problematic, but might cause damage, leading to loss of livelihood and potential unemployment. A local leader and teacher, formally educated, explained: *educated person, educated people, educated community, is the biggest problem for the children… And all the educated person, they want to make child what <u>they</u> want. [Educated people] they make a line… go [to the government school] and—he don't know about whole village, he is in the village, but he don't know. [They say] go to school… and make the whole future. But the labour, the farmer … their children never will be, no. The educated person, their children will be.* This teacher means the truth on the ground is that formal education isn't liberating for the poor, but only for those who already have some mainstream education and resources. It will not offer a future for the poorest children in the village.

This observation confounds Western views of ethics and equity amid extremes of poverty. Education that will help survival is welcome; education for the sake of it, is

not, which relates directly to the next theme that covers practices of teaching and learning.

Theme 2: practices of teaching and learning (T&L)

This broad theme is characterised by three key elements: concrete knowledge; respecting the individual; and democracy in action—learning from one another.

Concrete knowledge: doing is learning and knowing how to do engages confidence

The solar panel teacher discussed how students are given a book with diagrams numbering all components that they can label and annotate to create a personalised training manual. They take this home for reference. He explains the process: *There are some standard things… first do this, second do this, third do this, fourth do this.… [then]… put this thing, somehow, they put the right thing in the right place…after they look at [it and check], OK, make, solder and everything… [It's]…Not easy, not easy… First month, just to be familiar with the… colours…* [these indicate the order of processes of assembling the panels] *the name in English, Hindi, Spanish… their own language,* [the] *colour, blue …* When the learner has not understood the process, the paired system supports: *If there's* [a problem and they get stuck] *… then we will try and tell friends* [the paired learner from their village] *…So that they get another teach, because* [when it is something] *they can't understand… their friends… explain.*

I observed a hands-on demonstration of locating exact acupuncture needling points on the body in an acupuncture class and later interviewed the teacher. In respect of learning by doing, she emphasised the practical nature of the curriculum for her social worker's class: *it's got to be very practically based… a lot of the very in-depth traditional Chinese theory* [is] *just not necessary in practical terms…we follow the same treatment techniques, but you don't need it, so… we cut a lot of that out. The World Health Organisation has approved a course, and…it's absolutely in line with their suggested requirements.… Point location's very practical. They are learning… what each point does, what its relationship is to other points… they are actually doing something physical and hands-on that they can be checked on straight away, and then look up with this big smile, and say yeah, I got it right…*

In the Night Schools a long-term teacher explained how storying and conversations are important: *Our methodology is effective for children.… we are not… going by book by book and lesson by lesson… we also use puppetry.* This teacher described a wider curriculum: *We go outside also… And see the hill, and see the pond, and pick something. Our system is not by books…Things can be put in the paper and ask the children, what do you think, are you understanding it? … we can read and write newspaper… story books… other things…* [In] *one project for three months… the small children is only [writing] what is your father's name, how is your family, what are you doing, what is doing your mother? Small things. But the bigger class students… they are about fourteen years, learn about our state… how many languages…and agriculture… growing something. The tree protection and everything.*

Teachers discussed children's different abilities, different ways of learning and different interests, as well as the need to pace and break activities as part of how learning works. Scaffolding and modelling, but especially motivation, encouragement, and empowerment of learners through autonomy and self-realisation, inform teaching across all the projects. The Solar Panel Teacher commented: *we encourage, teach… Support.* The Acupuncture Teacher said: *I am very encouraging, because I'm so chuffed when they do things well that genuinely I praise them a lot…* And the Headteacher and former Night School Teacher said: *I can do these things, just… support… And motivate, motivate. Empower them.* [Show them and tell them] *'you can do* [it] *yourself'.*

For teachers, the rewards of getting it right are reflected through the students' enjoyment, not external criteria such as exams. One long-term teacher described practice: *we are…* [making] *space for children,* [we can] *see by eyes the children are doing some good things.* The criterion for success is children's happiness: *our success is our classroom, and our children is happy with me*, so this *is criteria for successness…Happiness, children's happiness.*

In the solar panel and acupuncture projects, acquiring a new practical ability brings a new self-transcendent confidence in using it. The acupuncture teacher suggests knowledge that is embedded by working with the hands can easily be checked by the learner… *I find they really grow in confidence, and often they are really, really, nervous to start off with, usually. About pulse taking, about putting needles in… I think the fact that it's hands on; they can do something, they love that.* For her, such confidence measures success: *it's the reward of seeing somebody gain confidence, grow in themselves, become a very good practitioner. When I see one of my students taking a case and treating it with compassion, with professionalism, with accuracy and diagnosis and treatment I mean, I well up. I am absolutely moved beyond words.*

Relating: respecting the Individual

Respect for others and service by leaders balances the community. The Headteacher discussed welcoming a new student:

…when the children come with their parents here, I am friendly, nice, so the children find a new friend from the schoolteacher. For the long-term teacher the role is more familial: *it's very friendly… I live in same village, so I know children, parents, and every family… I'm not teacher for*

children, I am elder sister. This is about working together. It is about relational values.

Further, teaching is a question of service. The Headteacher explained: *Teachers' work is very, very important… True teachers, real teachers… are servant* [of the children]. In a separate interview the local leader who has a BA in mathematics explained the importance of being able to help his community, and the insights he developed by attending school away from his village, gaining perspective on its culture: *I was in college, I used to go from my village to college by cycle… At that time village people select me as a night schoolteacher… First time I go to training for the night schoolteacher… I realised where my village is; what I can do for my village; what is the main problem of my village; that before that I never see… As to like caste, religion—they had a big problem, I never knew it before…*

For the male solar panel teacher working with a class of women students, relationships are different. Professional boundaries are clear, and socialisation is not appropriate: *we never contact directly. Someone should be between us and—so they are regularly in touch, and inform us,* [if] *they need something something…*[if] *there be problems. They support them.*

Democracy in action: learning from one another

It is not only learners who learn. Teachers emphasised the key importance of listening. Real-life applications offer a pragmatic touchstone for considering outsider ideas or knowledge; teachers learn from the learners and from the environment.

The long-term Night School teacher said: *I can't know about animal husbandry, but our children know about animal husbandry, so I also learn with my children… [I learn about] child behave [behaviour] and child emotions and everything is learn with children.* The Night School teacher confirmed he had learned: *more than in my house…* concluding: *if they can learn, I can learn….* The local leader explained the introspective importance of listening, to check whether something is worth knowing: *So, I am listening… and thinking what you are saying, whether I should follow… what you are saying in my life…* [If] *I got a good example, or good relation* [to] *what you are saying, yes… Otherwise no. I listen to you there and I do my own work. When I listen and I relate in my life what you are saying, it's important* [to me].

Participants' aims and dreams ranged from getting a world map for Night School children, to creating a classroom. In the middle of my academic research and list of semi-structured questions, it was the quietly spoken *dalit* former leatherworker teaching in a small shed who stood up, thumped his chest and left me speechless: ***The classroom comes from the feelings. Teaching is the heart.***

Discussion and evaluation of learning sustainability

The thematic analysis gives depth to the three projects and illuminates how complex challenges and problems of sustainability and unsustainability necessitate different ways of thinking about knowledge creation systems [32]. It was important that the learning sustainability evaluation took place after these initial data analyses, because they evidence the adaptations and depth of learning taking place within the three projects. The discussion and tables that follow, present frameworks that systematically and cumulatively evaluate and evidence learning sustainability.

At BFC, project designs are adapted to community and learner needs, follow spiral feedback processes like Kolb's [33] experiential learning cycle. Interview data demonstrated how core organisational values of equality, collective decision-making and self-reliance underpin pedagogy and project design. Evidence of interrelated designs demonstrates applied systems theory. Hager [34] offers a theoretical underpinning for environmentally integrated learner attributes and competencies based on performance and behaviour. Table 2 characterises the teaching and learning observed at BFC and groups these by project. It highlights examples of BFC practice demonstrating a wide range of pedagogies, development of learner attributes, BFC teacher leadership styles despite physical teaching spaces.

The 17 UN SDGs are interlinked. The challenge of obtaining a more in-depth understanding of what sits behind sustainability at the BFC involves mapping learning against all the sustainability measures involved (Table 3). The ways of knowing framework analysis discussed earlier in this article, establishes the premise for organising project data into different forms of knowledge-making as transformative ways of knowing [35]. Table 3 maps these against the 17 UN SDGs.[16] It includes evidence of transcendence as the metacognitive awareness of the learning process. Evidence of transcendence is also seen in awareness of global principles applied locally. Placing learning in harness to real world outcomes, Table 3 evaluates the relevance of projects for the UN SDGs, establishing that BFC learning demonstrates learning sustainability.

This analysis of interviews and project narratives makes clear that BFC learners address sustainable knowledge-making and learning practices for almost all SDG goals.

BFC projects aiming to improve community sustainability mainly address basic human needs and rights through social sustainability. However, this does not happen in isolation; rainwater harvesting, solar panels conserving fossil fuels, and tree protection are taught

[16] See 10. Available at https://sdgs.un.org/goals.

Table 2 Summary of project characteristics, learning attributes and competencies based on Hager [34]

Project	Main characteristics	Pedagogy of learners	Development of learner attributes and competencies	Teacher leadership style	Space and needs
Solar panel mamas	• Practical Apprenticeship model • Group work • New knowledge—applied skill—6 months duration • No common tongue • Repetition/rote • Visual mnemonic • Works or does not (function as assessment)	• Learning by doing • Peer support • Peer memory • Self-correcting feedback loop • New knowledge—changing social status • Underpinning ethos—collective global and social sustainability	• Communication • Collaboration • Cognition • Problem solving • Decision-making • Learning to learn—metacognition • Global citizens • Social responsibility • Self-actualisation • Solar literacy (engineering)	• Modelling • Skill in making • Scaffolding • Repetition • Slow steps • Encourage • Positive outlook	• Workshop and equipment • Funding for equipment • Barefoot teacher • Learners: international peer groups of women; or local women
Night schools	• Age/stage applied model • Subject relevance to lives • Models sustainable practices and social justice • Sensory materials • Access to literacy and numeracy • Educational toys • Projects • Storytelling • Teacher assesses by student engagement • Students choose teacher	• Empowerment and confidence • Rote Learning: singing, chanting • Learning together (friends, siblings, different ages) • Play • Learning by doing • Models new social knowledge • Place in the world—citizenship • Knowledge of power and responsibility (democracy).	• Cognition • Communication • Socialisation • Creativity • Applied reading, writing and numeracy • Metacognition • Mental pathways • Listening skills • Democracy • Global citizens • Social citizenship • Environmental citizenship • Respect; Value • Self-actualisation	• Relational • Child-focussed capability • Service to community • Story telling • Boundaried • Modelling equity and ethics; • Subtle modelling of social change • Motivate • encourage	• Hut, shed or room. • Barefoot teacher • Learners—children • Funding minimised: distributed resources
Social care workers	• Adaptable model: adding new skills to existing • Health literacy • Employment—jobs in community • Group work • Supports women building local skill development • Addresses gender imbalance	• Learning by doing • Team skills • Peer support • Peer memory • Builds on existing skills • New knowledge • Empowering—changing social status	• Communication • Health literacy • Problem solving • Decision-making • Metacognition • Social relations and responsibility • Self-actualisation • Empowerment	• Practical expertise—(in-house and voluntary) • Modelling • Scaffolding • Self and Peer check mechanism • Boundaries of skill • Respect	• Variable spaces, needs and equipment • Learners—gender dependent • Expert Teachers • Skills • Variable funding

as helping to offset climate change, although these are mostly in service to providing power and clean water in remote villages. Design elements incorporate systems- and future-thinking, linking local and global issues and alignment to the UN SDGs. Learning sustainability in these areas is highly effective, potentially illustrating forms of best practice. The cumulative effect of building social sustainability is entwined with individual empowerment and self-actualisation; a self-affirming mechanism of being valued and employed within one's community.

Another important finding is the responsiveness and flexibility of the BFC, so that it enables its participants and workers to develop from novice to expert practitioners, to a point where the 'students' become teachers and leaders. In this way the baton of sustainability is passed on across generations. This solution-orientated model fosters the creation of new knowledge that is responsive to changing contexts, available resources, local and environmental pressures.

With a focus on learning, the data show an evolution from novice to expert practitioners, one where the *dalit* can become the community expert. Crucially, transformational learning [36–39] is inherent in the process. Developing expertise leads to new ways of seeing problems and solutions. Table 4 sets out the process of evolution from novice to teacher to expert, critical for individual self-actualisation.

The Barefoot College approach to learning sustainability strengthens connections between people, environments, and communities. It is a values-based approach in which ultimately, the local learner holds the power. It is not about the best ideas of the organisation's leader but those of the real experts, namely, the real leaders on the ground, the people who hold the knowledge and understanding that the project will enhance and transform their lived reality, their "home lives" and the world in which they live.

A critical point is that the powerful discourse of differentiation evidenced in the interviews quietly asserts a

Table 3 Framework analysis of themes mapped as ways of knowing against numbers corresponding to the 17 UNSDGs

Knowledge Making	Head	Hands	Heart	Transcendance	Total SDGs by project and number
Project; Data	*Thinking; concepts; ideas; invention; (systems joined up thinking; thinking for community and ecological sustainability, problem solving)*	*Doing; practices; making; trying out*	*Being; beliefs; values; feelings; associating;*	*And metacognition: personal, individual. Individuals communicate learning sustainability through knowledge-making about SDG topics and beyond the immediate environment*	*Notes main SDGs in project by 1–17 SDG number*
Solar panel mamas (7; 13)	Wicked Problem: To provide cheap, clean energy and reduce poverty (1;8;10;11). Systems thinking (design). Futures thinking	Training = learning by doing (4); Making and repairing equipment (9;12); Decent jobs (8). Multinational (17)	Revaluing impoverished women (5); Observations: laughter; shared happiness	Learning to learn—demonstrates conceptual learning and metacognition. Observations: making mnemonic books; Multi-national collaborations project and trainee engineers (17); project continuity (16)	1; 2; 4; 5; 8; 9; 11; 13; 16; 17
Night Schools (4)	Wicked Problem: Poverty; inequality (Caste system); gender inequality; systems and futures—appropriate education for all (4; 10). Building stronger communities and institutions (11; 16)	Learning by touch. Artesian wells (6, 11, 13); recycled flip flop numbers (12); marking maps (16); Voting boxes	Equity (4;5;10). Shared values—democracy (16) access, sitting, communicating (10); *dalit* teachers (10; 8)	Observations: writing stories about their lives (3) Children's Parliament (16); interview with president; travel to Sweden (17); locating their place in the world	3; 4; 5; 6; 8; 10; 11; 12; 13; 16; 17
Social care workers (1; 3; 6)	Wicked Problem: No health care; poverty and lack of jobs (1;2); fractured community infrastructure; (11; 16). Systems improvement	Observations of Italian dentistry; Brit acupuncture by external volunteers (4; 17); informal menses discussions (5)	Health Care in the community (8;2); valued by community (11;5)	Empowerment and agency in decision making (3). Making diagnoses and treating patients (3); and informed decisions about own care (3;4)	1; 2; 3; 4; 5; 6; 8; 9; 10; 11; 16; 17
Theme-equity 1.1 power on the ground (5)	Wicked Problem: Gender equality (5); futures thinking	Night schools (4). Supports equal access (5); female president (4); climate action in everyday life (13)	Supports future values ie: Equality in the future (10; 11)	Storytelling; puppeteers Valuing and listening to children; children's agency at the centre (16;10); All Teachers learning (10)	4; 5; 10; 11; 13
Theme-Equity 1.2 balancing tensions (10)	Wicked Problem: Reducing inequality with wellbeing in mind (10; 3).	Making things together; being together (10)	Respect for each other (11; 16)	Stories for the future; puppets; future leaders (11; 16)	3; 10; 11; 16
Theme T&L 2.1 Concrete knowledge (4)	Wicked Problem: Poverty and hunger (1;2) (all projects) (3;4;5;6;7;8;9;10;11;12;13;16). Rural depopulation. Literacy, numeracy. Maintaining community (11)	Trad and tech; (solar power; water desalination; rainwater harvesting and storage (9;6;7, 17). Climate change (13). Health (3)	Values are the same across projects; to sustain living well together (16).	Seeing problems and acting on this. Values shared and discussed in interviews	1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 13; 16; 17
Theme T&L 2.1 respect for individual	Wicked Problem: caste, child labour and inequality (5; 10)	Actions and jobs (8;10;3; 9) External partnerships (17)	Love for others. Communication (3; 10; 11)	Teaching from the heart (3). Listening and learning from one another (17), progression (10; 11; 16)	3; 5; 8; 9; 10; 11; 16; 17
Theme T&L 2.1 Democracy in Action	Wicked Problem: poverty (1); lack of education (4); agency (3); inequalities (5;10)	Financial transparency (12) Elections and voting; Local leaders (10); Private spaces; (16)	Children select teachers they love; being together in community (11; 16)	Children's Parliament (17). Listening and learning from one another (17). empowerment (16). Modelled leadership (10)	1; 3; 4; 5; 10; 11; 16;17.

reflexive knowledge of resistance to cultural 'normalisation'. Educated people come from a perspective external to local children's lives where the earth is not flat. One example talks of *this educated person…[who] is the biggest problem for the children…* The argument is that an educated person takes these children's needs out of context; they cannot see their real needs because they don't experience their lives. A further message about knowledge brokerage is that external ideologies do not work here; they are oppressive. Reflecting on theories of culture, this can be read as a statement of identity set in a refusal to 'mimic' aspects of postcolonial nationhood [41, 42] which frames the identity of this case study. It is a timely reminder that I (the researcher) cannot fully 'know' the experiences I present here.

BFC sustainability discourse demonstrates deep knowledge of ethical, global, social, environmental, and economic practices phrased in a language of lived experience. In learning sustainability, the process of addressing fundamental human needs is coupled with learning

Table 4 Adapted Dreyfus 5 stage 'Novice to expert practitioner' model [40]

Stage	Characteristics
1. Novice	Rigid adherence to taught rules or plans Little situational perception No discretionary judgement Knowledge is decontextualised, ie: learning by rote
2. Advanced beginner	Guidelines for action based on attributes or aspects (global characteristics of situations recognisable only after prior experience) Situational perception still limited All attributes and aspects are treated separately and given equal importance
3. Competent	Able to see multiple components or aspects Now sees actions at least partially in terms of longer-term goals Conscious, deliberate planning Standardised and routinised procedures
4. Proficient	Sees situations holistically rather than in terms of various aspects or components Sees what is most important in a situation Perceives deviations from the normal pattern Decision-making less laboured; Using maxims for guidance, whose meanings vary according to the situation
5. Expert	No longer relies on rules, guidelines, or maxims Intuitive grasp of situations and decision-making based on deep tacit understanding Sees overall 'picture' and alternative approaches holistically. Analytic approaches used only in novel situations or when problems occur Vision of what is or may be possible

something new that nourishes and augments community. The interviews, the projects and the approach align inseparably with the local ecologies in which they originate. The Barefoot approach to learning sustainability is rooted in principles of social justice. It aims to resist universalising or homogenising tendencies and it will 'look' different in a different environment.

BFC learning sustainability has relevance for HEIs and learning communities across the globe. Academic traditions originate in the resource-affluent global North. A colonial worldview permeates Western research and academic education culture, comprising complex and often unknowable layers of language, methods and assessment wrapped up in the blindly dominant intellectual discourse of its origins. Academic perspectives employed for evaluation and critique are neither neutral nor objective. Awareness of inherent bias is crucial, or value judgements risk being based on a faulty premise. While bias can never be entirely eradicated, awareness is a step towards seeing and respecting another way of educating. Notwithstanding academic bias, this research identifies and translates the cognitive, individual, and social value of learning sustainability at the BFC. Indeed, such characteristics are especially relevant for HEIs balancing a traditional academic focus on individual knowledge-based learning, and increasingly aspiring to embed agentic engagement in the form of sustainable community service learning [21].

Reframing power by prioritising knowledge that is practical and contextual is a BFC approach centred on learners' engagement, that leads to fulfilment. Much of this is achieved by working with women, a significant difference from other learning systems. Empowering women to improve gender equality ensures the continuity of a nourishing relational and equitable balance in social learning that respects community knowledge and needs, something frequently lacking in the affluent North.

Learning sustainability extends the social practises and situated experiences of the organisation. Their communities precede and enact the globally constituted principles of ethical behaviours for sustainable development at the centre of the UNSDGs. Interview data indicates how the BFC identity as a learning organisation moves beyond Lave and Wenger's evolving concept of communities of practice [43, 44]. The people here have created partnerships and are proud of being part of a global community [45]. Adults and children show how what they do contributes to better energy, to peace. They are proud of their contributions to improving local and global lives. This speaks of the cultural humanity of the people in this place. The takeaway message is that people are at the heart of transformation and change.

External influencers need to have local relevance. When they do, they are reinforced by a pedagogy leading to learner self-actualisation and empowerment. Learners in turn support organisational ethos, so practical applications move beyond immediate local environments to inform new global principles, demonstrating "learning sustainability" in action. These cyclical effects are illustrated below (Fig. 13).

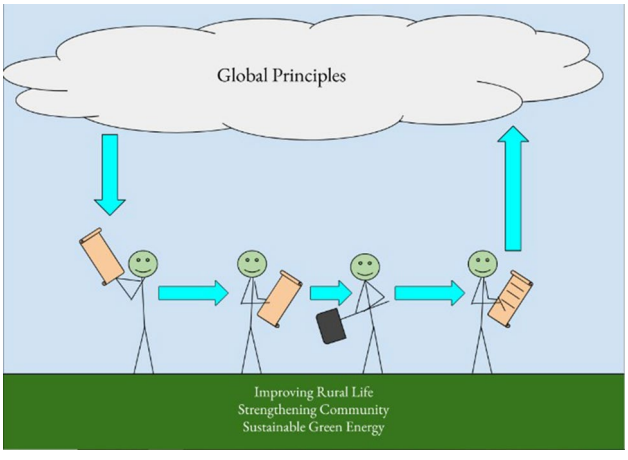

Fig. 13 Global principles are locally applied and tested. New learning is reported back

Conclusion

The research question sought to identify and define the characteristics and impact of learning sustainability at the BFC, using the 17 UN SDGs as a framework to show where the data demonstrated evidence of sustainability. We found that individuals felt proud and fulfilled, willing to share their lived experience and the change and transformation they were had made to their community. Working qualitatively with language and meaning to investigate what learning and teaching means came with limitations, but it was informed by individuals in the Barefoot College community speaking for themselves about their experiences of teaching and learning.

Learning sustainability at the BFC involves recognition of the nested nature of the individual within the community and within the wider world. This recognises the critical dependency of the wider world upon partner communities and of communities upon individuals. The impact on learners at the BFC is created through the characteristics that define its applied approach to learning sustainability:

i. The analyses of projects and themes demonstrate transcendent learning at the highest cognitive levels with values involving consistent participant wellbeing, agency, self-actualisation and community transformation. Everyone is valued for the knowledge they have [46]. Thus, social learning is critical for supporting equity and reframing existing relationships. Importantly, the relevance of external knowledge is determined by the learner(s).
ii. Power is distributed so that leadership works from the bottom up. This means change needs to work with existing systems and place people at the heart.
iii. Project design is deeply thought through and evidences an interconnectedness of parts commensurate with systems theory. Projects are networked and rooted in local conditions. Deep thinking evidenced in designs also incorporates flexibility and futures-thinking. One characteristic is that the global principles of sustainability that underpin these projects, emerge from the extreme social, environmental and economic conditions in which this community lives. We need to pay heed to this knowledge.

In the introduction we considered Elkington's [9] question on whether the BFC model could be applied elsewhere. We consider the model is transferable. Its relevance for processes, local engagement, agency and the creativity of people responding to real needs is clear, but it will look different in a different place. Learning through witnessing ethical and genuine practices in one of the most deprived areas of the world, prompts reflection and comparison. Here, learning sustainability embeds solutions that address local and global issues. Rich in resources, but burdened by capitalist material culture and autocratic institutions, the Global North lags far behind. Individuals and communities change faster than institutional frameworks. Bearing in mind the work of John Stuart Mill (1806–1873), we conclude that we must act within our communities, creating partnerships to uncover what is possible in our own culture [46]. This is the work that is needed. At the BFC, operations actively seek to promote the model. Changes in the outward-facing website aim to teach what has worked at a local level. More recently, a complex international committee with local representation promotes the BFC approach and sustainable solutions globally. Time will tell whether and how this next phase will deliver. Whatever it looks like, it is fitting that educated audiences in the Global North listen to and think about the experiences of what works in the Global South.

Reflecting on the data collection and interviews, I (the formally educated lead researcher) felt humbled by the openness of people and the knowledge they shared. On my arrival at the BFC, the local leader who was to accompany and translate asked me, "what can we teach you?" At the end, I asked the same person what he had thought of what participants had said. He paused and said what had surprised him was how everyone, even locally powerful people, had spoken of their feelings, of things from the heart. This taught me that something unexpected had occurred. That unexpected finding was people's happiness in being part of the BFC. This taught me everything about the people with whom I had been privileged to share time.

The final takeaway message is breathtakingly simple. It is that the richness within each of us provides the sustainable solution. Sometimes our vision or thinking needs to change. The practices at the Barefoot College illuminate how the community can be nourished. Such community principles with earth in mind [47] align with those expressed by Vandana Shiva [48, 49] and others.

The BFC presents a model in which the needed change is found in the ways that people relate to one another. It demonstrates a shift in power relations towards community agency and demonstrable happiness. At its heart lies the philosophy of Bunker Roy:

> *…This is the only sustainable way out…increase dependency on each other rather than outside… First, see what you have within. What you have within is so rich, is so deep, so profound, that you don't really need to go outside.*

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JP contributed project design, data collection, initial and secondary analysis and prepared the manuscript and corrections. FK contributed novice to expert practitioner and leadership concepts and verified and edited initial and secondary analysis. Both authors wrote the discussion and reviewed initial and final drafts. JP finalised the article.

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Data availability
Data generated during and analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
Approval for the project was granted by The University of Greenwich Research Ethics Committee and included information about the study, semi-structured indicative questions and consent forms for participants who have been anonymised in the study.

Consent for publication
Consent to participate included a statement on anonymity of participants and consent to publication. Permission was given for taking photographs with the understanding these could be used in publication.

Competing interests
None.

Photographic credits
All the photographs used are copyright of the lead author and were taken during data collection with permission of the Barefoot College.

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