From Education for Sustainable Development to Education for Environmental Sustainability: Reconnecting the Disconnected SDGs

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Abstract

Education and environmental sustainability are issues of great importance. Both are intertwined and cannot be meaningfully discussed in isolation. Nevertheless, it is education that serves the cause towards environmental sustainability. This would suggest that education in itself is incomplete if it fails to firmly integrate environmental sustainability within its agenda. A closer look at the SDGs suggests that the notion of environmental sustainability is not expressly integrated within Goal 4 on education ("Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all"). While numerous points elaborate the individual targets, SDG Goal 4 makes no single explicit reference to any concern related to environmental sustainability. This raises a number of important questions. If environmental sustainability is not even embedded within the goal, can education be expected to deliver environmental sustainability outcomes? Do the SDGs, in aiming for "sustainable development", predominantly refer to economic development, merely sustained over time and space? Are policy makers and development professionals in danger of inadvertently divorcing the inalienable union that education has with environmental sustainability? Is the sustainable development agenda risking diluting the fundamental basis—environmental sustainability—upon which it was originally articulated (Brundtland Report in Report of the World Commission on Environment and Development: Our common future 1987)? These are enquiries the research addresses. This paper is informed by an analysis of expert literature,

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including a systematic keyword search, and field research conducted in Bangladesh.

Keywords
Environmental sustainability · Sustainable development · Environmental education · Behavioural change

1 Introduction

Education and environmental sustainability are strongly bound to each other by a cause–effect relationship, whereby the former is typically understood to lead to the latter (Howe 2009). In this sequence, education serves as a means towards reaching environmental sustainability ends. While in theory, this may seem to be a plausible and logical induction, in practice it proves to be a much more unstable relationship.

Recent decades have seen a gradual shift in emphasis from environmental sustainability (ES) to sustainable development (SD). This new focus on SD with its triple bottom line approach to harnessing well-being, encapsulating (1) economic; (2) societal/social; and (3) environmental pillars, increasingly obscured the causal relationship that education has with ES or SD at large. This shift could be explained at the macro level in light of the split among economists between those favouring mainstream neoclassical economic model and those believing in ecological economic modelling. The former begets environmental economics with its consequent reliance on technology and modern means to lead to economic development with a sensibility to issues of sustainability vis-à-vis ecological economics with its stronger emphasis on the question of how to maintain sustainability.

While economic and concomitant social outcomes led by technological advancements are understandably attractive contemporary measures of modern quality education in both international and national arenas, particularly with respect to gender balance (Sachs 2012; Kates et al. 2005), they should by no means justify a progressively diminishing emphasis on environmental issues.

The result of this shift of focus and the consequent ambiguity it inflicted upon the environmental dimension gave birth to two models of education for sustainable future at large. One is dubbed environmental education (EE), and the other is an education for sustainable development (ESD). The relationship between both models of education has been the focus of discussion in the literature (e.g. Cartea 2005; UNESCO 2009). This debate about whether EE is part of ESD or not has been quite strong (Pavlova 2011). The coexistence of both models of education to address environmental concerns reflects the main assumption of this study, namely that the value of the "environment" in the realm of sustainability has weakened or at least become more ambiguous with respect to its influence on sustainability,

particularly since its integration as one of the three pillars of SD with its two other pillars (economy and society).

This paper is organised into seven sections. Section 2 introduces methodological approaches and analytical considerations. Section 3 then reviews relevant literature and offers a broad chronological discourse on the evolution of environmental education, including the gradual shift from ES to SD. It also highlights important implications that this shift in focus has had on environmental education. Section 4 then follows this same path more narrowly by taking a closer comparative look at both the Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs) with respect to environmental sustainability education.[1] Section 5 reports the main findings of this study and offers an analytical discussion of questions raised in the abstract with their relevant implications on education. This section also proposes and introduces a new conceptual model that integrates multiple modalities of education, incorporating *Formal, Informal and Non-formal Education for Environmental Sustainability (FINEES)* as a means of reinvigorating a more holistic focus on education that encapsulates both SD and ES. Section 6 applies the FINEES model to Bangladesh as a naturalistic case example of the theory in practice. This is followed by Sect. 7, which offers a concluding synthesis of the paper's main points, as well as a shortlist of recommendations for policy makers.

2 Methodological Approaches and Research Limitations

This research paper is based on a review of the expert literature, particularly policy-related documents. It leans towards a deductive approach in testing the theory and hypothesis that the influence and weight of the "environment" on notions of sustainability have had an overall diminishing role in education, progressively weakening across much of the global political landscape from ES to SD.

Quantitative data used in this paper are derived from a systematic keyword search that queried UN policy documents for search words of interest, including ES and SD. This keyword search is limited in scope to all 23 English languages UN Human Development Reports (HDRs) published to date (from 1990 to 2015). These reports were chosen because of their global influence and appeal.[2] Such focus could also be viewed as a limitation. The justification to limited focus on the HDRs, however, is the global view the paper attempted to take in order to construct a general universal model that could be appraised and applied in different contexts.

To construct its model, the paper was informed by the systems-thinking approach used in management discipline to scrutinise the different components, the linkages and interactions between those components (Cabrera et al. 2008). Here, the

[1]Millennium Development Goals (MDGs 2000–2015) http://www.un.org/millenniumgoals/ and Sustainable Development Goals (SDGs 2015–2030) http://www.un.org/sustainabledevelopment/sustainable-development-goals/.

[2]UN HDRs were accessed online at http://hdr.undp.org/en/global-reports.

systems looked into are primarily ES and SD. As a process-based system, education is used as the mediator variable that explains or rationalises the space of interaction between the system of ES first (as the predecessor of sustainability with a unique emphasis on environmental issues), and SD second (as the successor and mega-system with its three pillars—economy, society and environment). Education as a system was classified into three categories ranging from formal to informal and non-formal.

This study is also informed by Ph.D. research conducted in Bangladesh in November and December 2011.[3] The detailed method of data collection is available as Chapter "Corporate sustainable strategies in Dom Pedro I industrial road axis, São Paulo, Brazil" in the unabridged Bangladesh case study (Luetz 2013, Sect. 5.3) and also elaborated in similar case study research (Luetz 2017).

3 Broad Chronology on the Evolution of Environmental Education (EE)

Environmental education (EE) is not a matter of contemporary discussion only; it can be traced back in time. The field is quite rich with a tumultuous history (Carter and Simmons 2010). From as early as the eighteenth century, it has been ingrained in political philosophy of the Enlightenment thinker Jean-Jacques Rousseau (1712–1778), who both inspired early forms of environmentalism (LaFreniere 1990), and also emphasised the value of education as long as it revolves around the environment and away from the gated communities (Gianoutsos 2006). A few years later this foray into early forms of EE was followed by the Swiss naturalist Louis Agassiz (1807–1873), who is known to have encouraged students to "study nature, not books" (McCrea 2006).

Leaping forward in time for another major juncture for EE, in 1970 the world celebrated the first Earth Day on April 22nd (Earth Day Network 2016). The event invited the world to "hold hands" for environmental issues. In 1971 the North American Association for Environmental Education (NAAEE) was instituted to promote environmental literacy through EE programmes (Disinger, McCrea and Wicks 2001). In 1972 came the United Nations Conference on Human Environment, which was held in Stockholm. The Conference deliberated the role of education for ES. It is worth mentioning that education and its relation to ES were referred to in the declaration of the Conference two times (UNEP 1972), articulated under Principle 19:

> Education in environmental matters, for the younger generation as well as adults, giving due consideration to the underprivileged, is essential in order to broaden the basis for an enlightened opinion and responsible conduct by individuals, enterprises and communities in protecting and improving the environment in its full human dimension. It is also essential that mass media of communications avoid contributing to the deterioration of the environment, but, on the contrary, disseminates information of an educational nature on the

[3] A short background video to the Bangladesh field research was published by UNSW Australia on 18 February 2015 and may be accessed at https://youtu.be/PBJeelgnadU.

> need to project and improve the environment in order to enable mal (sic) to develop in every respect.

With respect to higher education formal establishments, Principle 20 (below) emphasised the importance of stimulating scientific research in order to address environmental challenges:

> Scientific research and development in the context of environmental problems, both national and multinational, must be promoted in all countries, especially the developing countries. In this connection, the free flow of up-to-date scientific information and transfer of experience must be supported and assisted, to facilitate the solution of environmental problems; environmental technologies should be made available to developing countries on terms which would encourage their wide dissemination without constituting an economic burden on the developing countries.

The Stockholm Declaration also found that environmental problems arose from basic human needs, including education, not being adequately met. Textual analysis of the declaration further shows that while education was clearly identified as a driver for environmental preservation, its spatial focus was predominantly applied to developing countries. In this context, the Stockholm Conference appears to have set the tone for an overall limiting application of EE, with its scope being narrowed from the "whole world" to "developing countries". This can be seen in Paragraph 4 of the declaration:

> In the developing countries most of the environmental problems are caused by under-development. Millions continue to live far below the minimum levels required for a decent human existence, deprived of adequate food and clothing, shelter and education, health and sanitation. Therefore, the developing countries must direct their efforts to development, bearing in mind their priorities and the need to safeguard and improve the environment. For the same purpose, the industrialized countries should make efforts to reduce the gap themselves and the developing countries. In the industrialized countries, environmental problems are generally related to industrialization and technological development.

A similar critique that may be drawn from the declaration is the further limiting connotation of environment as "human environment", as can be inferred from the opening introductory paragraph, which delineates the purpose of the Conference: "to inspire and guide the people of the world in the preservation and enhancement of the *human environment*" (emphasis added). This limitation goes against the broadness of what the environment as a term could incorporate. It also misses out on the extent to which human environment is affected directly or indirectly by other non-human environments.

Fountaining from the Stockholm Declaration, the United Nations Education Scientific and Cultural Organization (UNESCO) and the United Nations Environment Program (UNEP) generated two other major declarations that further paved the path for EE. These were the Belgrade Charter (1975) and the Tbilisi Declaration (1977). The Belgrade Charter was the first credited for introducing informal education to promote the EE among the general population. The Tbilisi Declaration then rectified what the Stockholm Declaration narrowly and strictly defined, i.e. it amended and re-enlarged the concept of environment back again from merely

"human environment" to "world environment". This can be inferred from Paragraph three:

> The declaration noted the unanimous accord in the important role of environmental education in the preservation and improvement of the world's environment, as well as in the sound and balanced development of the world's communities.

Furthermore, the Tbilisi Accord (1977) was a leading universal agreement in setting guiding principles for EE at all governance levels – local, national, regional and international and for all age groups inside and outside formal education settings. The Tbilisi Declaration also endorsed five key objectives for EE (ibid): (1) helping people at individual and societal level by raising their awareness respecting environmental challenges; (2) promoting applied knowledge about the environment and its associated problems; (3) instilling positive attitudinal change among individuals to actively participate in improving the conditions around their environments; (4) enhancing skills that are conducive to solving environmental issues; and lastly (5) forging active participation at all levels among individuals and groups to discuss and propose resolutions for the environment.

This paper uses the definition of EE as set by the Tbilisi Declaration (1977, I. 2.):

> Environmental education is the result of the reorientation and dovetailing of different disciplines and educational experiences which facilitate an integrated perception of the problems of the environment, enabling more rational actions capable of meeting social needs to be taken.

Henceforth, education has remained one of the strongest and most logical instruments, with which to encourage and support ES.

Education is often seen as a means to an end, in which the desired result—heightened awareness—ultimately supports positive behavioural change. Within the context of education, ES could be considered as the end—a desired outcome that is attained through empowering individual and societal actions towards preserving the environment. Environment referred to here broadly encompasses any ecological system, ranging from human habitats in urban settings to natural areas in rural contexts, irrespective of whether these areas sustain mammalian life, including that of humans.

3.1 From ES to SD: Implications on Education

Having sketched a broad chronology on the origins of EE, the paper now turns to address the progressive shift from ES to SD, and how this shift in emphasis impacted EE.

The buzzword "sustainable development" was born with the Brundtland Report (1987) and then taken and incorporated in the subsequent Rio Declaration (1992) with its Agenda 21. The widespread appeal of the Brundtland Report arises from its dramatically expanded concept of sustainability, which was far more broadly applied to numerous future development related concerns. The report is probably

most famously remembered for coining the following definition of SD: "Sustainable Development—Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland Report 1987, p. 16).[4] Agenda 21 added to this broadening view, both by elucidating the concept of SD and by embellishing the goals of SD. It stressed the necessity of balancing environmental, societal and economic considerations to improve the quality of life while also protecting the environment. Moreover, Chapter 36 of Agenda 21 also focused on "reorienting education towards sustainable development" (United Nations Conference on Environment and Development 1992).

This broadening definitional understanding had a very important consequence: as the concept of SD was gaining currency among policymakers and development experts, the term ES was becoming increasingly shrouded in blurriness. The new and broadened concept of SD created a kind of competitive ground for the three pillars due to sometimes their internal separateness and in other times the submergence of one pillar due to the popularity of another. The ramification of this development is significant: while education had formerly been understood as an indispensable instrument for reaching universally agreed goals (MDGs & SDGs), education has now started to become more and more loosely attached to the term ES. This can be inferred from a reading of Agenda 21 where none of the four areas of action for education make any reference to the concept of ES:

1. Improve the quality of basic education;
2. Reorient existing education programmes to address sustainable development;
3. Develop public awareness and understanding; and
4. Provide training for all sectors of private and civil society.

Other international conferences that indirectly influenced EE include the International Conference on Environment and Society in Thessaloniki in 1997 and the 2002 World Summit on Sustainable Development in Johannesburg (NAAEE 2004).

To recap, ES was once a highly respected term until the early 1990s. As SD progressively "took over", more and more attention shifted away from a singular focus on the "environment" to a multifaceted and broadened focus on "development". That includes the inception of UNESCO's Education for Sustainable Development (ESD) in 2005, which focused education on SD, rather than on ES. Moreover, ESD came as a very important development in the quest for environmental then sustainable development and the accompanying role of education to both (UNESCO 2012). For the first time, education now had an internationally recognised programme allocated only to SD and its underlining derivative, EE. The vision of ESD is to empower people to take responsibility for shaping their future. It equips learners with skills and knowledge they need to develop the behaviours requisite to achieving SD (Wolbring and Burke 2013).

[4]For more compact reading on the evolution of sustainable development, please consult *What is Sustainable Development*, https://www.hks.harvard.edu/sustsci/ists/docs/whatisSD_env_kates_0504.pdf.

Looking into the history of SD at a glance shows that ESD ultimately came to serve the three pillars of sustainability—economy, society and the environment. Henceforth, once again, the "environment" pillar was conceptually established as one of the three pillars of sustainability rather than singularly standing out as the major pillar or cornerstone of sustainability. With that being said, it comes as no surprise that out of five fundamental types of learning ESD supports for SD only twice was the word "environment" mentioned (UNESCO 2011). The five types of learning are namely the following:

1. Learning to know;
2. Learning to be;
3. Learning to live together;
4. Learning to do; and
5. Learning to transform oneself and society.

A detailed look into the document of the aforementioned five types of learning reveals that "Environment" is mentioned only in the learning to be (2) and learning to live together (3).

Overall, what can be concluded from developments related to ES and education pertinent to it through to SD and its education; that is ESD, is the observed correlation between education as a dependent variable and sustainability as an independent variable in whichever form the latter takes: be it dubbed with a sole emphasis on environment: (ES) or approached as a three-pillar model: (SD). By extension, following on the meta-analytical study of the 37 UN System-wide flagship reports by Vladimirova and Le Blanc (2015) (Fig. 1), the study draws a statistically appropriated linear equation for the relation between education and sustainability, whereby education serves as the means to the end, namely, sustainability; and the latter would affect and alter the former's focus depending on what it emphasises: ES or SD.

$$Y = \beta 1 + \beta X + e$$

where X is the explanatory variable—that is sustainability (be the focus is on ES or SD).

And where Y is the dependent variable—that is education.

The slope of the line is $\beta 2$ and $\beta 1$ is the intercept (the value of Y when $X = 0$).

For each change in the explanatory variable—sustainability—education would alter accordingly between the sole focus on environment and the centrality of attention on SD with the environment being embedded as one of the three pillars—environment, society and economy. This statistical formula shows that in both scenarios of education, environmental issues persist; nevertheless, the extent and

SDG area	Direction*	Number of reports covering this area**	Number of causal links put forward
1	SDG 4 →SDG 1	13	4
	SDG 1 →SDG 4		2
2	SDG 4 →SDG 2	8	3
	SDG 2 →SDG 4		1
3	SDG 4 →SDG 3	18	4
	SDG 3 →SDG 4		None
5	SDG 4 → SDG 5	19	7
	SDG 5 →SDG 4		3
6	SDG 4 →SDG 6	8	1
	SDG 6 →SDG 4		4
7	SDG 4 →SDG 7	6	5
	SDG 7 →SDG 4		7
8	SDG 4 →SDG 8	21	>10
	SDG 8 →SDG 4		4
9	SDG 4 →SDG 9	10	3
	SDG 9 →SDG 4		2
10	SDG 4 →SDG 10	11	7
	SDG 10 →SDG 4		4
11	SDG 4 →SDG 11	6	1
	SDG 11 →SDG 4		2
12	SDG 4 →SDG 12	9	5
	SDG 12 →SDG 4		2
13	SDG 4 →SDG 13	9	6
	SDG 13 →SDG 4		1
14	SDG 4 →SDG 14	0	None
	SDG 14 →SDG 4		None
15	SDG 4 →SDG 15	10	3
	SDG 15 →SDG 4		3
16	SDG 4 →SDG 16	19	6
	SDG 16 →SDG 4		4
17	SDG 4 →SDG 17	19	None
	SDG 17 →SDG 4		4

Fig. 1 Adaptation from the UNDESA meta-analytical study by Vladimirova and Le Blanc (2015) on the causal link between education and the SDGs. The *arrows point* into the direction of the causal relation. SDGs pertinent to education and environmental goals in the table are: *Education*—SDG 4: quality education; *Environment*—SDG 6: clean water and sanitation, SDG 7: affordable and clean energy, SDG 13: climate action, SDG 14: life below water, SDG 15: Life on land

depth vary. The bottom line is that this research finds that currently environmental issues are tackled as an embedded factor within the broader realm of SD, rather than by means of a unique independent function of education (UNEP 2013).

4 From the MDGs to the SDGs: EE for Sustainability

Having explored the broader historical interrelationships between education and ES and SD, a glance at the SDGs tells a story of an even more deteriorating relationship between education and the environment. The SDG dedicated to education is Goal 4: "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all". While this goal focuses on the social and economically equitable dimensions of development in its main statement, it fails to make any specific mention of the environment. Tying this back to the three main pillars of SD, it seems that environment not only weakened in relative terms in the realm of sustainability; its position has been jeopardised in absolute terms. That is to say, whereas the two other pillars of SD (economy and society) have been clearly stipulated in the SDG 4 on education, environment as the third pillar has been left with no seat in this SDG statement on education. Nowhere in the ten targets of SDG 4 has environment been mentioned even once (Fig. 2).

By contrast, looking into the predecessor goals, namely the MDGs, it becomes obvious the stark difference between the explicit emphasis it puts on ES on the one hand in MDG 7 and the role of education within the same goal—and articulated further through the ESD, which was launched by UNESCO (UNESCO 2009). To that end, MDGs and particularly MDG 7, seem to accelerate more in terms of the clear intention it has when pinpointing to ES and the role of education. This

- By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and Goal-4 effective learning outcomes
- By 2030, ensure that all girls and boys have access to quality early childhood development, care and preprimary education so that they are ready for primary education
- By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university
- By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship
- By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations
- By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy
- By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development
- Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, nonviolent, inclusive and effective learning environments for all
- By 2020, substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing States and African countries, for enrolment in higher education, including vocational training and information and communications technology, technical, engineering and scientific programmes, in developed countries and other developing countries
- By 2030, substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing states

Fig. 2 Targets of SDG 4 on education, adopted from UNESCO Global Education Monitoring. Report webpage http://en.unesco.org/gem-report/sdg-goal-4

becomes even clearer when MDG 7 is directly compared to SDG 4. Whereas MDG 7 fleshed out ES, neither SDG 4 nor any other goal makes any explicit reference to education for ES or to the over-arching concept, SD.

A systematic keyword search within all 23 English languages UN Human Development Reports (HDRs) published to date reveals that the use of sustainability language consistently favours SD over ES. This may not be surprising, seeing that ever since the Brundtland Report (1987), ES has been broadly and conceptually subsumed within SD. The only clear spike in the data is in UN HDR 2003: *Millennium Development Goals: A Compact Among Nations to End Human Poverty* (Figs. 3 and 4).

Year	Human Development Reports	ES Total	SD Total	% ES/SD
1990	Concept and Measurement of Human Development	0	7	0
1991	Financing Human Development	0	11	0
1992	Global Dimensions of Human Development	1	51	2
1993	People's Participation	0	19	0
1994	New Dimensions of Human Security	1	94	1.1
1995	Gender and Human Development	2	37	5.4
1996	Economic Growth and Human Development	1	58	1.7
1997	Human Development to Eradicate Poverty	1	24	4.2
1998	Consumption for Human Development	13	94	13.8
1999	Globalization with a Human Face	4	28	14.3
2000	Human Rights and Human Development	0	15	0
2001	Making New Technologies Work for Human Development	1	23	4.3
2002	Deepening Democracy in a Fragmented World	4	25	16
2003	Millennium Development Goals: A Compact Among Nations to End Human Poverty	49	174	28.2
2004	Cultural Liberty in Today's Diverse World	2	54	3.7
2005	International cooperation at a crossroads: Aid, trade and security in an unequal world	2	64	3.1
2006	Beyond scarcity: Power, poverty and the global water crisis	16	152	10.5
2007/2008	Fighting climate change: Human solidarity in a divided world	11	151	7.3
2009	Overcoming barriers: Human mobility and development	0	13	0
2010	The Real Wealth of Nations: Pathways to Human Development	11	111	9.9
2011	Sustainability and Equity: A Better Future for All	42	279	15.1
2013	The Rise of the South: Human Progress in a Diverse World	6	72	8.3
2014	Sustaining Human Progress: Reducing Vulnerabilities and Building Resilience	3	99	3
2015	Work for Human Development	24	245	9.8
all years	all reports considered together	194	1900	10.2 (average all years)

Fig. 3 Frequency table of UN HDRs published from 1990 to 2015. The data shows ES to be largely a subset of the political SD agenda. The only spike is the 2003 report that covered the MDGs: ES terminology represented 28.2% of all SD language used in the report

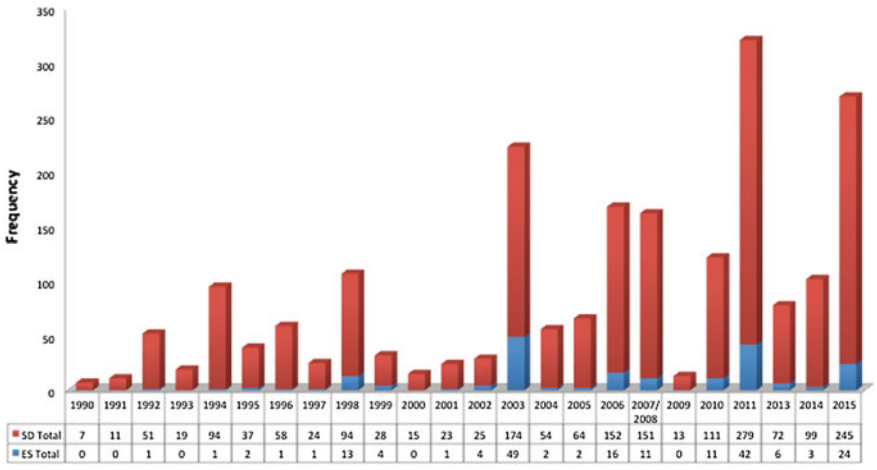

Fig. 4 Frequency graph of UN HDRs published from 1990 to 2015

The alarming theme that, however, emerges from both the MDGs and SDGs is the apparent missing synergy and interlinkages between the goal on education and the one(s) on ES (UNEP 2013). The design that informs both MDGs and SDGs in general terms seems to be an outcome/result-oriented model that lacks consideration to the drivers that lead to the desired changes those goals identified in the first place. This explains the missing link between education and ES in those universal goals on the one hand, and the neglect to mention the role of education in goal(s) pertinent to ES, on the other.

What also seems to be counter-intuitive is that the MDGs were enumerated in eight goals, whereas SDGs in 17 goals. Whilst the MDGs dedicated one goal for ES, they did not allude at any instance to education as a driver for it. Equally and oppositely, the goal on education (goal 2) targeted only universal primary education with not one target or a strand on EE within this goal. The SDGs are also surprising in the sense that being broken down into 17 goals from the original eight in the MDGs, not one of those 17 sought to make an explicit call either for education for ES, or ES in the goal related to education. This reticence to connect ES and education (in whichever form that could be) in any goal is discomforting, especially with the reality in mind that education is indispensable for achieving ES or SD at large.

5 Discussion, Analysis, Synthesis: Unifying Environmental Sustainability Education

Having sketched the history and development of EE and its transformation to education for SD, and the overall weakened position of EE under the SDGs, this study now puts forward a way in which environmental emphasis in education can get more attention, dedication and traction within the realm of SD. This would happen most reliably through connecting EE to all educational settings. By education settings, the paper refers to three setups through which education is channelled. These are: formal (e.g. universities), informal (elsewhere) and non-formal/incidental settings (e.g. natural habitat). As a main vehicle and driver for ES at the individual, institutional and societal levels, EE should be strongly streamlined in each of these educational settings.

This section elaborates on each education setting, starting with the most popular one; that is, the formal education setting, e.g. in schools and universities. Teaching dedicated to ES and represented in units and/or subjects informing students about different aspects of environmental management and climate adaptation should be mainstreamed. Adding to that, integrating and diffusing environmental issues into entire curricula (by means of activities related to environmental teaching) in subjects such as math, language, arts, etc. should be the new norm in the process of safeguarding quality control and accreditation of a subject.

Sustainability policies in formal education settings may also logically use education as an instrument for positive behavioural change. Designing those policies should occur in harmony with human behaviour and mechanisms of change

informed by behavioural sciences, particularly using the sub-fields of individual and group psychology, and theory of change.

On the lines of revamping formal education for ES, the paper advocates for environmental positive behavioural change induced from education in three waves. Each wave would allow for a natural cascade effect into the next wave. Those waves are to:

W1. Promote the notion of environmental sustainability among students;
W2. Empower students with skills and competences that enable them to change their behaviour accordingly;
W3. Encourage students to disseminate knowledge and skills on environmental protection from the fixation of simple habits pertinent to issues such as how to be efficient in using bathroom tissues through to more sophisticated issues such as the how to choose home-ware that is environment-friendly and efficient such as compact fluorescent lamps.

Since the advent of the Decade of Education for Sustainable Development (DESD) in 2005, EE has enjoyed growing popularity in formal settings around the world. Schools have been brought much closer to communities through engagement projects between them and public and private actors. Schools and universities in partnership with NGOs and the civil society have implemented EE programmes, thanks to the marriage between education and environmental sustainability resulting from the ESD. Plenty of examples are available (UNESCO 2012). Countries like the UAE, in collaboration with World Wildlife Fund (WWF), partook in EE programmes to promote environmentally aware citizenry, and have attracted the attention of thousands of students across the country (Nayar 2013). Another programme in Japan, "Youth X Change" by UNESCO and UNEP, targeted elementary schools with the aim of cultivating an environmentally prudent style of life, symbolised in choices students make in their normal daily lives. In general terms, after conducting a synthesis of practical- and expert-literature on environmental education projects and programmes since the initiation of the ESD, the focus from these programmes has been to either of the following:

1. Raise environmental awareness in daily practices; or
2. Raise environmental performance in daily choices

In this framework, EE programmes should not merely be a matter of rhetoric, i.e. being solely "environmently friendly" or dubbing an institution as such without further enhancing action-based exercises for environmental preservation. Similar to action research (Punch 2014), such engagement is more about being environmentally responsible and action-oriented by equipping students with practical life skills and competences that transform them into effective leaders, having communication and management acumen that can address environmental issues in their surroundings, be that in their home, their school, their community or in whichever context they may find themselves in.

Moving on to informal education setting, research suggests that people acquire more knowledge and skills from informal learning than formal one (Grip 2015). Furthermore, there is a global trend in which parents and students alike are increasingly dissatisfied with formal education systems. This is due to the fact that informal settings can cater for each student's needs more than systematic generalised formal education (Dib 1988). Lastly, brick and mortar formal education is simply not available in all landscapes (or to all socio-economic strata of society), whereas informal approaches can be much more flexible both in the presence and delivery of education. Hence, it makes full sense to underpin the value of EE in informal settings. After all, the reality is that to achieve 100% ES, it is a prerequisite to disseminate EE across all human and natural environments. Since the 1972 UN Conference on the Environment in Stockholm, this has been a key message. By virtue of this statement, EE could be attained provided that it fosters meaningful participation vertically and horizontally across the different segments of society (Flowers et al. 2009). And EE in informal settings is not only a matter of developing countries; it can also very well apply in developed countries. In Australia, a metropolitan local government authority conducted an EE project among low-income non-English speaking residents. The purpose of the project was to inform about storm water pollution. This kind of community-based informal EE has been applied with considerable success in different localities around the world. Such learning is deliberative and allows for engagement, discussion and group work, rather than time-predetermined instructional classes given within four-walled university settings.

The third and final EE setting of importance is the non-formal setting. Given what Skanavis and Petreniti (2006) from the University of the Aegean have called the "invasion of the non-formal environmental education in formal education", it is important to at least sketch the contours of what non-formal EE represents. According to Tahir (1997, p. 87), non-formal EE is the "type of intentional education which is for the development of, among various sectors of the society, environmental concepts, skills, attitudes and ethics which are carried on in various community institutions which may or may not include the schools and universities". The role of non-formal EE is to supplement the contributions of formal educational settings. While formal EE typically solidifies knowledge and competences related to environmental actions through labs and other formal infrastructure and architecture, non-formal EE is not limited in scope to the formal education sector. Simply put, non-formal EE can effectively raise both awareness and performance (cf, focus two from ESD projects).

The importance of non-formal EE emanates also from its nature and salience of attracting learners in their habitats. In other words, students do not need to first attend education establishment to receive EE, as in the case of the formal one. This allows behavioural change to occur. To explain in brief how this happens. As put by Nobel Prize winner Kahneman (2013), people have dual thinking processes in their mind. There is system one which is about behaviours we go about in our daily lives without too much effort in thinking; and system two which is about slow analytical reflection in our mind that requires high cognition and awareness before we engage in a particular act.

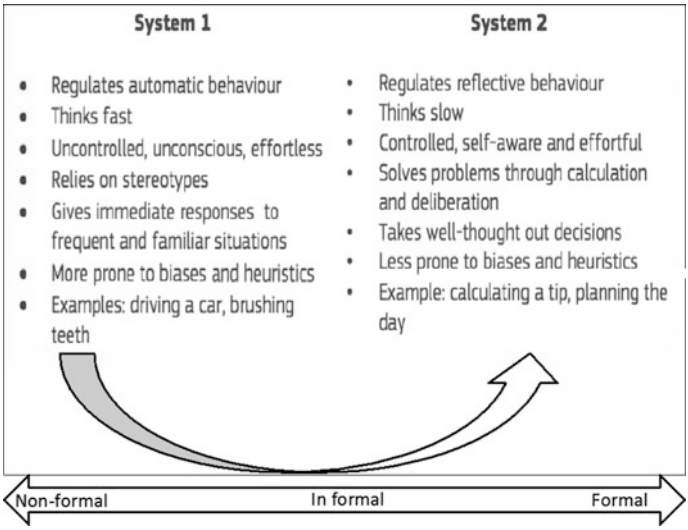

Fig. 5 Illustration denotes the cognitive transition for learners through the internalisation process of knowledge and skills acquired from the immersion into the formal-in formal-non-formal spectrum of education modalities. Quoted from *Applying behavioural sciences to EU Policy-making* (van Bavel et al. 2013) on the application of behavioural sciences to policy-making

Non-formal EE, if done well, would be able to address system one, which we use much more given its ease in our daily practices. The benefit of which would then allow for a positive behavioural change in both system one (addressed through the non-formal/incidential EE) and system two (tackled through formal EE), which is able to bring out the analytical dimension of the learner. The significance of non-formal EE in formal settings has been even more stretched by some authors (e.g. Heimlich 1993) to signify the interchangeability between the term non-formal EE and EE in general out of the belief that the latter should be often exercised in non-formal settings. To that extent, non-formal EE should be integral to formal EE, let alone the SDGs on the environment at large (Fig. 5).

5.1 Towards an Environmentally Inclusive Path: Formal, Informal and Non-formal Education for Environmental Sustainability (FINEES) Framework

Having enumerated the three education systems, the intention of this paper is to advocate for a new approach that utilises them jointly in one conceptual framework: the *Formal, Informal, and Non-formal Education for Environmental Sustainability* (FINEES model). The idea is to harness their natural/normative benefits in their setups as well as to build on the powers of their pedagogical methods to allow for a fuller ES model. This framework is proposed as a more comprehensive path,

given that it is broadly inclusive of all population segments. Combining both formal and non-formal EE has already been realised in some contexts, such as in the case of the Centers of Environmental Education of the Ministry of National Education and Religious Affairs in Greece (Skanavis and Petreniti 2006).

The paper goes beyond this binary combination to include also the informal system in its framework. As such, this paper proposes that traditional formal settings such as universities should also incorporate elements of informal and non-formal education. By this, the paper refers to the injection of informal pedagogical methods into formal education settings to stimulate participatory paradigm shift for the education community at large. This would allow learners to take responsibility and action for the environment and sustainability matters. To illustrate, for instance, universities should develop campus-wide, student-led activities with active teacher engagement to really instill interaction between both students and teachers as participants, rather than students on the one side listening to teachers, and lecturers on the other side as instructors.

Having a holistic integral model with all educational modalities—formal, informal and non-formal, would furthermore ensure that the role of education in environmentally sustainable development amplified in the quest to achieve the SDGs is not a mere "chalk-and-talk" exercise (Koshy et al. 2008) but rather an effective and efficient instrument towards fulfilment of the SDGs. This would allow for collaborative synergy among the three pillars of sustainable development through a fully rounded education framework that utilises the formal system (with its more economic analytical emphasis); the informal (with its social dimension); and the non-formal (with its tools, e.g. field trips, etc. that focus primarily on the environment in its natural habitat) (Fig. 6).

This paper now takes a look at a real-life case example that complements the discussion by means of theory-practice integration and FINEES model application.

6 Bangladesh: A Case Study for EE in Practice and the Applicability of FINEES

Bangladesh has one of the highest population densities in the world and for numerous development-related reasons lends itself as a useful case example for the discussion of EE and the FINEES model application. Naturalistic case observation is useful here as it can provide a better understanding of behaviour and behaviour change in settings where motivational issues are intertwined by multicausal factors and interdependent causal relationships.

With more than 1200 people per square kilometre of land, Bangladesh has more people than all of Russia (World Bank 2011, pp. 344–345; Belt 2011, p. 64). Bangladesh is also among the poorest and most low-lying coastal countries in the world. In 2011 the United Nations Development Programme (UNDP) categorised Bangladesh as a Low Human Development country with approximately 150+ million citizens and a rank of 146 (out of 187 countries) on the Human Development

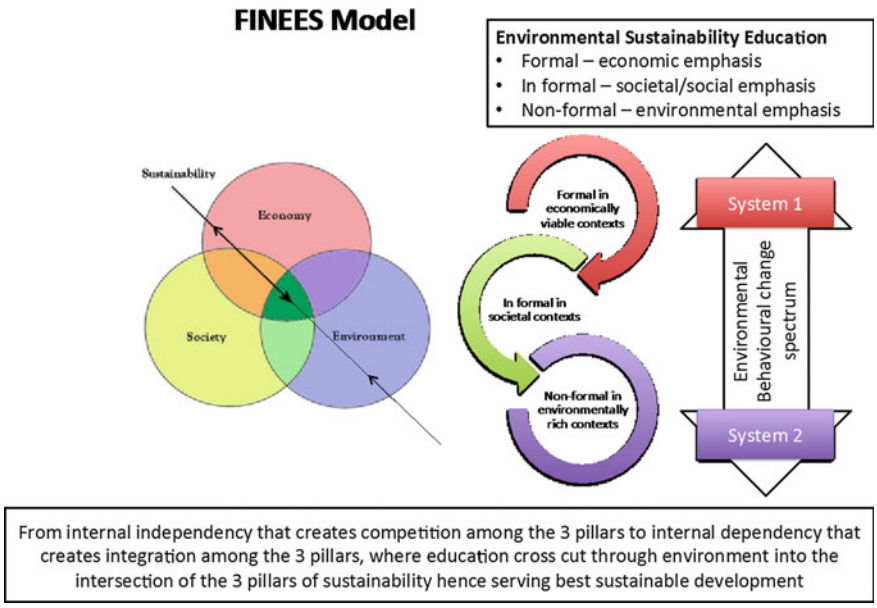

Fig. 6 Illustration shows integrated nature of the FINEES model of environmental sustainability education

Index (HDI) scale (UNDP 2011, p. 126). In 2005, 81.3% of the population lived on less than US$2 per day (UNDP 2011, p. 144). In recent years improvements in human well-being have no doubt been made, for example "the fertility rate plunged from 6.6 births per woman in 1975 to 2.4 in 2009" (UNDP 2011, p. 9), and life expectancy at birth was assessed in 2011 at 68.9 years (UNDP 2011, p. 129), up from 55.2 years in 1980 (UNDESA 2011). Development is characterised by a continued striving for SD, and education plays a crucial role. There are important environment related reasons for this. Every year thousands of people in Bangladesh are impacted and displaced by natural disasters (Luetz 2008), and mainstreaming EE into government policies and procedures seems to be broadly beneficial for affected populations in terms of providing them a better understanding of disaster causes, effects and prognosticated trends (ibid, pp. 78–87).

Perennial erosion is a case in point. According to the Centre for Environment and Geographic Information Services (CEGIS), every year anywhere between 66,500 (BSS 2012) and 1,00,000 people (Shamsuddoha 2007) become homeless due to the effects of erosion. On the Island of Bhola, Bangladesh's largest island, entire villages like Old Daulatkhan, Mirzakalu, Molongchara, Sarajgonj, Chowmohoni, Tazumiar, have been permanently lost to erosion (Luetz 2008, p. 28; cf Shamsuddoha and Chowdhury 2007, p. 23). By virtue of these facts, offering EE only in formal contexts would not be sensible to the situation of the population there given that a broad cross-section of society is eclipsed from reliable access to education (elaborated below).

While the precise causes of erosion in Bangladesh are complex, multifaceted, interrelated, and dynamic (Sarker and Thorne 2006; Sarker et al. 2011), being situated well beyond the scope of this study, the human implications of this progressive land erosion in terms of forced migration are far more straightforwardly discerned. Ph.D. field research conducted on the Island of Bhola has noted the continuing forced movement away from the eroding coast by tens of thousands of coastal dwellers (Luetz 2013, Chap. 5). A short background video to the Bangladesh field research published online by UNSW Australia[5] features this environmentally induced incremental forced human movement (https://youtu.be/PBJeelgnadU).

On numerous occasions, interview participants expressed the sentiment that the majority of erosion affected coastal dwellers are left to cope with this environmental change in the complete absence of any EE. One recurrently displaced forced migrant described how he had to move four times during the last 15 years because the land was "breaking down … very fast".[6] However, when asked what he thought was causing this creeping environmental change he responded by saying that he did not know the reasons, with his by-standing focus group participants nodding in agreement: "Everything is Allah's will. We are uneducated, we don't know". This encounter is broadly representative of many very similar encounters with local respondents. It illustrates that at grassroots level environmental changes may be concurrently conspicuous or even indisputable, and yet at the same time entirely incomprehensible.

Throughout field research, there was a strong sense that EE seems to be indispensable if people are to be enabled to better understand the changes taking place in their natural environments. And yet, data collection processes recurrently highlighted overall low levels of formal education. For example, of the 37 non-expert adult migrant respondents who indicated their highest level of educational attainment, 14 said that they had never attended school. Based on these 37 respondents' data, the average adult migrant lifelong school attendance is 2.8 years (Luetz 2013, p. 205, Fig. 5.25). This statistic broadly corresponds with UNDP data which estimates that the "[m]ean years of schooling" is 4.8 years (UNDP 2011, p. 129). This finding stresses the necessity of bringing EE to the population in multiple educational modalities, and not limiting it to four-walled formal classroom contexts only. This is where the FINEES model proves its functionality and viability given the inclusive, multi-dimensional and integrated concept approach it takes on education. Gender equity and girls' access to education furthermore illustrates that social inequities need to be tackled simultaneously within and without schools:

> Despite having achieved gender parity in primary school enrolments, Bangladesh still has a long way to go to achieve gender equity, access to quality education for all girls, completion of basic education with acceptable competency levels and relevant life skills and equal roles for women and girls in society. Gender discrimination starts from birth and continues throughout life in Bangladesh. The perceived lesser value and limited roles of girls and women are embedded in the socio-economic system. Girls' education,

[5]Published 18 February 2015.

[6]This interview situation and conversation is available in the short background video published by UNSW Australia (21:00–21:40 min): https://youtu.be/PBJeelgnadU?t=21m.

> very broadly defined, can play a part in changing these norms and practices. *The issue must be addressed both within schools and in the broader society*, starting from early childhood and continuing through adolescence. (UNICEF Bangladesh, no date, emphasis added)

Lack of reliable access to formal education is a compelling argument why formal forms of education need to be complemented by informal and non-formal approaches. The reasons are socioeconomically entrenched, as highlighted by the large number of young working children seen during fieldwork. It appeared that numerous parent respondents could not afford to send their children to school and instead sent them to work and contribute to the pool of disposable household income so the family could make meagre ends meet. Most frequently school non-attendance was explained on the grounds of present-day livelihood pressures which were perceived to be so severe as to force the children to work and contribute family income as garbage recyclers, domestic workers, burden carriers, errand couriers, etc. (WVB ACC 2011, pp. 1–2). UNICEF Bangladesh estimates that there are approximately 4.7 million working children (aged 5–14) in Bangladesh, and that "half of all child labourers do not attend school at all. […] As a result, working children get stuck in low paying, low-skilled jobs, thereby perpetuating the cycle of poverty" (UNICEF BD 2010, p. 3; cf, UCW 2011, p. ii).

In summary, if EE raises options, lack of EE forecloses them. There can be no doubt that the unequivocal panacea for Bangladesh's SD, including its management of present and future climate change adaptation challenges, will invariably involve a heightened commitment to education, free and compulsory for all. And by integrating environmental learning modules into educational designs, including through formal, informal and non-formal approaches, EE is poised to represent "no regrets" good SD practice, which will pay ES related dividends irrespective of which environmental and climate change adaptation scenarios are ultimately realised. To recapitulate, application of the FINEES model to the hard and real-life context of a country such as Bangladesh is valuable given the model's holistic integration of multiple modalities of education for the purpose of elevating the status of EE in any place to harmonise with the specific circumstances of the respective locus.

7 Concluding Synthesis and Recommendations for Policymakers

This paper reveals the discourse in the literature between the evolutionary approach to ES into SD and the paradigm-shift approach that sees ES diminishing as a result of its incorporation together with the other two pillars of society and economy in the SD. Irrespective of which view the reader takes, the point to make here is that there has been a transformation over time to ES into the notion of SD. With the importance and influence of the Brundtland Report (1987) giving its embrace to societal and economic pillars of development besides environment, ES as a major pillar has had to cope with growing interest in the other popular two pillars. While at the aspirational level, having the three pillars side-by-side were sought to

advance jointly, competition amongst them from the various agencies advocating for one over the other has been also crawling. The result of which is an overall weakened or blurry position of ES as a policy focus in its own right. This transformational shift might explain how the economic and social pillars in the SD have attracted most of the attention in the only education-related SDG (4), leaving less or no place for ES in the very same SDG.

This paper makes two recommendations. First, when addressing ES in and through education, our thinking should be more expansive, holistic and inclusive of multiple different educational approaches. If this also means changing the meanings of what a university or school stands for then a definitional shift or broadening should accompany the growing and widening scale of environmental threats. For instance, in the Pacific where schools and universities, particularly the latter, are only located in very specific urban areas, not all young people would ever be able to attend and harness the benefits of formal-only education. Developing a full-rounded, integral EE that works independently with each of the formal, informal and non-formal education strands, as well as jointly with both informal and non-formal ones integrated into the formal education system, promises to advance an environmentally responsible and action-oriented citizenry through a 100% positive behavioural change exemplified by the above-mentioned three waves of change, and the two focus areas induced from EE programmes worldwide. In short, formal, informal and non-formal approaches to EE are offered here as a policy tripod for more effective ES and SD.

Second, intergovernmental discussions and international and local consultations that include clusters from academia, the private, and the non-government sector should take place to re-establish a connection between SDG 4 on education and goals pertinent to ES. Building case and pilot studies using the Formal, Informal and Non-formal Education for Environmental Sustainability (FINEES) model would further infuse EE with an action-base for dynamic theory-practice integration. As seen in the Bangladesh case, it is more realistic to use the triad of FINEES than to rely solely on the normative formal education. Otherwise, a missed opportunity in the SDGs might be needlessly perpetuated, similar to the situation with the MDGs, where education (and EE) remained underappreciated (Gartner 2010).

As a concluding remark, the paper did not intend to reduce the positive impact the notion of SD brought on the environment. Indeed, since the intermarriage of the environment with the other two pillars, SD has allowed for an opportunity for an inclusive development rather than a fragmented one. Nevertheless, admitting the negative spill over of the very same concept on the pillar of the environment and its tandem with education is critical in the call out to revamp the plan of action to eventually reach the original aspiration of an inclusive comprehensive sustainable development, at the environmental, economic and social levels.

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