Toward Education for Sustainable Development

Lessons from Asia and the Americas

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Abstract

This chapter presents strategies and approaches that a range of international schools employ in various components of their programs in education for sustainable development (ESD). The schools vary as to method of funding, location, and student population. The approaches describe ways of compensating for an international lack of systemic support for ESD, a lack that hinders teachers from becoming agents for sustainability. The chapter presents replicable and adaptable step-by-step, detailed approaches that a school or education program can use to advance and highlight ESD in its curriculum, organizational culture, and physical infrastructure. Specifically, the chapter describes ESD pedagogies; strategies for transdisciplinary integration of sustainability themes into the academic curriculum; and ESD training for in-service teachers. The author writes from the perspective of a founder and principal of a school and an ESD practitioner and trainer.

Keywords

education for sustainable development – sustainability thinking – integrated lessons – IAS method – ESD pedagogies

1 About Education for Sustainable Development

As we enter a new decade, we face an urgent question: how can education at a global scale be transformed and empowered to become a force that fosters innovation and solutions related to the environmental and climate crises and to current economic and social inequalities? Education for sustainable development (ESD) provides a tool to support such a change. It cultivates skills, attitudes, behaviors, and ways of thinking that can prepare our youth to be reflective, engaged, and empathetic citizens. It provides students with the

ability to think systemically, react critically and creatively, acquire skills, and generally be equipped to face the challenges that lie ahead in shaping a better world.

In this chapter ESD is used as shorthand not only for education for sustainable development, but also for Education for Sustainability (EfS) and Sustainability Education (SE). I treat the term ESD as meaning an education that is concerned with the environment, society, and economy at a local and a global level. At its core, it supports instruction through formal and informal learning activities, multiple pedagogies, infrastructural spaces, and academic content that goes beyond awareness of sustainability issues (Henderson & Tilbury, 2004; McKeown & Hopkins, 2003; McKeown & Nolet, 2013; Tilbury, 2011).

2 ESD and the Academic Curriculum

International consensus is lacking as to the scope of ESD and as to its principles (Jóhannesson et al., 2011; Kwauk, 2020), a situation that limits teachers and school principals when they try to understand how, where, and when to integrate ESD into mandatory national curricula (Mwendwa, 2017). Even after decades' worth of publications by experts, many teachers and school administrators still have the outdated and incorrect notion that ESD is an add-on to the curriculum, extracurricular in nature, and an example of "adjectival education" – a view that marginalizes ESD in any competition with core and second-tier subjects (McKeown & Nolet, 2013). Deeply rooted assumptions across nations about curriculum, and about what is considered a core subject, add to the difficulty of envisioning mechanisms to produce new and improved functions from, and for, curriculum (Mwendwa, 2017), including the integration of ESD into the content of mandatory subjects.

Since the 1990s, experts have claimed that ESD can indeed be infused into existing curricula and that curricula can be appropriately modified through an all-subject integration of ESD (Ramsey et al., 1992). An earlier UN effort in the direction of ESD, called *Agenda 21*, contained a chapter that has been cited as an argument against integration, but a co-author of that chapter has shared with the international community on multiple occasions that the committee in charge of that chapter (Chapter 36, "Promoting Education, Public Awareness and Training") did *not* suggest that ESD should be a whole new discipline that needed to be constructed (Hopkins, 2013). McKeown and Nolet (2013) also emphasize that ESD does not belong to a single discipline, and that all subjects can contribute pedagogy and content toward getting ESD embedded in the curriculum. Furthermore, many experts view a transdisciplinary integration of

ESD into curricula as the most effective way to achieve ESD and thus contribute to the paradigm shift from education *about* sustainable development, to education *about, and for*, sustainable development (Woo et al., 2012).

2.1 *The Challenges of All-Subject Integration of ESD into Curricula*

Even though international research supports the teaching of local and global sustainability issues along with the content of national curricula, teachers report facing important challenges connected to such integration. As a former school founder and academic principal, and now an ESD researcher, trainer, and practitioner, I have come across such reports in one-on-one meetings with teachers, in webinars, teacher trainings, and other professional development events. Some of the challenges are, indeed, specific to a country's educational system, but several have been equally reported by teachers from such countries as the United States (including the states of Colorado, California, Nevada, and Florida), Costa Rica, Indonesia, South Korea, Guatemala, and Colombia.

One of the challenges I most frequently hear about is that academic principals and relevant supervisors and regional boards or ministries of education will not accept integration of sustainability content. Teachers say that this rejection flows from their country's nationally mandated curriculum, which fails to include teaching about, and for, sustainability. In countries like the United States, tests focus heavily on evaluating the mastery of prescribed material, material that does not address pressing social or environmental topics. Teachers say that their peers and their principals consider these social and environmental topics extracurricular. Teaching them during core subject lessons is thus not welcomed or encouraged.

Another significant challenge according to the teachers is the attitudes of parents toward environmental or social topics' being taught along with traditional subject matter. Because many parents lack adequate knowledge or understanding of issues such as climate change, they interrogate teachers as to whether their sustainability-infused lessons are important. They question how such lessons can help prepare their children to succeed on standardized and nationally mandated tests.

Teachers frequently say also that their own shortage of knowledge and lack of mastery of sustainability issues constitute another important barrier. Many have emphasized that for a long time they feared teaching about sustainability as part of their core subject because they are not science teachers and do not consequently consider themselves prepared to properly respond when students question them about environmental issues.

Teachers further report on the weaknesses and shortcomings of ESD pedagogies and approaches with regard to ways of building lessons that weave

together traditional subject matter and sustainability content. Teachers' own lack of preparation, they say, stems from the fact that their teacher-training programs focus solely on how to meet conventional standards.

2.2 *Creating Integrated Sustainability Lessons*

Infusing lessons for core subjects with topics pertinent to environmental conservation, economic prosperity, and social justice is a key step toward creating an “*environmentalized*” (Ramsey et al., 1992) curriculum. This section presents strategies to set this process in motion, for both established schools and new schools. These strategies should be considered along with the recommendations provided in the next sections.

Integrated lesson plans are a powerful tool to help initiate the process of building and delivering a curriculum with a structure that supports learning about, and for, sustainability. Such lessons blend mandated core academic topics with sustainability issues and foster skills and attitudes that further sustainable behavior and systemic thinking. Although some schools have programs of study that have been designed with the specific goal of providing integrated lessons throughout (in all courses and in all grades), other schools embark on the journey only after years of operating under more traditional curricular frameworks.

The latter was the case for Guanacaste International Academy (GIA), a small private K–12 school on the north Pacific coast of Costa Rica. Born in 2009 from a grassroots effort, the school was created to empower the local low-income youth. During its first years of operation, the school focused on delivering a program of studies that followed the standards set by the Costa Rica Ministry of Education. Nevertheless, I, as the founder and academic principal, and highly motivated by the results from lessons on the links between local environments and the local emerging economies, reimagined the program of studies into one that balanced academic excellence, environmental stewardship, and social equity.

The process of achieving a curriculum to support this vision was marked by the need to align the new content with the national academic standards so as to meet the requirements for accreditation and permission to operate as a private school. These dual considerations created important tensions, as the school's small team had no experience in aligning environmental stewardship and social equity with the national curriculum.

As a first step toward this alignment, we asked each teacher to present to the team their particular academic objectives for the year, as to both content and skills, as set by the ministry of education. Through this exercise we actually enriched the list of mandated topics, for various subjects and various grades.

On the advice of some of our teachers, we included content from such countries as Denmark, Germany, and Canada.

With a revised and improved list of academic topics, we discussed where on this list, and how, we could include learning opportunities that would foster environmental stewardship and social equity. We next asked each teacher to include in each semester's list of academic topics at least two environmental, social, or economic issues that were of interest to them. Next, teachers decided which academic topic would be the one in which they would teach the sustainability issue. During the first years, most teachers chose an academic topic with an obvious sustainability theme; with more experience, and thus more confidence, teachers were able to embed sustainability topics in such subject matter as differential equations. We discussed and detailed in addition the types of values, perspectives, skills, or behaviors we hoped to cultivate in the students as they learned about the selected environmental, social, or economic issue.

The final step in creating the new curriculum was to produce lesson plans that supported instruction of the selected sustainability issues through an academic topic(s). After observing what teachers were producing in terms of lesson plans, I conceived a method labeled IAS (Issue–Academic–Standard), or, in Spanish, *Pro-Ta-Es* (*Problema–Tema Académico–Estándar*). The IAS method guided teachers to produce integrated lessons that blended a mandated academic topic with a sustainability issue while fostering skills and attitudes supportive of sustainable behavior and systemic thinking. The method not only helped the teachers gain autonomy when building the integrated lessons, but mainly it also gave them the confidence that the lessons would, indeed, cover the content required by the national curriculum. Teachers did not have to sacrifice the standards; rather they covered these while including a sustainability issue, further allowing students to feel like their learning was actually applicable to more than scoring well on a test. In consequence, the IAS method became the approach followed by teachers year after year when producing their integrated lessons. It was our new norm for all integrated lessons.

It is important to highlight that even after having created a new curriculum aligned with national standards, the team revised the sustainability issues every year before the beginning of the school year. This process was fundamental to ensuring that the issues were always adapted to suit our particular context and that we included recent incidents relevant to our region.

The IAS method is a simple and straightforward strategy. For several years now, I have shared it and taught it to teachers from different countries and educational systems. First, the teacher selects a pressing regional or global social or environmental topic, along with the skills and attitudes they hope the student will gain from learning about this topic. This step represents the

“I”, or Issue. It is important to keep in mind that the “I” does not imply learning definitions for concepts or natural phenomena, but rather learning about the causes and consequences of a regional or global issue affecting natural environments or human populations or both. In addition, the “I” includes making students conceptualize how they can contribute to alleviating such issues at home, at school, or on a community level. Once the sustainability topic is selected, the principal and the teacher need to choose the academic topic into which that issue can be best inserted for instruction. This step stands for the “A”, or Academic. Once they decide when to teach the sustainability issue, and in connection with which academic topic, they then determine the academic skills that the lesson supplies and the standards that it meets. This step represents the “S”, or Standard.

By following the IAS method, teachers design lessons that cover academic topics mandated in the national curriculum, while meeting standards and fostering sustainability thinking and attitudes. The method can even be used to teach topics that are part of Advanced Placement tests (for the United States) or topics included in tests needed to earn a baccalaureate diploma from high school (such as in Costa Rica and most of Latin America). As an example of the IAS method, Figure 18.1 provides the outline for an integrated lesson for fourth grade English. Figure 18.2 details the outline of an integrated lesson for a US Advanced Placement history class.

Requesting teachers from all subjects and all grades to design one integrated lesson per academic period allows the whole academic team to gradually, but consistently, learn about ESD and the many ways to accent sustainability thinking and behaviors through their lessons. It also provides an important opportunity for teachers to learn about, or further their knowledge of, environmental, social, and economic problems occurring in their region or globally. If the school can acquire sample lessons from open sources or from organizations that provide training on ESD integration, pedagogies, and other related strategies, these samples can provide guidance and ultimately support teachers in building an integrated lesson.¹

At our school, in order to support the development of integrated lessons and the implementation of these through appropriate pedagogies, we held weekly interdepartmental meetings. They were an important component of the process we followed. They allowed the team to identify academic topics that could support learning activities across multiple grades and across different subject-matter areas, with the goal of developing hands-on projects that would benefit the school and the community. As an example, all the grades at our K–12 school developed, through their mathematics, social studies, and science classes, a tilapia fishpond. It was meant to provide a free source of

STEP	TO BE COVERED	HOW TO COVER MATERIAL	WHEN
I- ISSUE	DEFORESTATION IN CONNECTION WITH CLIMATE CHANGE.		
	UNDERSTAND MECHANICS OF CLIMATE CHANGE & REGIONAL CAUSES OF DEFORESTATION.	STUDENTS WILL WATCH 1 SHORT DOCUMENTARY ON DEFORESTATION IN NORTH, CENTRAL AND SOUTH AMERICA.	WEEK 3
		STUDENTS WILL WATCH 1 INTRODUCTORY VIDEO ON CLIMATE CHANGE.	WEEK 3
	UNDERSTAND HOW OUR INDIVIDUAL ACTIONS AND DECISIONS CAN CONTRIBUTE TO ALLEVIATE REGIONAL DEFORESTATION AND CLIMATE CHANGE.	CLASSWORK ON ADVERBS #2: STUDENTS CONSTRUCT THEIR OWN SENTENCES WITH PROPER ADVERB USAGE WHILE CONVEYING A MESSAGE THAT VOICES THEIR OPINIONS AND FEELINGS ON DEFORESTATION AND/OR CLIMATE CHANGE.	WEEK 5
	VOICE OUR OPINIONS AND VALUES.		
SUSTAINABILITY THINKING	BRAINSTORM IDEAS THAT CAN HELP OUR HOME, SCHOOL OR COMMUNITY TO LOWER GREENHOUSE GAS EMISSIONS AND/OR ACTIONS THAT SUPPORT DEFORESTATION.	HOMEWORK ON ADVERBS #1: STUDENTS CONSTRUCT 10 SENTENCES WITH AN IMPROPER USE OF ADVERBS & SHOW CORRECT USE. HALF OF THE SENTENCES MUST SHARE IDEAS ON HOW WE CAN REDUCE OUR CONTRIBUTIONS TO DEFORESTATION OR CLIMATE CHANGE AT HOME OR AT SCHOOL.	WEEK 6
A- ACADEMIC CONTENT	ADVERBS	INTRODUCE FOUNDATIONS ON ADVERBS (IDENTIFICATION, USAGE IN SENTENCES) THROUGH APPROVED LESSON PLAN.	WEEK 4
		CLASSWORK ON ADVERBS #1: STUDENTS READ 2 GRADE APPROPRIATE DOCUMENTS ON DEFORESTATION AND ARE TASKED TO UNDERLINE ADVERBS AS THEY READ.	WEEK 5
		QUIZ ON ADVERBS #1: RANDOM SENTENCES WILL BE SELECTED FROM EACH STUDENT'S HOMEWORK TO CONSTRUCT A SHORT IN-CLASS EVALUATION ON ADVERBS.	WEEK 7
S- STANDARDS TO BE COVERED	IDENTIFYING ADVERBS, MASTERING SENTENCE CONSTRUCTION WHILE USING ADVERBS, AND UNDERSTANDING HOW TO FIND INCORRECT USES OF ADVERBS.	THROUGH LESSON ON ADVERB FOUNDATIONAL KNOWLEDGE, CLASSWORK #1 & #2, QUIZ #1	

FIGURE 18.1 Outline for an integrated lesson on adverb identification and usage along with deforestation in connection with climate change

protein to the cafeteria. The project also taught students how growing produce locally reduces personal greenhouse gases contributions. It allowed them to investigate the level of support that local food producers were receiving from restaurants and hospitality businesses (Pihen et al., 2018). In addition to these successes, the project allowed the mathematics, social studies, and science teachers to cover mandated topics through assigned work that was related to

STEP	TO BE COVERED	HOW TO COVER MATERIAL	WHEN
I- ISSUE	RACIAL INEQUALITIES IN THE US-PRESENT & PAST	STUDENTS WILL READ JOURNALISTIC PIECES FROM BOTH TIME PERIODS THAT THROUGH UNBIASED CONTENT INFORMS ABOUT KEY EVENTS OR ACTIONS THAT OCCURRED AGAINST A SPECIFIC RACIAL MINORITY IN THE US.	WEEK 4
	COMPARE AND CONTRAST KEY EVENTS IN THE TIME PERIOD OF 1865-1898 AND OF THE LAST DECADE	STUDENTS WILL WRITE THEIR OWN SHORT JOURNALISTIC PIECE, WITH PROPER SOURCING OF INFORMATION, TO ANALYZE WAYS IN WHICH THE RISE OF CAPITALISM CONTRIBUTED TO MAGNIFY INEQUALITIES EXPERIENCED BY RACIAL MINORITIES; AND HOW MODERN ECONOMIC ACTIVITIES AND CONSUMPTION PATTERNS CONTRIBUTE TO THIS AS WELL.	WEEK 5
	ENVISION ECONOMIC MODELS AND ACTIVITIES THAT CAN HELP ALLEVIATE INEQUALITIES EXPERIENCED BY RACIAL MINORITIES IN THE US	STUDENTS INDIVIDUALLY CREATE A SET OF QUESTIONS FOR KEY TERMS AND EVENTS (FOR THE TIME PERIOD 1865-1898) THAT CONTRIBUTED TO RACIAL INEQUALITIES. QUESTIONS INCLUDE PROVIDING IDEAS ON HOW SUCH EVENTS COULD HAVE BEEN BETTER REGULATED BY THE CITIZENS AND/OR GOVERNMENT/LAWS; AS WELL AS IDENTIFYING ANY CURRENT MECHANISMS THAT HELP TO BETTER REGULATE INDUSTRIES AND THEIR OPERATIONS.	WEEK 7
	VOICE OUR OPINIONS AND VALUES.	STUDENTS DISCUSS THEIR OPINIONS ON THE RELATIONS BETWEEN CAPITALISM AND SOCIAL INEQUALITIES EXPERIENCED BY RACIAL MINORITIES IN MODERN TIMES, WHILE ARGUING IN FAVOR OR AGAINST OF IDEAS FROM THE RISE OF CAPITALISM SUCH AS SOCIAL DARWINISM AND GOSPEL OF WEALTH.	WEEK 8
A- ACADEMIC CONTENT	UNIT 6: THE RISE OF INDUSTRIAL CAPITALISM	INTRODUCE RAILROADS AND VANDERBILT	WEEK 1
		INTRODUCE STEEL AND CARNEGIE	WEEK 2
		INTRODUCE ROCKEFELLER AND OIL	
		INTRODUCE CONCEPTS OF NEW BUSINESS ORGANIZATION: VERTICAL AND HORIZONTAL INTEGRATION, TRUSTS, HOLDING COMPANIES.	WEEK 3-4
		INTRODUCE "THE WEALTH OF NATIONS", LAISSEZ-FAIRE, SOCIAL DARWINISM, GOSPEL OF TRUTH.	WEEK 5-6
S- STANDARDS TO BE COVERED	AS DESCRIBED BY COLLEGE BOARD FOR UNIT 6: PERIOD 6, AP US HISTORY	THROUGH ASSIGNED WORK AND INTRODUCED CONCEPTS ON WEEKS 1-8	

FIGURE 18.2 Outline for an integrated lesson on the rise of capitalism and pertinent content mandated for the Advanced Placement US history exam

the fishpond (for example, concepts of geometry, areas, and volume for mathematics; concepts of freshwater ecology, overfishing, and pollution of rivers for science; and concepts of commercial activities and economies of specific regions for social studies, to mention a few).

Although generally successful, the fishpond project had its particular failures (for example, the first layers of cement we laid leaked and lost us

substantial amounts of money and time) and its challenges (for example, finding a staff member who knew how to design a water recirculation system). The project taught us several things. If we wanted to follow a whole-school approach (Henderson & Tilbury, 2004; Barr et al., 2014) to bring sustainability to all the components of the school (physical, cultural, and educational), we needed to include hands-on projects and experiential learning activities in which at least one staff member could be the expert. This expert became the person who provided, during our interdepartmental meetings, adequate knowledge both of the sustainability topic(s) that the project was addressing, and of the project-building process itself. By taking this approach, we avoided the risk of losing money in materials purchased for the project in the eventuality that we would make mistakes during the building stages. We additionally allowed teachers to learn about the building tasks and the sustainability topics during paid after-school hours and thus reduced their learning curve about environmental issues. Most important, we avoided investing class time in building tasks that produced no results and avoided the risk of having parents question the need for these projects and viewing them as a “waste of learning time”. As teachers became more and more comfortable with project-based and experiential learning, as well as more knowledgeable on sustainability topics, we ventured on to more complex projects. For those, we learned that by communicating to the parents the project idea and informing them that we lacked an expert to guide us, we consistently received support. Either a parent or a family member offered help, or we were connected with a company that was willing to lead the project and teach the school’s maintenance team, academic staff, and students the proper follow-up care.

2.3 *ESD Pedagogies*

Integral to infusing ESD into a school’s program of studies are the pedagogies that support the delivery of integrated lessons and stand-alone classes focused on a sustainability theme. Such pedagogies are central in delivering an education that ensures that all learners have the skills, knowledge, and tools to become global citizens, and thus are motivated to live more sustainably and with consideration for the world’s natural environment, economies, and societies. Pedagogies associated with ESD provide powerful opportunities for teachers to deliver instruction through innovative, collaborative, and meaningful venues. They allow teachers to respect their own level of eco-literacy when they develop their lessons, thus avoiding potentially exposing any personal shortcomings as to their knowledge of environmental and social issues. I recommend that when teachers use ESD pedagogies, they create a record of student academic performance and compare it to performance levels when

students confront the same subject matter through more traditional instruction. Schools can use these records to document that students can effectively learn the prescribed curriculum material, *and* meet relevant standards, through ESD pedagogies. I have included in Table 18.1 some of the pedagogies I observed at schools that follow curricula that integrate sustainability; some pedagogies used at GIA school; and some shared by innovative teachers I have worked with.

In addition to the above-mentioned pedagogies, problem-based learning is often a useful approach to teach about, and for, sustainability. It provides teachers and students with the possibility of learning together about a sustainability issue, while covering academic topics from multiple subjects. Through this pedagogy, students are assigned to investigate a sustainability issue that resonates with them. The research process can include graded or class work for multiple assignments, such as science, social studies, and language arts. The research should ideally culminate in an action plan or innovation thought up and proposed by the student, which should be open to being carried out and tested. Problem-based learning positions students as the designers and leaders of projects that instruct the students themselves, their school community, and even their families about sustainability issues and potential solutions. At Green School Bali, a private K–12 international school located on the island of Bali, Indonesia, this pedagogy is part of their core program of studies. In order to graduate from Grades 8 and 12, students design a project to address an environmental problem, which can range from presenting reliable and strong evidence on an issue, to launching an entrepreneurial service or product. During the 2017 presentation of such projects, I witnessed excited teachers supporting students who shared ideas that ranged from making skateboards from plastic trash to defending a plant-based diet as a personal contribution to alleviating the climate crisis.

An ESD pedagogy known as critical reading and writing allows teachers to teach students about sustainability along with literacy skills, critical thinking, and “futures” thinking. Students read about a sustainability issue, practicing pertinent reading comprehension skills, and produce written material that proposes solutions or innovations to address the issue, or they provide their own personal perspectives. At Green School Bali, teachers employ critical reading and writing frequently as part of their daily academic lessons. In a language class there, in which students were tasked to read about significant individuals, such as Nelson Mandela and Mahatma Gandhi, students Melati and Isabel, young sisters, felt empowered by these readings, which made them ask how they, too, could become a force of change. Duly motivated, they created the Bye

TABLE 18.1 ESD pedagogies applied and observed by author

Pedagogy	Description
Outdoor learning and field work	Doing hands-on projects developed in the outdoors or with materials provided by nature, exploration of natural environments, and learning about a specie or habitat in direct contact with it. This pedagogy can also include field trips that expose students to agents of change and professionals in sustainability, to learn about their work and its challenges and rewards.
Community oriented/serving lessons	Volunteering with a local organization, initiative, or movement that works within a specific regional or global sustainability issue. This pedagogy also includes analyzing a sustainability problem that is affecting the students' local community and designing or proposing a solution, intervention, or action to tackle such issue.
Group discussion and debate	Presenting a past or present sustainability issue, or a recent incident, to the whole group and allowing students to voice their opinions, perspectives, and values. Discussions allow students to respectfully debate opposing views and defend theirs with strong and well-structured arguments.
Reflective written or visual pieces	Presenting materials such as short documentaries, opinion articles, written stories, or poems that focus on a sustainability issue can help initiate individual and group reflection. It also allows students and teachers alike to relate their own personal values, actions, and habits to the introduced problem.
Recent critical incident (social or environmental)	Students, after analyzing a recent critical incident, explain what they believe they could have done and discuss what they should do. Students can also propose ideas for what government entities, the affected community and even the rest of the world should do in light of this incident.
Case studies	Through case studies, connect students with local agents working toward alleviating a sustainability local issue. This pedagogy allows the teacher to add context to a learning activity and provides students with opportunities to conduct meaningful work with agents of change within their communities.

Plastics Bags initiative, a response to Bali's overwhelming plastic pollution. In 2019 the initiative strongly backed the enactment of a local government ban on plastic bags, straws, and Styrofoam in Bali. Now an internationally acclaimed youth-led movement with teams in 43 locations across the globe, Bye Plastics Bags is an example of what inspired youth can accomplish.

In employing ESD pedagogies, teachers can place students at the center of academic lessons, providing them with platforms from which to conduct research on issues affecting their communities, design initiatives that can translate into policies, and create entrepreneurial solutions with significant impact.

3 ESD Training for In-Service Teachers

International research reports that besides ESD principles' not being properly thought about or understood by in-service teachers, school principals, or academic supervisors (Bolstad, 2004; Briggs et al., 2018; Feinstein, 2013; Hopkins, 2013; Mwendwa, 2017), these individuals have received no formal preparation, as either pre-service or in-service teachers, on how to design and deliver ESD-infused learning activities (Bolstad, 2004; Briggs et al., 2018; Conelly, 2013; Feinstein, 2013). Since these barriers to effective ESD occur across nations, there is a critical need to support both in-service and pre-service teachers by offering adequate training. Topics should include ESD and its principles and scope, and related pedagogies and strategies for curriculum and lesson-plan construction within the framework of ESD. Training should establish foundational knowledge of pressing sustainability issues, such as climate change, deforestation, marine pollution, and food security.

Especially important to include is instruction on how to construct both integrated lessons and stand-alone courses focused on sustainability. Both formats are necessary in shaping innovative, empathetic critical thinkers; therefore, both should be seen as essential inclusions in trainings and programs. Perhaps a school has a handful of teachers with the confidence and knowledge to teach about a specific sustainability issue, such as gender inequality, violence, or extractive industries. Consequently, the process of bringing ESD into the school will begin with offerings of stand-alone courses. Neither integrated lessons nor stand-alone courses should be deemed in competition for a space in the curriculum; both should be embraced and understood as complements and extensions of one another.

The process of providing ESD training to a school can be spearheaded by one or a few passionate and committed staff, who perhaps do not have ESD

expertise but who have learned about other schools' or educators' embracing its principles, or who have experienced the benefits of doing so in their own classrooms. Such a process can start with having open conversations with colleagues about teaching for sustainability. These dialogues can provide rich opportunities for teachers to voice their opinions – on the importance of teaching the necessary core academics through lessons that support environmental literacy and foster critical and future thinking; on their views on key environmental and social problems; on concerns about teaching about sustainability when their subject area is not science; on concerns that sustainability lessons are of lesser quality or are less academically rigorous. The overall goal is to spark the process of recognizing the value of bringing ESD training to the school and to have a group of teachers who can shepherd the case to the school's academic principal or administrative staff.

The staff who are championing the efforts to institute ESD training should include in their arguments examples of various schools that are delivering ESD programs. (The international research community must increase its efforts to document the positive impacts of schools' shifting to ESD or of schools' starting off with sustainability at their core.) Examples serve as evidence that there exists, beyond individual desire, international recognition of the imperative need for teaching about, and for, sustainability and of the consequent academic, personal, and community benefits. Sharing examples can also instill confidence that this process can be undertaken by one's own institution. Myriad countries and regions have school networks, government organizations, or NGOs that connect and showcase institutions that have embraced ESD.² I highly encourage using this information as a resource for inspirational examples and relevant arguments. I also recommend research on whether, through these networks, local NGOs or universities are offering ESD workshops or educational programs on sustainability issues and environmental literacy. If the case for instituting ESD training is not strong enough, or if a school simply does not have the resources, providing teachers with the option of offering a stand-alone course, even if the teacher will be a co-learner with the students, can be an important step in beginning the process of introducing ESD trainings.

At GIA in Costa Rica, new and experienced teachers alike received training in the month before the new academic year. The first two weeks included inter-departmental meetings to discuss the most pressing regional and global sustainability issues. The principal led these meetings, with direct collaboration from those teachers who had high levels of environmental literacy. In addition, the trainings included a time to share the ESD strategies and pedagogies used by each teacher. We found it interesting that the group did not settle on a single preferred pedagogy, or even on just a few. Instead, teachers appreciated that

there were many ways to deliver an integrated lesson. They considered that this diversity in ESD pedagogies honored the complexities of their students' learning profiles as well as of the subject matter they taught.

During these trainings, they commonly shared two main concerns. First, new teachers questioned their ability to properly teach a mandated core topic via lessons involving non-traditional assignments, such as building an infrastructure at the school (for examples, refer to Pihen et al., 2018), doing community work, or researching a sustainability issue. Second, teachers feared parents would not understand the academic benefits of using these pedagogies. To address this concern, for parent-teacher meetings the staff provided summaries of students' performance results when the lesson on the topic had been delivered within an ESD pedagogy. This step alleviated fears of both teachers and parents, reassuring them that students would be properly prepared to succeed in national tests.

To provide support beyond the trainings once the school year began, I met regularly one on one with each subject teacher. To further support our teachers, department heads and I randomly observed classes and provided individual feedback.

Hero School also provides replicable examples on how to train teachers for delivering an education aligned with sustainability thinking, democracy, and global citizenship. This small school is operated by the NGO Long Way Home in San Juan Comalapa in Guatemala, a community deeply affected by genocide during the country's civil war. The school's complete infrastructure was built by upcycling materials that included truck and car tires and plastic and glass bottles. Many of the academic lessons learned by the students at Hero School feature the construction of physical items that can aid their community to live more sustainably, such as an improved wood stove or composting toilet. During its first years of operation, it recruited teachers exclusively from the local community, teachers who had received no training in ESD pedagogies or principles and who had low levels of environmental literacy. The project's director determined that before classes were to get going, teachers had to meet daily to learn about ecological concepts and phenomena and about sustainability issues, local and global. As the only member of staff with knowledge of these topics, he chose to educate his colleagues through engaging approaches, which included watching documentaries and group discussions. Once the teachers had acquired an adequate level of eco-literacy, the school focused on providing training throughout the school year on why, and how to teach for sustainability.

After nine years of operation, the teachers at Hero School have gained such a high level of mastery of how to teach through lessons that link academics and

sustainability that if necessary, they are capable of meeting without the school's leader when revising their lesson plans. On several occasions, in observing these meetings I witnessed how the Spanish, physical education, mathematics, science, and social studies teachers for the sixth grade offered each other confident support and guidance. By following a template constructed by the entire team (see Figure 18.3), each teacher explained the type of learning activity that would be delivered and the pedagogy that would be followed, which academic skills would be gained, and which social and environmental attitudes and way of thinking would be fostered. The constant contributions from the teachers were so valuable that almost every lesson was improved consequent to the collaborative and interdepartmental work.

Competency	Achievement Indicator	Processes	Content	Attitudes
Learns and practice different athletic disciplines while promoting the reutilization of repurposed and recycled materials	<p>Applies the correct techniques for each discipline and simultaneously learns the importance of reimagining ways to use repurposed materials to build items.</p> <p>Learns the value of working as part of a team.</p>	<p>Introduction to disc throw techniques.</p> <p>Introduction to building discs by using recycled or repurposed materials.</p>	<p>-Area for throwing and basic rules.</p> <p>-Weights for men's and women's discs.</p> <p>-Dimensions for men's and women's discs.</p> <p>-Ways to manufacture discs.</p> <p>-Proper techniques to hold and throw disc.</p>	<p>-Interest and enthusiasm for developing individual athletic abilities.</p> <p>-Leadership skills and abilities to work as part of a team when building items.</p> <p>-Active manifestation of values and attitudes of respect and care towards natural environments.</p>

FIGURE 18.3 Template for lesson plan revision constructed by Hero School teachers
Note: The content was created by the physical education teacher and revised by the Spanish, mathematics, science, social studies and physical education teachers

4 Closing Note

This chapter's recommendations and insights grow out of K–12 classroom experiences in curriculum design that involve alignment of sustainability content with national standards, teacher trainings, and application of diverse

ESD pedagogies. The recommendations involve only some of the many components that must change for the world to achieve, at a global scale, the kind of education that meets such requirements as those of UNESCO’s Sustainable Development Goal 4.7. Figure 18.4 provides a framework intended to provide guidance and support to schools and to those actors working with them in beginning their journey toward installing ESD across all their sectors. Because adaptation to context is essential for a successful and true application of ESD, I do not propose the framework as a universal blueprint. Nations, states or provinces, and communities within them all face different challenges, and all have diverse educational systems, economies, politics, religions, and norms. This framework does, however, include components requiring transformation that were not addressed in this chapter. Again, every recommendation as to how to install ESD in a school and in an educational system must be adapted to context.

FIGURE 18.4 “Toward ESD” framework graphic

Notes

- 1 For English-speaking teachers, some providers of sample sustainability lessons include, but are not limited to, The Center for Green Schools (US), Green Education Foundation (US), Resources for Rethinking (Canada), California Education and the Environment Initiative

- (US), Facing the Future (US), and The Institute for the Built Environment (US) through the document *Green Schools in the Tropics: A Toolkit for Schools on a Budget* (Pihen González et al., 2018). Currently, The Green Teach Project, led by an international team of doctoral students from the University of California Santa Barbara, is in the initial stages of constructing an international open-source inventory of K–12 integrated lesson plans for all core subjects, cataloged by country and region, language, UNESCO's SDGs, and sustainability issue.
- 2 These include, but are not limited to, Center for Green Schools, Green Schools National Network, Green Schools Alliance, and Green Schools Initiatives (for the United States); Observatorio de Eco-Educación (for Central America); Eco-Schools (for Europe and more); The Global Coalition for Green Schools (globally).

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