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Education for Sustainable Development

SOURCEBOOK

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Education for Sustainable Development

SOURCEBOOK

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About this Publication

The target audiences for the *Education for Sustainable Development Sourcebook* are primary and secondary teachers and mid-level decision-makers, who have responsibility for primary and secondary education. Another primary audience is teacher educators who work with pre-service and in-service primary and secondary school teachers.

The purpose of the publication is to describe ways in which education for sustainable development (ESD) can be integrated into primary and secondary schooling. This collection of briefs is designed to complement other ESD materials published by UNESCO. The topics for the briefs were selected in consultation with UNESCO Field Offices and Institutes. The briefs for primary and secondary teachers are specifically written for professional educators who work in formal education settings. The briefs for teachers as well as those for decision-makers address "gaps" in the UNESCO ESD literature.

www.unesco.org/en/esd/videos/

What is Sustainable Development?

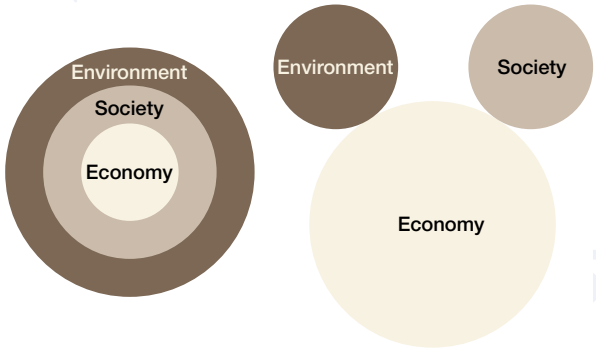
"We hold the future in our hands. Together, we must ensure that our grandchildren will not have to ask why we failed to do the right thing, and let them suffer the consequences."

UN Secretary-General Ban Ki-moon, 2007

Sustainable development is the overarching paradigm of the United Nations. The concept of sustainable development was described by the 1987 Bruntland Commission Report as *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs."*

Sustainability is a paradigm for thinking about a future in which environmental, social and economic considerations are balanced in the pursuit of development and an improved quality of life. These three spheres – society, environment and economy – are intertwined. For example, a prosperous society relies on a healthy environment to provide food and resources, safe drinking water, and clean air for its citizens.

The sustainability paradigm is a major change from the previous paradigm of economic development with its damaging social and environmental consequences. Until recently these consequences have been seen as inevitable and acceptable. However, we now realize that major damage or serious threats to the well-being of humans and the environment in pursuit of economic development have no place within the sustainability paradigm.



VISUALIZING SUSTAINABILITY

We might then ask, what is the difference between sustainable development and sustainability? Sustainability is often thought of as a long-term goal (i.e. a more sustainable world), while sustainable development refers to the many processes and pathways to achieve it (e.g. sustainable agriculture and forestry, sustainable production and consumption, good government, research and technology transfer, education and training, etc.).

Principles of Sustainable Development

All sustainable development programmes must consider the three spheres of sustainability – environment, society and economy – as well as an underlying dimension of culture. Since sustainable development addresses the local contexts of these three spheres, it will take many forms around the world. The ideals and principles that underlie sustainability include broad concepts such as equity among generations, gender equity, peace, tolerance, poverty reduction, environmental preservation and restoration, natural resource conservation, and social justice. The Rio Declaration[1] contains 27 principles, including:

- People are entitled to a healthy and productive life in harmony with nature;
- The right to development must be fulfilled so as to meet developmental and environmental needs of present and future generations in an equitable way;
- Eradicating poverty and reducing disparities in living standards in different parts of the world are essential to sustainable development.
- Environmental protection is an integral part of the development process and cannot be considered in isolation from it.

1 The Rio Declaration emerged from the United Nations Conference on Environment and Development, also called the Earth Summit, which was held in Rio de Janeiro in 1992. A total of 172 governments participated, including 108 heads of state or government. Agenda 21 is the official document of the Earth Summit.

- International actions in the fields of environment and development should also address the interests and needs of all countries.
- To achieve sustainable development and a higher quality of life for all people, countries should reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies.
- Women play a vital role in environmental management and development. Their full participation is therefore essential to achieving sustainable development.
- Warfare is inherently destructive to sustainable development. Peace, development and environmental protection are interdependent and indivisible.

These principles can guide the efforts of governments, communities and organizations to define sustainability goals and create programmes to help achieve those goals.

Perspectives of Sustainable Development

Not all the concepts associated with sustainability are incorporated in the 27 principles of sustainable development in the Rio Declaration. Accompanying principles of sustainable development are perspectives that have become part of the global sustainability dialogue, such as:

- A systems thinking approach[2] , rather than an approach that looks at problems in isolation should be used. Sustainability issues are linked and part of a "whole."
- Understanding local issues in a global context and recognizing that solutions to local problems can have global consequences.
- Realizing that individual consumer decisions affect and give rise to resource extraction and manufacturing in distant places.
- Considering differing views before reaching a decision or judgement.
- Recognizing that economic values, religious values, and societal values compete for importance as people with different interests and backgrounds interact.
- Seeing all humans as having universal attributes.
- Knowing that technology and science alone cannot solve all of our problems.
- Emphasizing the role of public participation in community and governmental decision-making. People whose lives will be affected by decisions must be involved in the process leading to the decisions.
- Calling for greater transparency and accountability in governmental decision-making.
- Employing the precautionary principle – taking action to avoid the possibility of serious or irreversible environmental or social harm even when scientific knowledge is incomplete or inconclusive.

It is important that educators, leaders, and citizens recognize that sustainable development is an evolving concept and that the list of sustainability perspectives can therefore grow and change.

Values within the Sustainability Paradigm

Throughout its history, the United Nations has been a champion of values related to human dignity, fundamental freedoms, human rights, equity, and care for the environment. Sustainable development takes these values a step further, extending them beyond the present generation to future generations. Sustainable development means valuing biodiversity and conservation along with human diversity, inclusivity, and participation. In the economic realm, some embrace sufficiency for all while others uphold equity of economic opportunity. Another vehicle for the values inherent in the sustainability paradigm is the Earth Charter, a declaration of fundamental ethical principles for building a fair, sustainable, and peaceful global society.

Sustainable Development Topics

Sustainable development includes a number of topics, which U.N. Member States have agreed to address. With their environmental, social, economic and political roots, these topics are complex and are often difficult to define as well as find solutions for. They include reducing poverty, changing consumption patterns, global population growth, and protecting human health, all of which present challenges to our social and economic systems. In addition, the topics also include protecting the land we live on, the water we

2 *Systems thinking* is the process of understanding how elements of a system influence one another within the whole. Systems thinking, also called a whole-systems approach has been defined as an approach to problem solving, in which "problems" are viewed as parts of an overall system, rather than as isolated parts, outcomes or events.

drink, the air we breathe, and the resources we use as well as major contemporary challenges like climate change and loss of biodiversity. The list is extensive. All of these and related topics can be approached from a sustainability perspective.

Creating Sustainability Goals and Plans

Following the Earth Summit in 1992, governments and communities were charged with the responsibility of creating sustainability plans. In order to do so, governments and civil society must identify priorities and create sustainability goals. Then, they can create plans to achieve them. Ideally, at the national level, every ministry or department would include sustainability in its goals, plans and policies given that it is the responsibility of all sectors of governments and societies to work towards a more sustainable future.

Coordinated Efforts

Governments and civil society as well as individuals must hold the responsibility for a more sustainable future. All must contribute in their own way. The 40 chapters of Agenda 21 describe ways forward in many areas, from agriculture to waste disposal. Nevertheless, the education community has a special role to perform. Explicitly mentioned in each of the chapters, education is an essential ingredient for a more sustainable future. For example, it is through education that the next generation of citizens, voters, workers, professionals and leaders are prepared for life-long learning. Without education, progress towards a more sustainable future will be compromised. Indeed, we must learn our way forward.

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Reorienting Curriculum to Address Sustainability

Reorienting a curriculum to address sustainability can take place at a classroom or national level.

At the classroom level, teachers can begin by explicitly stating the link between the topic in the mandated syllabus and sustainability. For example:

- Today we are learning about World War II. As you know, war is considered an unsustainable state in which human lives are lost and resources wasted. One of the principles of sustainability is that warfare is inherently destructive to sustainable development. Why do you think war prevents countries from making progress towards sustainability? (e.g. rather than spending national income on human well-being it is spent on human destruction).
- Today we are discussing health risks related to contaminated water. Access to water is now considered a human right, and human rights are fundamental in creating sustainable communities.
- Today we are talking about international trade. Think about the shirt that you are wearing and where the fibre came from, where the cloth was made, where the shirt was sewn, and how it was transported to where you are. How much energy did that take? What is the carbon footprint of your shirt? How is your shirt related to sustainable use of resources?

From simple statements such as these, pupils will build their conceptions of sustainability and their knowledge of it.

Several tools to reorient a curriculum to address sustainability have been created. The *ESD Lens* "Review Tool 9: ESD integration in the curriculum" provides a way for analysing the extent to which ESD is integrated in the curriculum at national and school levels. The *Education for Sustainable Development Toolkit* contains eight exercises for reorienting a curriculum to address sustainability and holding community forums to gather public opinion related to curricular change. "Project Y" has also been used widely to integrate sustainability into existing lesson plans and units. Project Y takes a gradual approach, introducing one or a few new items related to sustainability in each lesson. Over the course of a school year, the aggregate amount of sustainability taught and time on task (i.e. learning about sustainability) can be substantial.

The reorienting process can also occur at national levels or provincial/state levels in ministries of education where the mandated curriculums are written. A national or provincial process should be conducted more systematically and thoroughly than a reorienting process carried out by a teacher working in isolation or by a small team of teachers working in a school. A national or state level process would include inviting stakeholders to a public participation process to gather input (e.g. statements of needs and desires as well as opinions) related to the reorienting process. In this way, a ministry will be modelling public participation and transparency, which are essential elements of sustainability. (See Case Study: Toronto Board of Education Curriculum Revision and Reorientation, http://www.esdtoolkit.org/discussion/case_study.htm).

To reorient a curriculum to address sustainability, educational communities need to identify the knowledge, issues, perspectives, skills, and values central to sustainable development in each of the three components of sustainability – environment, society, and economy – and integrate them into the curriculum. The education community also needs to decide which of the many existing sustainability issues (e.g. biodiversity, climate change, equity, and poverty) will be part of the curriculum. Ideally, efforts to reorient education will be based on national or local sustainability goals. A properly reoriented curriculum will address local environmental, social, and economic contexts to ensure that it is locally relevant and culturally appropriate.

In an effort to save time or resources, governments have imported curricula from other countries or regions. In the case of ESD, this is inappropriate, because local and national sustainability goals and local contexts will not be well targeted.

See Sample Activities:

ESD Lens Review Tool 9: ESD integration in the curriculum

Project Y: Exercises of reorienting curriculum

To access the ESD Lens Review Tool 9: ESD integration in the curriculum, open the following hyperlink and go to page 68. Review Tool 9 focuses on the extent to which ESD is integrated into the curriculum.

http://unesdoc.unesco.org/images/0019/001908/190898e.pdf

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Project Y: Exercise for reorienting curriculum

Directions: Identify a lesson plan or unit that you currently teach. Write the name of the unit in the circle. Categorize what you currently teach using the chart below. How can you add one or more sustainability elements related to knowledge, issues, skills, perspective or values to this lesson or unit?

Society

Knowledge
Already in my unit: _____
_____
I would like to add: _____
_____

Local Issues
Already in my unit: _____
_____
I would like to add: _____
_____

Skills
Already in my unit: _____
_____
I would like to add: _____
_____

Perspectives
Already in my unit: _____
_____
I would like to add: _____
_____

Values
Already in my unit: _____
_____
I would like to add: _____
_____

Economy

Knowledge
Already in my unit: _____
_____
I would like to add: _____
_____

Local Issues
Already in my unit: _____
_____
I would like to add: _____
_____

Skills
Already in my unit: _____
_____
I would like to add: _____
_____

Perspectives
Already in my unit: _____
_____
I would like to add: _____
_____

Values
Already in my unit: _____
_____
I would like to add: _____
_____

Environment

Knowledge
Already in my unit:
_____
_____
_____
I would like to add:
_____
_____
_____
_____

Local Issues
Already in my unit:
_____
_____
_____
I would like to add:
_____
_____
_____
_____

Skills
Already in my unit:
_____
_____
_____
I would like to add:
_____
_____
_____
_____

Perspectives
Already in my unit:
_____
_____
_____
I would like to add:
_____
_____
_____
_____

Values
Already in my unit:
_____
_____
_____
I would like to add:
_____
_____
_____
_____

Reference Sheet for Completing Project Y Worksheet

Reorienting education involves selecting appropriate knowledge, issues, skills, perspectives, and values for the environmental, social, and economic spheres of sustainability. The following are suggestions to begin completing a PROJECT Y worksheet.

Knowledge

People need basic knowledge from the natural sciences, social sciences, and humanities to understand:

- the principles of sustainable development,
- how they can be implemented,
- the values involved, and
- the ramifications of their implementation.

Skills

ESD must provide people with the practical skills that will enable them to:

- continue learning after they leave school,
- to find a sustainable livelihood, and
- to live sustainable lives.

Examples:

- The ability to communicate effectively both orally and in writing;
- The ability to think about systems (both natural and social sciences);
- The ability to think in terms of time – to forecast, to think ahead, and to plan;
- The ability to think critically;
- The ability to use multiple perspectives to understand another person's viewpoint;
- The ability to analyse values underlying differing positions;
- The capacity to move from awareness to knowledge to action;
- The ability to work cooperatively with other people;
- The capacity to develop an aesthetic response to the environment and the arts.

Reference Sheet for Completing Project Y Worksheet

Issues

Every community has sustainability issues. Reorienting education includes selecting issues that are relevant to the local community. Here are a few of many possible issues:

Agriculture

Atmosphere

Biodiversity

Changing consumption patterns

Climate Change

Deforestation

Desertification and drought

Fresh water

Gender equity

Human settlement

Indigenous people

Land use

Oceans

Population growth

Poverty

Protecting and promoting human health

Solid and hazardous wastes and sewage

Perspectives

Perspectives on sustainability are commonly statements that expand upon the principles of sustainable development found in Agenda 21. Principles include, but are not limited to:

- Environmental protection and human-centred development are considered together, not separately.
- There must be a balance and integration of environment, society, and economy.
- States have a right to development, but must respect geographic boundaries.
- Partnerships can achieve more than solitary action.
- Social and environmental problems change through time and have both a history and a future.
- Contemporary global environmental issues are linked and interrelated.
- Systems thinking or a whole-systems approach should be used in problem solving rather than looking at problems in isolation.
- Humans have universal attributes.
- The family is the foundational social unit.
- Local issues must be understood in a global context and we should realize that solutions to local problems can have global consequences.
- Individual consumer decisions and other actions affect and give rise to resource extraction and manufacturing in distant places.
- Differing views should be considered before reaching a decision or judgement.
- Economic values, religious values, and societal values compete for importance as people with different interests and backgrounds interact.

- Technology and science alone cannot solve all of our problems.
- Individuals are global citizens in addition to being citizens of the local community.
- Communities are built for all people regardless of income, ethnicity, status, etc.
- Community and governmental decision-making must include public participation. People whose lives will be affected by decisions must be involved in the process leading to the decisions.
- Transparency and accountability in governmental decision-making are essential.
- The decentralization of governmental decision-making allows people to find solutions that fit local environmental, social, and economic contexts.
- Employing the precautionary principle – taking action to avoid the possibility of serious or irreversible environmental or social harm, especially when scientific knowledge is incomplete or inconclusive – is necessary for the long-term well-being of a community and our planet.

Values

Understanding values (e.g. one's own values, the values of the society one lives in, and the values of others around the world) is an essential part of understanding one's own and other people's viewpoints. Values from the Earth Charter include:

- Respect the Earth and life in all its diversity.
- Care for the community of life with understanding, compassion, and love.
- Build democratic societies that are just, participatory, sustainable, and peaceful.
- Secure the Earth's bounty and beauty for present and future generations.
- Eradicate poverty as an ethical, social, and environmental imperative.
- Affirm gender equality and equity.
- Uphold the right of all, without discrimination.
- Treat all living beings with respect and consideration.
- Promote a culture of tolerance, nonviolence, and peace.

Principles of Sustainable Development

The Rio Declaration contains 28 principles of sustainable development including:

- People are entitled to a healthy and productive life in harmony with nature;
- Eradicating poverty and reducing disparities in living standards is essential;
- Warfare is inherently destructive to sustainable development.

Reference Sheet for Completing Project Y Worksheet

Herman Daly's three conditions of a sustainable society:

(1) Rates of use of renewable resources do not exceed their rates of regeneration.

(2) Rates of use of non-renewable resources do not exceed the rate at which sustainable renewable substitutes are developed.

(3) Rates of pollution emission do not exceed the assimilative capacity of the environment.

Donnella Meadows outlined these general guidelines for restructuring world systems towards sustainability:

(1) Minimize the use of non-renewable resources.

(2) Prevent erosion of renewable resources.

(3) Use all resources with maximum efficiency.

(4) Slow and eventually stop the exponential growth of population and physical capital.

(5) Monitor the condition of resources, the natural environment, and the welfare of humans.

(6) Improve response time for environmental stress.

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Teaching Techniques for ESD

Quality Education

UNESCO has identified ten key aspects that support quality education related to the individual learner and to systems of education. Five of these aspects are at the level of the learner, including:

- seeking out the learner,
- acknowledging the learner's knowledge and experience,
- making content relevant,
- using many teaching and learning processes, and
- enhancing the learning environment (UNESCO, 2005).

By using a variety of teaching techniques, teachers help pupils employ and develop different learning processes. With variety, pupils have a chance to grow as learners and to enhance their skills and capacity to learn and think.

A quality education implies that the needs of individual learners will be considered and addressed in developing and delivering lessons. By using a variety of teaching techniques, the teacher attends to the diverse needs of the pupils in the class. Not all students learn in the same way. Some prefer to listen, others to read, and still others to participate more actively. Unfortunately, traditional pedagogies mainly serve pupils who are good at listening, reading, memorizing and sitting still; however, not all pupils have these abilities. Yet education is for all.

Meeting the learning needs of all pupils in the classroom is a form of social equity, which is a core concept of sustainability. For many years, the educational community did not link teaching techniques with social equity. Previously, only the pupils who were good at reading, memorizing and reciting excelled in school. Those pupils who were not did not thrive in school and often dropped out, thereby limiting their careers and economic potential. Dropping out of school is a major social and economic sustainability issue. However, using a variety of teaching techniques to meet the learning needs of pupils can address equity in the classroom. Such practice also demonstrates to the pupils a form that equity and social sustainability can take. Pedagogies used in school, like other educational practices (e.g. a whole-school approach to sustainability), can therefore promote principles of sustainability.

Another form of equity inherent in sustainability that is visible in the classroom is related to gender. Considering that men and women, particularly in rural and indigenous societies, tend to have quite different socio-cultural roles, classroom teaching techniques need to be employed in locally relevant and culturally appropriate ways that foster gender equity. The same is true for access to educational resources for both boys and girls.

ESD Pedagogies

Pedagogies associated with ESD stimulate pupils to ask questions, analyse, think critically and make decisions. Such pedagogies move from teacher-centred to student-centred lessons and from rote memorization to participatory learning.

ESD pedagogies are often place-based or problem/issue-based. ESD pedagogies encourage critical thinking, social critique, and analyses of local contexts. They involve discussion, analysis and application of values. ESD pedagogies often draw upon the arts using drama, play, music, design, and drawing to stimulate creativity and imagine alternative futures. They work towards positive change and help pupils to develop a sense of social justice and self-efficacy as community members.

The following are descriptions of and sample activities for four teaching techniques: simulations, class discussions, issue analysis, and storytelling. Each technique stimulates different learning processes.

Simulations

Simulations are teaching/learning scenarios in which the teacher defines the context in which the pupils interact. The pupils participate in the scenarios and gather meaning from them. For example, pupils imagine they live in a small fishing village and have to learn how to manage the fishing stocks sustainably (i.e. without depleting the fishing stocks or starving the people). Often, simulations are simplifications of complex abstract concepts. At the same time, because they are distillations of real-world situations, simulations give a sense of reality and thus engage and motivate learners of all ages.

Teaching Techniques for ESD

Why

Concepts associated with sustainability are often abstract and complex. Simulations reduce complexity and highlight salient aspects. Simulations give concrete ways to teach abstract concepts. Providing concrete examples for abstract concepts is especially important for children and adolescents, many of whom are still in the concrete stages of cognitive development.

Connection to ESD Pedagogies

Simulations:

- Engage pupils with visual, auditory and tactile-kinesthetic learning modalities, thereby promoting equity.
- Address real life problems that face communities and add relevance to the curriculum.
- Promote higher-order thinking skills.

How

Teaching using simulations involves:

- Teaching academic concepts related to the simulation.
- Describing the context of the simulation.
- Explaining the rules of the simulation.
- Monitoring the activities of the pupils as they engage in the simulation and gently redirecting if necessary, and
- Reflection on the simulation and relating it back to the concepts.

The reflection is important in reinforcing the academic concepts.

After using a simulation in class, it is important to process the simulation to know if the pupils learned what the teacher expected. The discussion also provides the teacher with the opportunity to deal with any misconceptions that arise. Use the following three questions to process the simulation:

(1) What did you learn?

(2) How is this simulation like real life?

(3) How does the simulation differ from real life?

The answers from the pupils can be surprising. For example, to teach about sustainability, one teacher used the Sustainable Resource Management Inquiry simulation, which is described in the sample activities section. When she asked the class, "What did you learn?" the first group answered, "It's not possible." She paused before writing their answer on the board. Fortunately, the other groups intervened to explain to the first group and the class that it was, in fact, possible. The answers to these three questions can thus provide the teacher with a high level of understanding of what the pupils perceived and learned during the simulation.

See Sample Activity: Sustainable Fisheries Management Inquiry: A simulation activity.

Teaching Techniques for ESD

Class Discussions

Class discussions allow for the transfer of information amongst pupils and from the pupils to the teacher, in addition to the traditional route from teacher to pupils. Pupils come to the classroom with a wide variety of life experiences that can enrich the teaching of the mandated curriculum. Pupils can therefore contribute a great deal to discussions of sustainability with observations from their neighbourhoods about what is sustainable and what is not. Teachers can then incorporate these experiences into their lessons through class discussions that provide pupils with real life applications of concepts.

Why

One of the skills that ESD develops is the ability to communicate orally and in writing. Discussions give pupils opportunities to develop oral communication skills (e.g. developing focus and purpose before speaking, active listening, building on the ideas of others, summarizing, and questioning). Pupils with strong auditory learning modalities learn well from discussions, both from listening and expressing their own ideas.

Connection to ESD Pedagogies

Classroom discussions:

- Are student-centred,
- Stimulate pupils to analyse and think critically, and
- Promote participatory learning.

How

Class discussions require planning as with other types of teaching techniques. Discussion can be built into a lecture or around a list of questions, a problem to solve, a plan to be made, or an activity to be completed. All of these require verbal exchanges among group members. Discussions can take a variety of forms. Large-group discussions involve the whole class; small-group discussions just two to six pupils. Discussions can be teacher-led, pupil-led, or interactive. Discussions do require setting and enforcing ground rules (e.g. one person speaks at a time while the others listen).

Teachers can use discussions to assess pupil knowledge and application of the three spheres of sustainable development – environment, society, and economy. Sometimes one of the aspects is obvious (e.g. recycling aluminium is good for the environment because it conserves energy), but others might not be as obvious (e.g. recycling is good for the economy because it employs people, and recycling is good for society because the city government does not have to spend as much on garbage collection and disposal and can therefore allocate the money for other priorities and needs, for example education).

See Sample Activity: How is the Activity Pictured Sustainable? Class discussion.

Issue Analysis Techniques

Issue analysis is a structured technique for exploring the environmental, social, economic, and political roots of problems that face communities. Issue analysis helps pupils identify major arguments related to a community problem as well as key stakeholders and their perspectives, goals, and assumptions related to that problem. Issue analysis also looks critically at the proposed solutions and the costs—financial and otherwise—and at who will bear those costs. Issue analysis can be done briefly or in depth. Issue analysis is interdisciplinary, bridging the natural and social sciences.

Why

Sustainability is an over-arching paradigm that encompasses environmental, social, economic, and political problems and issues that face communities around the world. When the pupils of today assume positions of leadership and become voters, they will have to deal with complex issues that have no simple answers. While in school, they should develop the tools and frameworks for thinking in a way that will help them untangle the complexities of sustainability issues that face their communities. They will also need to learn to create solutions that are locally appropriate and at the same time keep in mind global consequences (e.g. cleaning up local pollution without shipping toxic and hazardous waste to another country). Issue analysis guides pupils through a process that can be used with any issue. It is a generic process that can be applied to a wide range of environmental, social, and economic problems.

Issues analysis also gives pupils a way to come to grips with the feeling that something is not quite right in their own community and in communities around the world, but that they do not yet have the skills to explore. Pupils today come to school with broad exposure to the media. These media put them in contact with people outside their neighbourhoods and around the world. Additionally media expose them to excessive wealth and grinding poverty as well as many other inequities in the world. Pupils hear seemingly contradictory facts, for example, that people have never been wealthier and yet more than a billion people around the world live on less than one US dollar per day.

Connection to ESD Pedagogies

Issue analysis:

- Brings relevance to the curriculum.
- Promotes higher order thinking skills and critical thinking skills.
- Promotes decision-making (e.g. evaluating which proposed solution is best).
- Promotes thinking about the future.

How

Issues analysis begins with naming an issue or problem and being able to clearly define it. Several good issue analysis frameworks appear in the educational literature. Two frameworks, which are based on lists of questions to ask about an issue, are featured in the sample activities section. Pupils answer the list of questions for a community issue or problem. Issue analysis can be done individually, as a small group or as a class.

See Sample Activities: Critically Reading Newspaper Articles: Sustainability issues analysis.
Writing a Brief: Local sustainability issue analysis.

Storytelling

Telling stories to convey and illustrate sustainability ideas is an engaging form of teaching. Stories can be taken from current events, history, television programmes, literature, drama, and personal experience. Storytelling also draws on the oral traditions of indigenous societies and folk art. Storytelling has been practised for generations as a means of entertainment, education or cultural preservation and to instil moral values among younger generations. Storytelling is an effective ESD pedagogy as the values reflected in traditional stories often contain the wisdom of the elders or stem from creation stories, which helps to impart respect for cultural heritage as well as the environment.

Why

Storytelling makes ideas, theories, and concepts learned from textbooks come alive. Storytelling adds a human element to otherwise dry information. This enables teachers to better transmit sustainable development information, principles and values to pupils. Storytelling is especially good for pupils whose preferred learning modality is auditory. Remembering a list of isolated concepts and definitions is difficult, but recalling the flow of a story related to these concepts may be easier for pupils. A story may also provide a non-threatening way to ease pupils into learning. Stories engage people of all ages and abilities.

Connection to ESD pedagogies

Storytelling:

- Links to traditional and indigenous knowledge and passes wisdom from one generation to the next;
- Engages learners with cultural heritage and the fourth dimension of sustainability, culture;
- Connects with auditory learners, who are not fully engaged in classroom based on learning from textbooks, to address issues of classroom equity;
- Incorporates principles, perspectives, and values related to sustainability.

How

A lesson can be structured with a storytelling component that illustrates the academic content or adds a sustainability component to the lesson. For example, predator-prey relationships can have a sustainability twist by telling a story of the unintended consequences of the introduction of non-native species (e.g. rabbits into Australia). Rather than progressing through the material fact by fact, this may be told within a story structure built on a plot with an initial situation, conflict, complication, climax, suspense, resolution, and conclusion. With practice, the pace of a story can be varied and suspense built through pauses to draw pupils' attention.

A variation of this lesson plan is, instead of providing the resolution to a story, asking pupils to imagine it, thereby allowing pupils to develop problem-solving and critical thinking skills. Teachers can ask questions such as:

- What do you imagine happens next? How is that a logical extension to the story? What do you think could have happened if...?

Bringing the story back to the content of the lesson and the theme of sustainability is important. Teachers can ask, for example, how does this story illustrate sustainability and its principles and values? Openly linking the story to the class content is important. Although the tie between the story and the content is obvious to the teacher, it may not be so to the pupils.

Combining Teaching Techniques

Many other teaching techniques that engage pupils in participatory learning and high-order thinking skills exist. The Internet is full of lesson plans based on different teaching and learning techniques. Part of the challenge is having a coherent plan to use a variety of techniques to achieve learning goals (e.g. fostering both independent and collaborative learning) as well as teaching the content of the mandated syllabus. The ESD Lens Review Tool 8: Teaching and Learning Strategies is designed to help teachers balance teacher-centred and learner-centred approaches as well as examining how these approaches can be combined in an ESD learning process.

See Sample Activity: ESD Lens Review Tool 8: Teaching and Learning Strategies.

To access the ESD Lens Review Tool 8: Teaching and Learning Strategies, open the following hyperlink and go to page 63. Review Tool 8 encourages a balance between teacher-centred and learner-centred approaches as well as combining different teaching and teaching processes.

http://unesdoc.unesco.org/images/0019/001908/190898e.pdf

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Sustainable Fisheries Management Inquiry: A simulation activity

DESCRIPTION: Sustainable management of a resource pool is complex, involving many social and economic variables. In this simulation, toothpicks represent fish in a lake surrounded by a fishing village. Residents of the village fish for sustenance and economic well-being and are challenged to make their resources feed everyone in the village for all times.

TEACHING TECHNIQUES: simulation, hands-on, class discussion.

GRADE LEVELS: Lower and upper secondary.

OBJECTIVE: To learn about sustainable resource management and the necessity for community cooperation.

VOCABULARY: Sustainable Resource Management, replenish

MATERIALS: Toothpicks or pebbles (about 120 per group of four pupils).

TIME: 30–60 minutes.

TEACHING SEQUENCE:

- Separate class into groups of four.
- Teacher explains that each group of four is a fishing village and that the toothpicks represent the fish in the lake. The village has to figure out how many fish they can catch each round so that there are always enough fish for the villagers.
- Teacher explains the rules:

– Begin with 16 toothpicks (fish) in the lake.

– Each person must draw at least one toothpick per round to survive.

– At the end of each round, nature replenishes the resource pool by approximately one-half of the number of fish existing in the lake. (For example, if 8 toothpicks are left in the lake, then 4 toothpicks are added to the resource pool.)

- Pupils play game. If a community does not manage the fish stock well and removes them all from the ocean, explain the consequences (e.g. the members of the community could die of starvation or have to relocate). Request the pupils start the game over.
- Ask the pupils questions to answer while playing: What is the maximum number of fish that each person can withdraw and still have the resource pool last for generations?
- Discussion questions following the game:

  (1) What did you learn?

  (2) How is this simulation like real life?

  (3) How does the simulation differ from real life?

CLOSURE: What did you learn about living in a sustainable community from this activity?

EVALUATION: Listen to the responses of the three discussion questions as well as the closure. The answers are revealing of pupil understanding.

EXTENSION: Ask pupils to tell stories about the life they would lead in this fishing village and how it affects the number of fish they take from the sea. For example, one person is single and takes one fish. Another person is married with children and requires three fish to feed his whole family. Another person takes two fish—one for herself and another to sell to the restaurant.

SAFETY: Remind pupils not to put the toothpicks in their mouths because they carry germs from other people's hands. Remind pupils that the toothpicks are sharp and rules for sharp objects apply (e.g. no poking classmates).

SOURCES:

UNESCO. 2006. "To drain or to sustain," Education for Sustainable Development Toolkit. *Learning & Training Tools* No.1, pp. 62-63.
http://unesdoc.unesco.org/images/0015/001524/152453eo.pdf
Also available online in html at http://www.esdtoolkit.org/concept_intro/drain1.htm

Project Learning Tree. 1995. Renewable or not? Pre K – 8 *Environmental Education Activity Guide*. Washington, D.C. American Forest Foundation.

How is the Activity Pictured Sustainable? Class discussion

DESCRIPTION: This lesson focuses on pupil descriptions of the three spheres of sustainability in their own community. Sustainability is often thought of as related solely to the environment. This activity brings out the social and economic dimensions of sustainability.

TEACHING TECHNIQUES: Class discussion, graphic analysis.

GRADE LEVELS: Upper primary and lower secondary.

OBJECTIVE: To build pupil understanding of all three spheres of sustainability – environment, society, and economy.

VOCABULARY: Sustainable development.

MATERIALS: Pictures of activities in the community (e.g. riding a bicycle, recycling, buying food that is locally grown instead of imported food, purchasing from local merchants rather than major department stores or supermarkets, using a reusable cup rather than disposable one, planting a tree, visiting the community library, mentoring the next generation, attending community meetings).

TIME: 30 to 60 minutes.

TEACHING SEQUENCE:

- Teacher explains that s/he will show pictures of a number of activities common to the community. As the pupils look at the picture, they think about whether the activity contributes to a more sustainable community.
- Teacher asks pupils to explain how the activities in the pictures could contribute to a more sustainable society. Pupils should explain: (1) the action's contribution to sustainability in terms of environment, society, and economy or (2) the principle of sustainable development that the picture illustrates.

CLOSURE: Teacher draws a concept map on the board with the responses to the following question: What did you learn about our community and the three spheres of sustainable development – environment, society, and economy – today?

A concept map, also called a mind map, is a graphic illustration of major concepts, subordinate concepts and examples represented by different geometric shapes. For example, ellipses are drawn around major concepts and connected with lines or arrows to subordinate concepts in squares. Examples are added in diamonds.

EVALUATION: Listen to the pupils' comments during the discussion and to their responses to the question in the closure.

EXTENSION: Request that pupils take pictures in their community and then use their pictures as the topics of discussions. Pupils can photograph activities that create more sustainable communities as well as those that lead to less sustainable communities.

SAFETY: Not applicable. (For the extension, pupil should be reminded of safety issues and precautions while walking around their communities taking pictures.)

SOURCES: Mind maps. About.com. http://homeworktips.about.com/od/homeworkhelp/ss/mindmap.htm (Accessed 2 July 2010.)

EXAMPLES:

Picture: A person riding a bicycle on a city street.

Riding a bicycle is good for the environment because it does not create much air pollution especially when compared to driving a car, which consumes fossil fuels. Riding a bicycle is good for society, because the rider can interact with other people rather than being isolated in a car. Riding a bicycle is good for the economy because bicycles have a lower impact on the roads compared to heavy vehicles, and, as a result, less costly road repair is necessary.

Picture: A recycling bin.

Recycling is good for the environment because it conserves natural resources and energy. Recycling is good for the economy because it employs people to sort and package materials for resale. Recycling is good for society because the city government does not have to pay for as much garbage collection and disposal. In this way, money can be spent on other priorities and needs, such as education.

Picture: A local farmers' market.

Buying locally grown food is better for the environment because it requires less energy to transport it to market. Foods grown in distant places require large quantities of fossil fuels to transport them to market, thereby increasing greenhouse gases in the atmosphere and contributing to global warming. Buying locally grown food supports local

How is the Activity Pictured Sustainable? Class discussion

farmers and their families financially. Buying locally grown produce contributes to community well-being in that locally grown foods are often more nutritious.

Picture of a locally owned store.

One of the principles of a sustainable economy is to keep money circulating within a community as long as possible. Purchasing from local merchants rather than supermarkets is good for the local economy. If people buy goods from a large discount store, the profit goes to the corporation and stockholders who are not usually a part of the community in which the store is located. If a person buys clothing from a local merchant, that merchant can buy food from a local farmer, who can then buy shoes from a local merchant, etc.

Picture of a stack of reusable cups and disposable cups next to a large beverage container.

Using a reusable cup rather than a disposable one reduces the amount of garbage communities have to manage. Garbage collection and disposal are expensive. In addition, reusing cups requires less energy than manufacturing new ones. Using less energy means reducing the use of fossil fuels and the production of greenhouse gasses.

Picture of a young tree being planted.

Planting a tree is good for the environment because it holds the topsoil in place and it also helps the community by purifying the air and providing shade. This natural cooling is much less expensive than mechanical air conditioning.

Picture of a library.

Libraries are amongst the most sustainable institutions in our communities. Not only do they allow people to borrow and read far more books and magazines than they could afford, they are also repositories of community information (e.g. newspaper collections), which support community decision making.

A picture of an older person working with children.

Mentoring the next generation is an important part of social sustainability. Older generations need to transmit their knowledge, skills and wisdom to the younger generations. Such interactions pass on cultural knowledge, which adds richness to lives and can help prevent poverty or illness.

A picture of a community/neighbourhood meeting or sign announcing a public meeting.

Public participation is an important tool or way of doing business in creating sustainable communities. Those whose lives will be affected by government decisions should be given an opportunity to express their desires and concerns. Public participation requires a public that is willing to participate and for community members to express their opinions.

Writing a Brief:
Local sustainability issue analysis

DESCRIPTION: The lesson plan gives pupils an opportunity to practise issue analysis.

TEACHING TECHNIQUES: Issue analysis, class discussion.

GRADE LEVELS: Upper secondary.

OBJECTIVE: To give pupils practice analysing complex sustainability issues at the community level.

VOCABULARY: Spatial distribution, longevity, risk, unintended consequences.

MATERIALS: (1) Newspaper articles, brochures, and other publications on a local sustainability issue and (2) list of 13 issue analysis questions

TIME: Two class sessions (approximately 45 minutes to an hour each) separated by at least a day for pupils to complete the assignment as homework.

TEACHING SEQUENCE:

- The teacher selects an issue that the local community faces and prepares for issue analysis by collecting newspaper articles, brochures, etc. on the issues
- Teacher gives the assignment.

Assignment: You are working for the city government. An issue is on the city's agenda for discussion and possible action in the coming months. From the list of 13 issue analysis questions, select the five most important to this issue and write a two-page brief for your supervisor that s/he can discuss at the next staff meeting.

- Pupils read the published materials and then select the five questions they think are the most important.
- The teacher leads a discussion on which elements the pupils consider to be the most important and why.
- The pupils complete the assignment.
- The teacher reads the completed assignment and prepares a discussion on two or three of the 13 questions (e.g. what are the advantages and disadvantages of the proposed solutions?).

CLOSURE: What did you learn about the process of community issue investigation?

EVALUATION: Create a scoring guide or rubric and assess completed assignment using the scoring guide or rubric. (See "Assessing Pupil Learning with Rubrics" Brief in this series.)

EXTENSION: Invite an employee of the city government to talk to the class about the issue and to listen to the pupils' interests and concerns.

ALTERNATIVE ASSIGNMENT:

In place of using a community issue for this assignment the teacher chooses a scenario or case study for the pupils to analyse. Please note that if the teacher selects a scenario that the pupil will have to use their imaginations or collect data from other sources rather than using locally-related facts to complete the assignment.

Scenario 1 – The city has been approached by a waste hauler from a wealthy country. The hauler has offered to pay the city $20,000 if they accept tons of electronic waste dumped on vacant land near the city dump.

Scenario 2 – The city would like to install a water purification plant for the city's water system. Currently, the water in the system is not purified and many people get sick from it, especially infants, young children, and the elderly.

Scenario 3 – A real estate developer asks the city to purchase vacant property within the city limits to construct an office building. The neighbours oppose the idea because the land is the only nearby open space, which they use for recreation. However, the city needs money and is considering selling the land.

SAFETY: Not Applicable

Writing a Brief:
Local sustainability issue analysis

13 Issue Analysis Questions

1. What are the main historical and current causes (i.e. physical/biotic, social/cultural, or economic) of the issue?
2. What are the geographic scale, the spatial distribution, and the longevity of the issue?
3. What are the major risks and consequences to the natural environment?
4. What are the major risks and the consequences to human systems?
5. What are the economic implications?
6. What are the major solutions that are currently implemented or proposed?
7. What are the obstacles to these solutions?
8. What major social values (e.g. economic, ecological, political, aesthetic) are involved in or infringed on by these solutions?
9. What group(s) of people would be adversely impacted by or bear the cost of these solutions?
10. What is the political status of the problem and solutions?
11. How is this issue connected to other issues?
12. What change can you make or have made in your daily life to lessen the issue?
13. Beyond changes in your daily life, what is the next step you could take to address the issue?

Source: McKeown-Ice, R. and Dendinger, R. 2008. Teaching, learning, and assessing environmental issues. *Journal of Geography*, Vol. 107, pp. 161 – 166.

Critically Reading Newspaper Articles: Sustainability issue analysis

DESCRIPTION: The lesson plan gives pupils an opportunity to practise issue analysis.

TEACHING TECHNIQUES: "Jigsaw" cooperative learning, issue analysis, class discussion.

GRADE LEVELS: Upper primary and lower secondary.

OBJECTIVE: To give pupils the opportunity to learn to critically read newspaper articles on local sustainability issues. They will also learn about their community in the process.

VOCABULARY: Assumptions, manipulation, controversy

MATERIALS: Three newspaper articles on a controversial topic of local interest, which is related to sustainability.

TIME: 45–75 minutes.

TEACHING SEQUENCE:

- Teacher separates the class into learning teams (i.e. groups of three).
- Teacher gives each pupil in the learning team a copy of one of the three articles. Each pupil silently reads her/his article twice.
- Pupils separate into three temporary "expert" groups according to the article they were assigned to read in the expert groups. (For example, all those with article number one sit together.) The pupils identify and discuss the main points of their reading and rehearse how they will present them to their own learning teams. The three expert groups disband and each learning team reassembles.
- Each person in the learning team presents the information from her/his newspaper article. The others in the group ask questions for clarification.
- Each learning team writes answers to the following four questions based on the newspaper articles.
  - What is the issue about and how does it relate to sustainability?
  - What are the arguments?
  - What are the assumptions made?
  - How are the arguments manipulated?
- The teacher then leads a class discussion, giving each group a chance to add their ideas to the discussion.

CLOSURE: What did you learn today about newspapers as a source of information?

EVALUATION: Listen to the discussion of the four questions as well as the closure. The answers reveal a great deal about what the pupils have understood.

EXTENSION: Repeat this activity using a different topic. Repetition will help pupils cement their skills and deepen their knowledge about other topics that face their community.

SAFETY: When pupils move to their groups they must be respectful of others, not jostling anyone or removing her/his chair.

SOURCES:

Clark, P. 2000. Teaching Controversial Issues, *Green Teacher*, Vol. 62.

Jigsaw Classroom. Jigsaw in 10 easy steps. http://www.jigsaw.org/steps.htm (Accessed July 1, 2010.)

Reading a Traditional Tale: A storytelling activity

DESCRIPTION: This lesson invites reflection upon the principles of truth and falsehood and whether or not they contribute to the citizenship required for more sustainable societies. This activity highlights human values and ethics associated with sustainability.

TEACHING TECHNIQUES: Storytelling.

GRADE LEVELS: Primary

OBJECTIVE: To develop understanding of human values associated with sustainability, such as responsibility and citizenship, and to engage pupils in higher-order thinking skills.

VOCABULARY: Truth, falsehood, deceive, citizenship, common good.

MATERIALS: Text of folk tale "Fire, Water, Truth and Falsehood"

TIME: 45 minutes.

TEACHING SEQUENCE:

- Explain to the pupils basic concepts of sustainability and vocabulary, such as
  - working individually or together for the common good,
  - citizenship (i.e. the behaviour of an individual in terms of the duties, obligations, and functions of a member of society), and
  - transparency (i.e. informing others or the public about decision-making processes and activities),
- Set the scene for reading an African tale. For example, in many cultures, elders tell stories to young people to pass on wisdom; this is one of many such stories. In this story, human characteristics (i.e. telling the truth and telling lies) and things commonly found in the world around us (i.e. fire and water) are personified and become major actors in the story.
- Read the folk tale "Fire, Water, Truth and Falsehood."
- Pause to let pupils think about the tale.
- Ask a pupil to summarize the tale.
- Lead a discussion linking the tale to concepts of sustainable development with questions such as:
  - How is working for the common good illustrated in this tale?
  - How is working for the common good broken?
  - Which character deceived another character?
  - What was the motivation of falsehood? (E.g. greed)
  - What does this story teaches about the issue of truth and falsehood?
- Link the tale to daily life
  - Ask pupils to give examples from daily life that illustrate working for the common good and good citizenship.
  - Ask pupils to give examples from daily life in which for personal gain an individual or an organization is not truthful or transparent. How did this hurt the common good?
  - How can committing ourselves to truthfulness and working for the common good help our community or the world in general?

CLOSURE: Ask pupils what they learned about truth and sustainability.

EVALUATION: Listen to the pupils' comments in the discussion and the questions in the closure.

EXTENSION: Ask pupils to write and share their own tales dealing with truth, falsehood and sustainability.

SAFETY: None

SOURCES:

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Reading a Traditional Tale:
A Storytelling activity

Fire, Water, Truth and Falsehood
An African Tale

Long ago, Fire, Water, Truth, and Falsehood lived together in one large house. Although all were polite toward each other, they kept their distance. Truth and Falsehood sat on opposite sides of the room. Fire constantly leapt out of Water's path.

One day they went hunting together. They found a large number of cattle and began driving them home to their village. "Let us share these cattle equally," said Truth as they travelled across the grasslands. "This is the fair way to divide our captives."

No one disagreed with Truth except Falsehood. Falsehood wanted more than an equal share but kept quiet about it for the moment. As the four hunters travelled back to the village, Falsehood went secretly to Water and whispered, "You are more powerful than Fire. Destroy Fire and then there will be more cattle for each of us!"

Water flowed over Fire, bubbling and steaming until Fire was gone. Water meandered along, cheerfully thinking about more cattle for itself.

Falsehood, meanwhile, whispered to Truth. "Look! See for yourself! Water has killed Fire! Let us leave Water, who has cruelly destroyed our warm-hearted friend. We must take the cattle high in the mountains to graze."

As Truth and Falsehood travelled up the mountain, Water tried to follow. But the mountain was too steep, and Water could not flow upwards. Water washed down upon itself, splashing and swirling around rocks as it tumbled down the slope. Look and see! Water is still tumbling down the mountainside to this day.

Truth and Falsehood arrived at the mountaintop. Falsehood turned to Truth and said in a loud voice, "I am more powerful than you! You will be my servant. I am your master. All the cattle belong to me!"

Truth rose up and spoke out, "I will not be your servant!"

They battled and battled. Finally they brought the argument to Wind to decide who was master.

Wind didn't know. Wind blew all over the world to ask people whether Truth or Falsehood was more powerful. Some people said, "A single word of Falsehood can completely destroy Truth." Others insisted, "Like a small candle in the dark, Truth can change every situation."

Wind finally returned to the mountain and said, «I have seen that Falsehood is very powerful. But it can rule only where Truth has stopped struggling to be heard.»

And it has been that way ever since.

(Forest, 1996 pp. 91-92)

Assessing Pupil Learning with Rubrics

ESD calls for participatory learning, critical thinking, and communicating about complex, real-life issues. That is why traditional forms of assessment, which often involve selecting one correct answer amongst several possible answers – are not appropriate. As pedagogy and learning evolve, so assessment must also evolve.

Complex learning, such as learning related to sustainability, should not be assessed with simplistic measures (e.g. multiple-choice tests). Nevertheless, assignments that demonstrate pupils' understanding of complex topics (e.g. essays, projects, speeches, research reports and multi-media presentations) require deep thinking and original work by the pupil. At the same time, teachers are faced with the time-consuming and relatively difficult task of grading.

One tool for grading complex assignments in a systematic way is a rubric. Rubrics are effective because they assist both the teacher and the pupil. For the teacher, rubrics decrease grading time and increase objectivity. For the pupil, rubrics promote learning and provide effective feedback.

How to Make a Rubric

To make a rubric, the teacher creates a set of grading criteria or elements s/he expects to find in a completed assignment, an explanation of each element and a point value associated with it. The process includes:

1. Writing a draft of the assignment.

2. Making a list of items the pupils should learn or accomplish through completing this assignment. (What are the elements that the teacher expects to see in an excellent product?)

3. Organizing the list from most important to least important or in the order in which the elements should appear in the assignment.

4. Assigning each item on the list a percentage value so that the items total 100 percent.

5. Revising the assignment to be completely consistent with the rubric.

Table 1. Sample elements from rubric for a biographical essay

	Possible points	Points Earned	Comments
Name, date of birth and death	5		
Education (must include significance later in life)	5		
Major accomplishments with dates	5		
Explanation of how these accomplishments are connected to sustainability	10		
Grammar and spelling	5		

(Note. This table is not a complete rubric. To see a complete rubric visit

http://712educators.about.com/cs/biographies/l/blrubricbio.htm)

Assessing Pupil Learning with Rubrics

Assignment and Rubric

Teachers provide pupils with a rubric when they give and explain an assignment. By simultaneously receiving the assignment and corresponding rubric, the pupils know what is expected of them. This promotes learning and reduces grade anxiety. The teacher grades each assignment on a rubric form and gives the pupil the form with her/his mark on it. In this way, the pupil not only receives a specific mark, but also understands the strengths and weaknesses of her/his assignment.

Rubrics for Advanced Students

For students in secondary school and tertiary education, scoring rubrics are more complex. In addition to the list of elements of the assignment, levels of mastery are added, creating a grid with scoring elements vertically down one side and levels of attainment (e.g. emerging, developing, and mastery or needs work, competent, and excellent) horizontally across the top. Three to five levels of attainment are common. The teacher inserts descriptions of expected levels of mastery for each box in the grid.

Table 2. Sample Items from Rubric for Analysing a Sustainability Issue

	Needs Work	Competent	Excellent	Comments / Score
Choice of topic	Topic was not complex or controversial.	Topic was complex and controversial.	Topic was complex and controversial and lent itself well to analysis within the time allotted.	/10
Content	Incomplete grasp of information or key points missing and/or tenuous link to analytical framework.	Displayed understanding of topic but tie to analytical framework is tenuous.	Displayed full grasp of topic as it related to the analytical framework.	/15

Concluding Remarks

Rubrics are useful tools to help teachers rate pupil performance on varied forms of assessment while still allowing for variation and creativity on the part of the pupils. Rubrics are also flexible in that they allow for a greater depth of learning on a wide variety of sustainability topics.

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Extra-Curricular Activities

Some schools provide activities for pupils outside regular school hours, for example: thematic clubs and music, or athletic practices and events. Extra-curricular activities for pupils are usually voluntary rather than mandatory and often have social, philanthropic, artistic, athletic, or other goals instead of academic ones. Pupils often organize and direct these activities under teacher sponsorship or supervision, although pupil-led initiatives are also common.

In general, extra-curricular activities allow pupils to develop talents, skills, and abilities that the mandated primary and secondary curriculums do not address. As a matter of social equity, all pupils should have a chance to demonstrate their personal strengths, including non-academic ones, at school. These additional activities often allow pupils who do not excel in traditional classroom activities and behaviour (e.g. reading, reciting, and sitting still), to develop and demonstrate abilities which are not routinely used in the classroom. Providing all pupils with the opportunity to show their best work is a form of equity, which is at the heart of sustainable development and ESD.

Extra-curricular activities can focus on sustainability, addressing environmental, social and economic concerns of the community. The purpose of this section is to describe a variety of extra-curricular activities with sustainability themes.

School Gardens

Although school gardens are often used as living illustrations of the life science curriculum, they can also teach sustainability. School gardens can be used to increase pupil nutrition (e.g. school gardens provide produce for school meal programmes). School gardens also increase food security (the availability of and access to food) as well as teach agricultural skills for self-reliance or for use in a future career.
(See http://www.fao.org/schoolgarden/)

Community Monitoring

Pupils, assisted by teachers and community members, work together to monitor and critically evaluate the problems and conflicts facing their local community (e.g. beach erosion, water quality, traffic, or litter) and then design and implement activities and projects to address some of those problems. *Sandwatch*, a beach monitoring programme, is popular with teachers and pupils. (See http://www.sandwatch.org)

Pupil Peer Counselling

Adolescents often have issues they do not want to discuss with parents or teachers, but for which they need information and assistance in order to make decisions that may affect their well-being for years to come. Schools have established peer help desks and counselling to promote health, social responsibility, behaviour change, and decision-making. They have also established chat forums in which pupils can seek advice and guidance as well as openly express issues that concern them. Topics include physical and mental abuse, alcoholism, drug abuse, premarital sex, and HIV and AIDS. Such programmes help pupils become more knowledgeable about many of the serious health risks and social risks facing them and thus make more informed life decisions. (See *Mentoring Malaysia* http://www.youtube.com/watch?v=xJrm0miaSio and Makerere College, Kampala. Uganda, *UNESCO Associated Schools Second Collection of Good Practices: ESD*. P. 19–20.)

Special Events

Special events (e.g. environmental fairs, music and art festivals) at schools are memorable for pupils and community members who participate in them. Special events give pupils an opportunity to use skills and talents that are not often used in the classroom. Such opportunities address issues of equity, giving less academically oriented pupils a chance to employ and demonstrate their abilities. Pupils can sing, cook, perform sketches and make presentations, among other activities. Special events can focus on sustainability themes, giving pupils an opportunity to work cooperatively to gather information about different aspects of sustainability or unsustainable activities in the community. (See *Young Reporter – BIS Green Love Festival* http://www.youtube.com/watch?v=C9JGbfqiTkQ)

Extra-Curricular Activities

Community Service

Pupils observe inequities in their community between "the haves and the have-nots." They know that some community members lack the means to provide for their own needs, which is a social and economic sustainability issue. Some pupils express a desire to help. Community outreach comes in many forms (e.g. working in kitchens or food pantries to feed the hungry, visiting the elderly in nursing homes, assisting in nursery schools, and replanting environmentally degraded areas). Participation can be: (1) direct, involving face-to-face interactions with the recipients of the service, (2) indirect, with pupils working in supportive roles through a group or agency, or (3) via advocacy campaigns and raising awareness of a community problem. Such community service benefits pupils by increasing their sense of civic efficacy and their personal development. (See *Service Learning Reflections 2009 Chapel Hill High School* http://www.youtube.com/watch?v=whQUH1HPn4I)

Arts Drama, Music, and Dance

Drama, music, poetry, and dance can call upon talents and skills that are not part of the mandated curriculum and also have a sustainability focus. For example, pupils can write and act in sketches that reflect sustainable and unsustainable practices in the community or write lyrics to songs that remind others about good daily practices (e.g. water conservation). These pupils can perform for others so that the sustainability messages are conveyed across the school and into the community.
(See *Sustainability* http://www.youtube.com/watch?v=-wiuivBFxF8)

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What is ESD?

Education is the most powerful weapon you can use to change the world.

Nelson Mandela

Education is essential to sustainable development. The education of today is crucial to enhancing the ability of the leaders and citizens of tomorrow to create solutions and find new paths to a better, more sustainable future. Unfortunately, our current collective pool of human knowledge, skills, and experience does not contain the solutions to all the contemporary global environmental, societal, and economic problems. Although humanity has faced crises in the past and successfully navigated them, the scale of current problems is greater and the size of the world population larger than ever before. While we can draw upon experiences of the past to solve the problems of today and tomorrow, the reality is that citizens of the world will have the task of learning their way towards sustainability. Education is therefore central to learning and to a more sustainable future.

The responsibility for a more sustainable future is borne by governments and civil society as well as individuals. All must contribute in their own way. The 40 chapters of Agenda 21[1] describe ways forward in many areas, from agriculture to waste disposal. Education is a cross-cutting theme and is mentioned in each of the 40 chapters. This demonstrates how the education community has a special role to perform. It is through education that the next generation of citizens, voters, workers, professionals, and leaders will be prepared for life-long learning about sustainability.

The United Nations uses sustainability as an over-arching paradigm to address numerous interrelated challenges (e.g. poverty reduction, environmental protection, social justice, and education for all). (See Brief: What is Sustainable Development?) As part of this approach, the United Nations declared 2005 – 2014 as the Decade of Education for Sustainable Development (DESD). Education for sustainable development (ESD), also called education for sustainability (EfS) in some parts of the world, is a key concept for education in the new millennium. ESD is a broad concept bringing a distinctive orientation to many important aspects of education on the whole, including access, relevance, equity and inclusivity.

Thus, ESD is far more than teaching knowledge and principles related to sustainability. ESD, in its broadest sense, is education for social transformation with the goal of creating more sustainable societies. ESD touches every aspect of education including planning, policy development, programme implementation, finance, curricula, teaching, learning, assessment, administration. ESD aims to provide a coherent interaction between education, public awareness, and training with a view to creating a more sustainable future.

Four Thrusts of ESD

ESD has four thrusts or areas of emphasis:

(1) Improving access and retention in quality basic education

Enrolling and retaining both boys and girls in quality basic education is important to their well-being throughout their lives and to the society in which they live. Basic education focuses on helping pupils gain knowledge, skills, values and perspectives that encourage sustainable livelihoods and on supporting citizens to live sustainable lives.

(2) Reorienting existing educational programmes to address sustainability

Reorienting education requires revising education from early childhood care and up through higher education. It requires rethinking what is taught, how it is taught, and what is assessed, with sustainability as the central theme. This process is future-oriented because the pupils of today will need to be able to address the challenges of tomorrow, which will require creativity as well as analytical and problem-solving skills.

1 Agenda 21 is the official document of the United Nations Conference on Environment and Development, also called the Earth Summit, which was held in Rio de Janeiro in 1992. Agenda 21is a comprehensive blueprint for action to be taken globally, nationally and locally by organizations of the UN, governments, and major groups.

(3) Increasing public understanding and awareness of sustainability

Achieving the goals of sustainable development requires citizens who are knowledgeable about sustainability and about daily actions necessary to help achieve community and national sustainability goals. These citizens will require a widespread community education and responsible media that are committed to encouraging an informed and active populace to learn throughout life.

(4) Providing training to all sectors of the workforce

All sectors of the workforce can contribute to local, regional and national sustainability. Both public sector and private sector employees should receive ongoing vocational and professional training infused with the practices and principles of sustainability, so that all the members of the labour force can access the knowledge and skills necessary to make decisions and work in a sustainable manner.

Thrusts one and two primarily involve formal education. Thrusts three and four are mainly concerned with non-formal and informal education. Addressing all four thrusts of ESD requires actions by the formal, non-formal and informal sectors of the education community.

Characteristics of ESD

ESD has essential characteristics that can be implemented in many culturally appropriate forms. ESD:

- is based on the principles and values that underlie sustainable development (see next section);
- includes all three spheres of sustainability – environment, society, and economy – with an underlying dimension of culture;
- uses a variety of pedagogical techniques that promote participatory learning and higher-order thinking skills;
- promotes life-long learning;
- is locally relevant and culturally appropriate;
- is based on local needs, perceptions and conditions, but acknowledges that fulfilling local needs often has international effects and consequences;
- engages formal, non-formal and informal education;
- accommodates the evolving nature of the concept of sustainability;
- addresses content, taking into account context, global issues and local priorities;
- builds civil capacity for community-based decision-making, tolerance, environmental stewardship, workforce adaptability and quality of life;
- is interdisciplinary: no single discipline can claim ESD for itself alone, but all disciplines can contribute to ESD. (UNESCO 2005)

These essential characteristics of ESD can be implemented in diverse ways, so that the unique environmental, social and economic conditions of each locality are reflected in teaching and learning processes in local schools.

ESD is based on Principles of Sustainable Development

ESD is based on the ideals and principles that underlie sustainability, such as intergenerational equity, gender equity, peace, tolerance, poverty reduction, environmental preservation and restoration, natural resource conservation, and social justice. The Rio Declaration from the Earth Summit in 1992 contains 27 principles of sustainability. For example:

> ***"Education must simultaneously provide maps of a complex world in constant turmoil and the compass that will enable people to find their way in it."***
>
> **(Delors Report)**

- people are entitled to a healthy and productive life in harmony with nature;
- the right to development must be fulfilled so as to equitably meet the developmental and environmental needs of present and future generations;
- eradicating poverty and reducing disparities in living standards in different parts of the world are essential to sustainable development.

These principles can help governments, communities, and school systems identify the knowledge, principles, skills and values on which they will create ESD or reorient existing education to address sustainability.

What is ESD?

ESD and the Five Pillars of Education

Education has many purposes, including enabling people to fulfil their individual potential as well as contributing to social transformation. Each generation has the challenge of deciding what to teach the next generation; naturally, education changes across time and space. For example, an appropriate and quality education in rural and mountainous Asia will differ from that of urbanized Europe. In spite of their differences, all educational programmes should be based on the five pillars of education, which are foundational to providing a quality education and fostering human development. Four pillars are from the Delors Report, Learning: The Treasure Within: learning to know, learning to do, learning to live together, and learning to be. A fifth pillar was added by UNESCO to address the special challenge of sustainability: learning to transform oneself and society.

The four thrusts of ESD and the five pillars of education bring together two compatible educational paradigms and efforts. Both require that school systems and teachers move towards teaching all five pillars. This is a challenge because many formal education systems currently focus primarily on learning to know and only secondarily on learning to do. Nevertheless, all five pillars are necessary to help people from all walks of life to create a more sustainable future.

ESD and Values

The values underlying the sustainability paradigm, such as human dignity, fundamental freedoms, human rights, equity, and care for the environment, are the values that underlie ESD. The values to be contained in a particular ESD programme are a matter of discussion for the stakeholders (e.g. teachers, school administrators, parents of pupils, community members and where acceptable the pupils themselves). The goal is to create a locally relevant and culturally appropriate values component to ESD, one that is informed by the principles and values inherent in sustainable development. Values shape many things within a society (e.g. our worldview, how we treat others, how we view ourselves, our expectations of the government, and our use or abuse of natural resources). Values shape human actions in the world from small (e.g. how personal decisions are made) to large (e.g. how national legislation is written). The ways in which countries decide how to approach sustainable development will be closely linked to the values they hold.

Understanding values is an essential part of understanding an individual's own worldview and that of other people. Understanding your own values, the values of the society you live in, and the values of others around the world is a central part of educating for a sustainable future. Each country, cultural group, and individual must learn the skills of recognizing their own values and assessing them in the context of sustainability.

A good starting point for addressing values in ESD-related teaching and learning is the Earth Charter. The Earth Charter is an ethical framework that includes respect and care for the community of life, ecological integrity, universal human rights, respect for diversity, economic justice, democracy, and a culture of peace. The Earth Charter is the product of a decade-long, worldwide, cross-cultural dialogue about common goals and shared values. The Earth Charter has been used successfully in education programmes around the world over the past few years.

> ***Knowledge and education are key factors for sustained, inclusive and equitable economic growth and for the achievement of all the Millennium Development Goals.***
>
> **UN General Assembly MDG Summit**
> **Draft resolution: Keeping the Promise**
> **September 2010**

It should be noted that the difference between education that supports development and education that supports sustainable development is in part determined by the values incorporated in the curriculum. Some values operating in societies support short-term economic growth at the expense of social and environmental security (e.g. valuing monetary gain over human safety and preservation of the environment), while other values favour more sustainable development (e.g. valuing working for the common good rather than for the private gains of an individual). For example, if teachers and students examine models of economic development in industrialized cities in the late 1800s and early 1900s, they see how heavy industry (e.g. steel mills) made large profits for their owners at the expense of the safety of the workers, who were on occasion seriously injured or who suffered injuries from repetitive actions. These same industrial sites also caused a great deal of air and water pollution. In these cases, economic gain was more highly valued than human safety and environmental conservation. In contrast, steel mills today that follow sustainable practices have elevated the value of safeguarding employee well-being and conservation of resources such as water and energy. By

analysing and comparing the societal values held in both time periods, the history lesson also teaches an important component of sustainability. Thus, reorienting education to address sustainability requires careful consideration of values implicitly and explicitly expressed in the curriculum.

ESD and the Millennium Development Goals

The connection between ESD and achieving the Millennium Development Goals (MDGs) is obvious in some cases and more obscure in others. ESD addresses MDG #2 (Achieve universal primary education) through the first thrust of ESD—improving access to and retention in quality basic education. Access to education is also important in realizing other MDGs (UN General Assembly 2010).

We do not have the data to definitively state the impact of ESD on the MDGs. However, we do know that education contributes to the progress made towards all the MDGs. We know from the DESD Monitoring and Evaluation process that ESD is being carried out around the world in formal, non-formal, and informal settings related to numerous sustainability themes (e.g. resource conservation, peace, human rights, disaster risk reduction, biodiversity, health and consumption). Such educational activities are important in making progress towards the MDGs.

A good example of the contribution of ESD to the MDG agenda is Goal #7 (Ensure environmental sustainability). The DESD Report *Review of Contexts and Structures for ESD 2009* highlights many ESD efforts delivered through an environmental education (EE) focus, especially in sub-Saharan Africa. Such EE/ESD efforts contribute to environmental sustainability. In addition, local ESD efforts to rediscover and incorporate indigenous and traditional knowledge related to care for the Earth into ESD programmes help achieve MDG #7.

Contribution of Sustainable Development to Education

Not only does education contribute to sustainable development and the transformation of society; the reverse is also true. Sustainability improves education and has the potential to transform education. As countries and communities struggle to cope with contemporary challenges accompanied by major life-changing events (e.g. climate change-induced drought or the rise in sea level), the purpose and relevance of education itself have been questioned.

Sustainability adds purpose to education. Perceptions of the purpose of education vary according to the role and perspective of the person responding to the question. Teachers often say that the purpose is to help children develop their full potential. However, the reality of a teacher's job is that s/he must also prepare students to pass end-of-the-year exams for promotion to the next year of schooling. Parents often hope that school will prepare children for jobs that will provide economic security for their families. Some politicians claim that the purpose of education is to ensure national economic competitiveness. Others say that global stability is the goal of education.

For years, many countries have used education as one of several investments to increase economic growth. Unfortunately, such economic growth has brought with it unprecedented environmental challenges as well as large gaps - both economic and societal – between the "haves" and the "have-nots." It is evident that economic growth as the purpose of education no longer serves the planet well. From the perspective of sustainable development, it is time to rethink, reorient and restate the purpose of education. Education that promotes sustainability, global stability and resilient societies could help create a more sustainable future for the planet.

Sustainability gives a common vision. Many children and adults know that something is not right in their community and in the wider world. They see environmental deterioration, social injustice, and economic inequity around them and learn about it in the media. Children and adults can easily identify what is unsustainable in the world around them. They also want a better world and some can even envision that world. Sustainability also positions education to make a concrete contribution to a better world.

Sustainability gives relevance to the curriculum. The relevance of many primary and secondary curricula has also been called into question. The disconnection between the curriculum and life in the community is a factor in children and adolescents dropping out of school. Unfortunately, retention in school is a problem for countries around the world. One of the causes of dropout is that pupils or their parents do not perceive education as being relevant to the lives they lead or would like to lead.

Making the curriculum more directly related to the lives of children and adolescents is important to retention. Education that is reoriented to address sustainability examines real-life problems in the community and explores solutions, thereby adding relevance to the curriculum by connecting it to learners' felt needs.

Sustainability in the curriculum raises economic potential. Another factor in dropout is economic. If education were perceived as contributing to a child's or the family's current or future economic well-being in a tangible rather than abstract sense, some children would stay in school longer. Developing a curriculum that increases the economic potential of pupils is facilitated when sustainability as a crosscutting curricular theme is added. Creating and living in a more sustainable world requires knowledge and skills for living sustainably and having sustainable livelihoods. Preparing pupils to fill the "green jobs" of tomorrow is an important part of education today.

Sustainability gives concrete examples of abstract concepts. All too often, education is criticized for being theoretical and abstract. The cross-cutting themes of sustainability and its related issues (e.g. climate change and biodiversity) that challenge local communities provide excellent real-life examples of abstract concepts contained in the curriculum. Such local examples also increase the relevance of the curriculum.

Sustainability can save pupils' lives. Natural disasters threaten the lives of school children and their families. By adding topics related to local natural disasters (e.g. the ways that human activity can exacerbate or ameliorate conditions in disaster prone areas) to the curriculum, the lives of children and community members will be more secure. Such security will be enhanced by adding lessons on what do to when natural disasters strike (e.g. following safe evacuation routes) as well as constructing safe schools.

ESD: the Hope for the Future

In today's world, we have seen that the economic growth model has led to environmental degradation, social injustice, and economic inequities. Unfortunately, many education systems support such a model. To live in a more sustainable world, we need to rethink the purpose of our education systems as well as what is learned, what is tested, and how it is taught. Education is one of several mechanisms available to governments and communities to bring about social transformation and thus create more stable, equitable and resilient societies. Education, within an ESD framework, can address difficult changes and contemporary challenges—whether environmental, social or economic, or whether they are local or global in scale. Aligning primary and secondary schooling with the purpose of sustainability will help us create an environmentally robust, socially equitable and economically fair world. ESD is our hope for this type of world.

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ESD and Adjectival Educations

Core Disciplines and Adjectival Educations

Core disciplines – those that are part of primary and secondary education around the world – generally include mathematics, science, language[1], and social studies. Other disciplines, known as second-tier subjects, are often part of the curriculum, depending on funding and cultural priorities. Second-tier disciplines include art, music, health, life skills, technical and vocational education and training (TVET), etc.

Many other fields of education exist and compete for a place in primary and secondary education. The term "adjectival education" was coined to characterize the fields of education that use the term *education* or *study(ies)* in their name.

Figure 1. Core disciplines, second tier subjects, and adjectival educations.

The list of adjectival educations is long – there are more than 100. This list includes environmental education, fire safety education, disaster risk reduction education, human rights education, etc. These adjectival educations bring relevance and significance to education. Non-profit organizations and, occasionally, governmental agencies create educational resources (e.g. activity guides and videos) on specific topics. Then, they try to interest school administrators and teachers in using these forms of adjectival education in their classrooms.

ESD is *not* just another adjectival education, which can get lost in the competition for a place in primary and secondary curriculums. ESD is an overarching paradigm that guides and transforms the core disciplines, second-tier disciplines, and adjectival educations so that they can all contribute to a more sustainable future.

It is true that in the mid-1990s some people thought of education for sustainable development (ESD) as an adjectival education (i.e. sustainability education to advance sustainable development). However, this perspective fell short of the larger understanding of ESD as "harnessing" all aspects of education, including public awareness and training, in order to make progress towards more sustainable societies. Today, different aspects of ESD can be found in many fields within education (e.g. environmental education, human rights education, ecological economics education).

It is true that in the mid-1990s some people thought of education for sustainable development (ESD) as an adjectival education (i.e. sustainability education to advance sustainable development). However, this perspective fell short of the larger understanding of ESD as "harnessing" all aspects of education, including public awareness and training, in order to make progress towards more sustainable societies. Today, different aspects of ESD can be found in many fields within education (e.g. environmental education, human rights education, ecological economics education).

Adjectival educations contribute to ESD; however, none can substitute for ESD.

1 Language includes listening, reading, writing, grammar and speaking as well as literature. Language refers to an official national language and can also refer to a mother tongue.

ESD and Adjectival Educations

ESD and Environmental Education

Many people ask about the relationship between ESD and various adjectival educations. The most frequently mentioned is ESD and environmental education (EE). The close relationship between ESD and EE is evident in the history of ESD. Environmental educators were the first group to endorse ESD, and in many respects kept the interest in ESD alive in the post-Rio decade (i.e. 1992 – 2001). Furthermore, EE, like many educational fields such as human rights education and ecological economics education, contributes to ESD in terms of content and pedagogy. As a result, ESD has some of its roots in EE.

The authors of Chapter 36 of Agenda 21[2] "Promoting Education, Public Awareness and Training" built the chapter on the lessons of EE, but they did not create an educational vision that was equivalent to EE. Analyses of the foundational documents for EE – the Tbilisi Declaration from the Intergovernmental Conference on Environmental Education – and for ESD – Chapter 36 of Agenda 21 – reveal some similarities and many differences between EE and ESD.

Differences. Agenda 21 emphasizes the importance of basic education to progressing towards a sustainable world as well as social and economic components, while the Tbilisi Declaration states the goals of EE as awareness, knowledge, skills, attitudes/values, and participation in an environmental context.

Important differences between EE and ESD:

- ESD teaches all the spheres of sustainability – environment, society, and economy, with an underlying dimension of culture. EE focuses more on the environment.
- ESD has four thrusts: (1) access to and retention in quality basic education; (2) reorienting existing education programmes, (3) increasing public awareness and understanding; and (4) providing training. EE primarily works in thrusts two and three.

Similarities. There are, of course, similarities between how ESD and EE are currently practised. For example, both EE and ESD have an environmental component. Both EE and ESD call for participatory learning and the use of pedagogies that promote higher order thinking skills, support decision-making, and stimulate the formulation of questions. Both EE and ESD have a values component.

Although some similarities between EE and ESD do exist, they are not significant enough to support the claim that EE and ESD are the same.

The Challenge for Teachers

The reality for most teachers is that they are obligated to teach a curriculum mandated by a national or regional ministry of education or the local school district. A teacher rarely has the luxury or the challenge of creating his or her own curriculum entirely.

At best, teachers can use activities from various core subjects and adjectival educations to teach sustainability concepts mandated in the curriculum. For example, to teach about habitats a biology teacher could use a simulation from environmental education, while to teach about graphs a mathematics teacher could use national population pyramids from population education.

In affluent countries, teachers struggle to make sense of and draw upon the overwhelming number of adjectival education materials available. In some countries, the adjectival education materials do not correspond to the mandated curriculum. In other countries, some adjectival educations claim to be doing the same thing as ESD. One task of ESD is to bring some order into all this educational activity.

The ESD Framework: One for All

Sustainability issues come to the focus of the public one after another. Climate change was covered widely in the press in 2009, especially with the COP 15 meeting in Copenhagen. Yet 2010 was the International Year of Biodiversity for the United Nations and 2011 the International Year of Chemistry. Teachers have little time to learn new content or devise new teaching techniques for each sustainability issue as it becomes popular or urgent and then fades away. What educators need is a framework for teaching a wide range of sustainability-related topics. ESD provides that framework.

2 Agenda 21 is the official document of the United Nations Conference on Environment and Development, also known as the Earth Summit, which was held in Rio de Janeiro in 1992. Agenda 21 is a comprehensive blueprint for action to be taken globally, nationally, and locally by organizations of the UN, governments, and major groups.

ESD and Adjectival Educations

Table 1. List of some adjectival educations

Anti-Racist Education	Energy Education	Native Studies
Anti-Smoking Education	Entrepreneurship Education	Nature Studies
Anti-Violence Education	Environmental Education	Nutrition Education
Biodiversity Education	Equity Education	Outdoor Education
Character Education	Experiential Education	Peace Education
Citizenship Education	Family Studies	Permaculture Education
Civics Education	Futures Education	Population Education
Community Studies	Gender Education	Recycling Education
Computer Studies	Global Education	Religious Education
Conflict Resolution Education	Heritage Education	Self-Image Education
Conservation Education	HIV and AIDS Education	Sexuality Education
Consumer Education	Holocaust Education	Systems Thinking Education
Cooperative Education	Horticulture Education	Tsunami Education
Drug Use Prevention Education	Human Rights Education	Values Education
Development Education	Indigenous Peoples Education	Vocational Education
Disaster Prevention Education	International Studies	Water Education
Earthquake Education	Leadership Education	Women's Studies
Economics Education	Life Skills Education	Workplace Education
Education for International Understanding	Media Education	World Studies
	Multicultural Education	

The Strengths Model

Within primary and secondary education, the strengths model posits that:

1. Education for sustainable development (ESD) does not belong to a single discipline.

2. Every discipline, teacher and administrator can contribute to ESD.

3. An individual or an organization should be responsible for identifying existing strands of sustainability in the curriculum and integrating them into a comprehensive ESD programme.

4. Those who carry out this integration process to create a comprehensive ESD programme must be supported and enabled by educational decision-makers (e.g. Ministries of Education).

In this approach, the synergistic strengths of combined educational disciplines can convey the knowledge, issues, skills, perceptions, and values associated with ESD.

Disciplinary Contributions to ESD

The strengths model states that no single discipline can or should claim ownership of ESD and that every discipline can contribute to ESD. Many topics inherent in sustainable development (SD) are already part of the formal education curriculum, but have not been identified as such, nor have they been seen as contributing to the larger concept of sustainability. In fact, ESD and SD pose such broad and encompassing challenges that they require contributions from many disciplines. For example, consider these disciplinary contributions to ESD on the topic of water quality:

- Mathematics helps pupils understand extremely small numbers (e.g. parts per hundred, thousand, or million), which allows them to interpret pollution data.
- Biology helps pupils comprehend the effects of pollution on organisms.
- Health education helps pupil recognize the risks to human health from pollution and the range of human tolerance of risk.
- Reading develops the ability to distinguish between fact and opinion and helps pupils become critical readers of print media.
- History teaches the concept of global change, while helping pupils to recognize that change has occurred for centuries and that civilization has had to confront problems like water pollution.
- Social Studies helps pupils to understand ethnocentrism, racism, and gender inequality as well as to recognize how these are expressed in the surrounding community and countries worldwide (e.g. women walking for hours to fetch water for their families).

> The contributions of the environmental education and science education communities to the environmental strand of ESD are more widespread than contributions of other disciplines to ESD. However, schools that have programmes in civil rights, human rights, multicultural education, anti-racist education, gender equality, anti-bullying, and peace education contribute substantially to the social strand of ESD.

Pedagogical Contributions to ESD

ESD draws on pedagogies, not just content, from a wide variety of disciplines:

- inquiry from science
- spatial analysis from geography
- communication skills from language arts
- creative thinking from the arts
- higher-order thinking skills from a variety of disciplines

The combined pedagogical techniques and strategies of each discipline contribute to an expanded vision of how to stimulate creativity, critical thinking, and a desire for life-long learning – all cognitive abilities that support sustainable societies.

The Strengths Model

A Process for Implementing the Strengths Model

To implement the strengths model, at a local level:

1. Ensure that educators and administrators understand the concepts of sustainability and ESD.

2. Examine the mandated curriculum and school activities for existing contributions to ESD. (See Brief: Curricular Analysis: Finding Sustainability in Existing Curricula.)

3. Identify potential areas of the mandated curriculum in which to incorporate examples that illustrate sustainability or additional knowledge, issues, perspective, skills or values related to sustainability. (See Brief: Reorienting Curriculum to Address Sustainability and sample activities.)

4. Integrate the existing sustainability content and the new elements to create comprehensive ESD programmes in which sustainability is explicitly taught to pupils across subject areas and throughout their years of schooling.

5. Provide professional development opportunities for teachers and create awareness among the educational community of the ESD programme.

Using the strengths model requires:

- oversight to integrate the disciplinary and pedagogical contributions to form a comprehensive ESD programme. The integration process will prevent omissions and duplication. For such integration to occur, support from senior administrators is essential.

- a cadre of educators and administrators, who are sufficiently well-versed in sustainability and ESD to carry out the process. In order to create a generation of educators and administrators who understand ESD and the strengths model, institutions of teacher education should explicitly teach it to pre-service and in-service teachers and administrators.

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Curricular Analysis: Finding sustainability in existing curricula

Many topics inherent to sustainability are already part of the formal education curriculum, but have not been identified as such nor have they been seen as contributing to the larger concept of sustainability. The concept of sustainability has been emerging and developing for generations, but did not acquire its name until the 1980s. Nevertheless, many topics related to environmental, social and economic sustainability are in the curriculum. In order to reorient education to address sustainability and to implement the *strengths model,* it is important to examine the mandated curriculum for existing contributions to ESD.

To analyse the curriculum, one needs to look for concepts that are related to the three spheres of sustainability – environment, society and economy – as well as themes of sustainability that are important to the local community or country.

Examples of themes of sustainability important to communities or countries*:

Biodiversity
Climate change
Poverty reduction
Gender equality
Health promotion
Sustainable agriculture
Sustainable forestry
Sustainable consumption
Peace and human security

* Sustainability themes usually appear in governmental policy documents.

Some concepts are foundational to understanding sustainability, and others are directly related to sustainability. For example, learning about conservation or the sustainable use of natural resources pertains to sustainability; however, knowing what natural resources are is foundational to understanding the sustainable use of natural resources. Without the foundational concept, the learning related to sustainability may be lost or difficult. As a result, curricular analysis requires identifying both foundational concepts and sustainability concepts.

Table 1. Examples of Learning Expectations: Secondary Ecology Curriculum Tennessee, USA

Category	Learning Expectation
Unrelated to sustainability	Describe how matter cycles through various biogeochemical cycles.
Foundational to sustainability	Describe the flow of energy through an ecosystem.
Sustainability	Summarize the human impact on ecosystems.
Sustainability	Describe how biodiversity relates to the stability of an ecosystem.

Methodology

To analyse a curriculum for sustainability content, identify each item (e.g. learning standard, outcome, or objective) as belonging to one of three major categories: sustainability, foundational to sustainability or unrelated to sustainability. Read through the curriculum and mark items according to the coding scheme. It is better if two people read the curriculum and mark it according to the same coding scheme. Then, the two documents can be compared to reveal differences in raters' perceptions of sustainability. If the coded documents are considerably dissimilar, it is necessary to re-read and re-mark curricula with a common understanding of sustainability and the coding system. (See Table 1.)

Create a Coding Scheme

Creating and consistently utilizing a coding scheme to mark relevant sections of a curriculum is central to curriculum analysis. A low-tech method of coding uses coloured pencils to mark components of the curriculum pertaining to sustainability (e.g. green for environment, yellow for society, and pink for economy). Then, assign colours for selected sustainability themes (e.g. red for poverty reduction). Next, use dotted lines for concepts foundational to sustainability and solid lines for sustainability concepts. No colour or marking is used for concepts unrelated to sustainability. Coding software for tagging relevant prose also exists.

Curricular Analysis: Finding sustainability in existing curricula

Examples of learning objectives related to society and sustainability

Learning objectives that pertain to sustainability in social studies from the Secondary School Curriculum 2012 of the Central Board of Secondary Education of India include the following:

- Making the child aware of his or her rights and duties as a consumer.
- Recognize the ways in which [fundamental] rights are exercised and denied in real life situations.
- Appreciate and critically look at the role of government in ensuring food supply. (This learning object is also related to the sustainability theme of human security and could therefore be coded twice.)

Discussion

After coding the curriculum, ask and respond to the following:

- How much knowledge, skills, values, and perspectives related to sustainability are currently included in the mandated curriculum?
- How can existing curricular items coded as "sustainability" be openly taught as contributing to sustainable development?
- How can sustainability concepts taught in different disciplines and throughout years of schooling be integrated so that pupils understand the sustainability paradigm and pathways to a more sustainable future?

Why are elements of sustainability, which are in the curriculum, not taught as such?

Obviously, some topics related to sustainable development already exist in the primary and secondary curricula. Many teachers, however, do not teach them as such. This inconsistency may occur because:

- no mandate exists to include sustainability in classroom activities,
- teachers do not recognize the sustainability-related content, or
- teachers do not have the teaching skills to relate topics to the sustainability paradigm.

How can sustainability be integrated throughout years of schooling?

One complicating factor for the teacher is that usually no requirements exist to integrate elements of sustainability from one course to another or throughout years of schooling. Given that mandated curricula are most often large – larger than many teachers feel they can comfortably teach within the academic year – little time exists to integrate knowledge from one disciplinary course into another (e.g. from geography into literature), or from previous years into the current year. We know that children and adolescent learners generally will not integrate their sustainability knowledge across disciplines and years of schooling on their own. Such transfer and combination of knowledge need to be explicitly and purposefully taught so that the bigger picture of sustainability is not lost.

What is missing?

Curricular analysis often leads to basic understandings that are essential to reorienting the curriculum to address sustainability. For example, a social studies curriculum may not contain the word "equity" or the term "social justice," although both equity and social justice are essential to sustainable societies. A gap analysis[1] of content is an important part of reorienting curriculum to address sustainability. ESD calls for teaching knowledge, skills, values, perspectives, and issues related to sustainability. The current reality of many countries is that although curricula often include knowledge and skills, values and perspectives are not part of the printed curricula.

Next Steps

A multi-stakeholder consultation process can identify essential knowledge, skills, values, perspectives, and issues important to a more sustainable future of a community or a country.[2] Then, a gap analysis between the current curriculum and the results of the consultation process can identify necessary additions to the curriculum.

1 Gap analysis compares the existing state or performance with the potential or ideal state or performance.

2 For a process for convening a community forum on sustainable development goals or education for sustainable development, see "Creating Community Sustainability Goals: Deciding what is important" and "Community Forum" in the *Education for Sustainable Development Toolkit*. http://www.esdtoolkit.org/community_goals/deciding_important.htm and http://www.esdtoolkit.org/reorient_edu/forum.htm

Curricular Analysis: Finding sustainability in existing curricula

An equally important process is analysing the curriculum for concepts that are outdated or that teach unsustainable development. These need to be removed from the curriculum as part of the reorienting process.[3]

References

Central Board of Secondary Education. 2010. Secondary School Curriculum: 2012 Main Subjects Volume 1. http://cbse.nic.in/welcome.htm

Tennessee Department of Education. 2010. Curriculum Standards: Secondary 9 – 12: Science: Ecology. www.tennessee.gov/education/ci/sci/doc/SCI_3255.pdf

3 See "Weeding the Curriculum" in the *Education for Sustainable Development Toolkit*. http://www.esdtoolkit.org/reorient_edu/weeding.htm

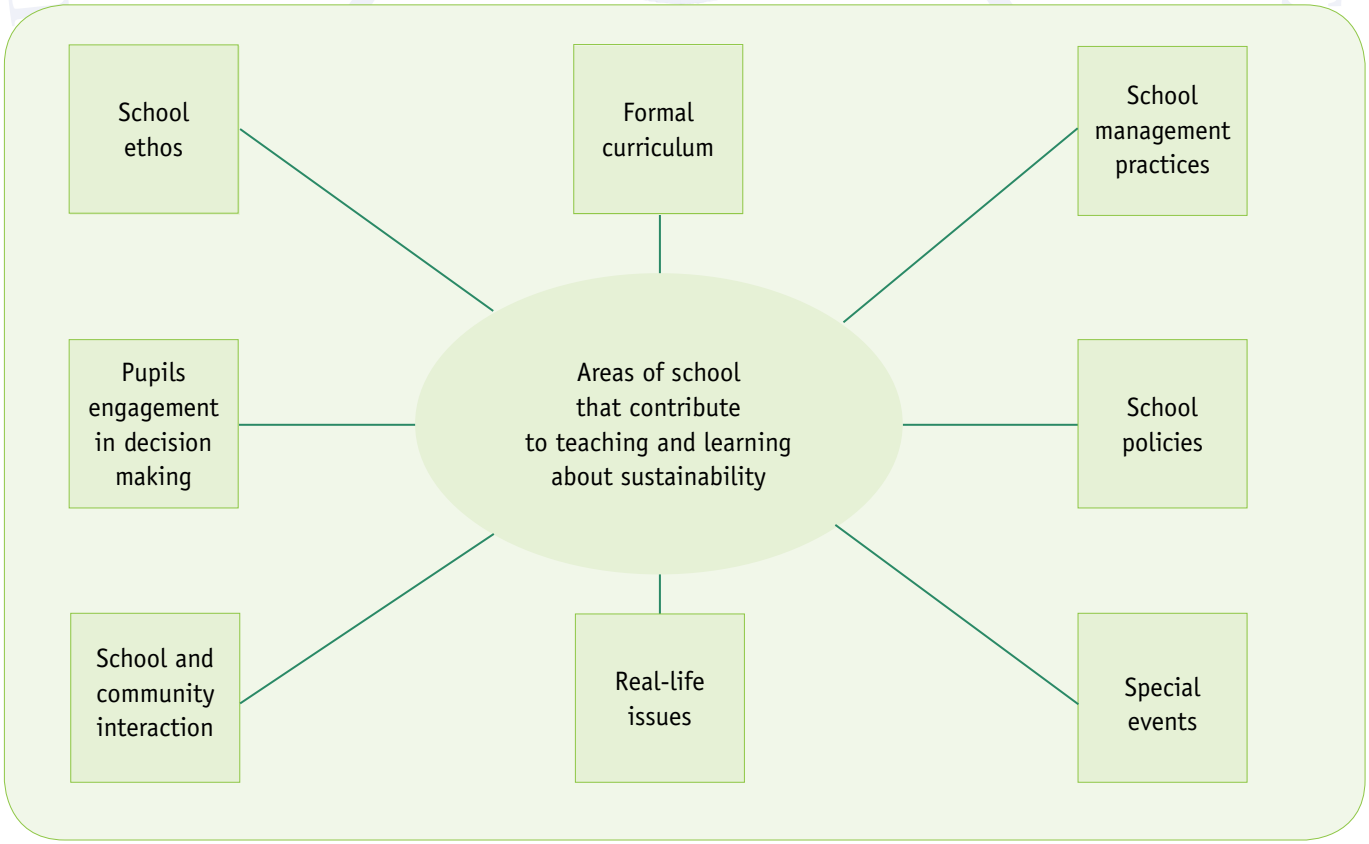
Whole-School Approach to Sustainability

Pupils learn more than the official curriculum while in school. They also acquire cultural norms, values and behaviour, from teachers, non-teaching staff and other pupils as well as from their physical surroundings (e.g. buildings and grounds). Pupils are quick to notice discrepancies between what is taught and what occurs around them. For example, if they study energy conservation but the school does not implement such measures, pupils notice it. For this and other reasons, the whole-school approach to sustainability has become increasingly popular.

A whole-school approach to sustainability is practised in a variety of ways, differing from place to place. Whole-school approaches usually address the following:

- The formal curriculum contains knowledge, skills, perspectives and values related to sustainability.
- Learning includes real-life issues to enhance pupils' motivation and learning.
- The school has a sustainability ethos which can be seen in the treatment of others, school property, and the environment.
- School management practices reflect sustainability (e.g. procurement, water and energy use, and waste management).
- School policies reflect environmental, social, and economic sustainability.
- Interactions between the school and the community are fostered.
- Special events and extra-curricular activities apply and enhance classroom learning about sustainability.
- Pupils engage in decision-making affecting school life.

Schools often begin with one sustainability activity, which then leads to others. Over time, the school enacts and maintains a number of sustainable practices.



Whole-School Approach to Sustainability

Ideally, an entire school reflects sustainability in the academic programme, school policies and daily practices. Enrolment and hiring practices should reflect equity, a major component of social sustainability. Are all pupils treated equally regardless of ethnicity, gender or race? Does the school staff itself mirror the ethnic, racial, and gender composition of the local population? (e.g. are any ethnic minorities on the staff?). Purchasing policies should reflect principles of economic sustainability. Is paper with a post-consumer recycled content purchased from locally owned businesses rather than a major corporation? Building construction and maintenance should reflect environmental sustainability. Are water and energy conservation practices commonly used? Are non-toxic and non-polluting cleaners used to clean the school facilities?

In order to create a whole-school approach in your community, begin by making an inventory of school and community resources. Then, generate a list of possible projects. Next, prioritize your activities according to importance and availability of resources. Finally, select an activity which can be easily accomplished. Initial success will lead to other successful projects.

See Sample Activities: ESD Lens Review Tool 12: ESD and sustainable schools.

Education for Sustainable Development Toolkit: Stoplight Activity.

To access the ESD Lens Review Tool 12: ESD and sustainable schools, open the following hyperlink and go to page 82. Review Tool 12 contains a sustainable schools audit to help schools set targets for change and improvement.
http://unesdoc.unesco.org/images/0019/001908/190898e.pdf

References

Ferreira, J., Ryan, L. and Tilbury, D. 2006. *Whole-School Approaches to Sustainability: A review of models for professional development in pre-service teacher education*, Australian Research Institute in Education for Sustainability (ARIES) for the Australian Government Department of the Environment, Water, Heritage and the Arts. Sydney: ARIES. http://www.aries.mq.edu.au/projects/preservice/

UNESCO. 2010. ESD Lens: A Policy and Practice Review Tool. *Learning & Training Tools*, No. 2. http://unesdoc.unesco.org/images/0019/001908/190898e.pdf

Stoplight: Prioritising Sustainability Projects

DESCRIPTION: To determine the order of implementation of sustainability projects according to importance and resource availability.

GROUP SIZE: This exercise may be completed by an individual or a group.

MATERIALS: Stoplight Importance and Resource Availability worksheets –

One or two per participant.

Stoplight worksheets – one per participant.

Red, yellow, and green crayons or coloured pencils.

List of current and potential sustainability projects.

Note: It is helpful to have a list of possible whole-school sustainability projects before beginning this exercise. If a list is not available, participants should brainstorm for current and future current projects prior to the start of this exercise. (See sidebar 1 for examples of whole-school sustainability projects.) For an exercise in creating a list of potential sustainability projects, see Making Your Ideas Fly! found in the Education for Sustainable Development Toolkit at http://www.esdtoolkit.org/reorient_edu/ideas_fly.htm.

Sidebar 1. Examples of Whole-School Sustainability Projects

- Waste audit for entire school.
- Compost for cafeteria and garden waste.
- Litterless lunch programme.
- Energy audit.
- Water conservation programme.
- School garden or natural area.
- Reuse centre for art materials.
- Peace garden or conflict resolution site.
- Recycling programme.
- Purchase of safe substitutes for hazardous cleaning products.
- Indoor air quality audit.
- Breakfast programme for pupils in need.
- Social services site at the school.
- Free dental check-ups for pupils.

SEQUENCE:

1. On the Stoplight Importance and Resource Availability worksheet, list potential whole-school sustainability projects. For each potential project:

- Circle a number corresponding to the potential project's importance in accomplishing school or community sustainability goals,
- Circle a number showing the availability of resources.
- Add importance and availability scores, and record this number for each potential project.
- Average the scores for each project.

2. On the Stoplight worksheet, list potential projects in descending order according to the combined score.

3. Colour stoplights green for projects you can begin now. Colour stoplights yellow for projects the group wishes to do later. Colour stoplights red for projects that are neither important nor have resources available.

4. Begin planning for the projects with green lights. Discuss how to develop resource bases for yellow-light projects

SOURCE:

UNESCO. 2006. Education for Sustainable Development Toolkit. *Learning & Training Tools* No. 1. Available on line at http://unesdoc.unesco.org/images/0015/001524/152453eo.pdf
Also available online in html at
http://www.esdtoolkit.org/reorient_edu/stoplight.htm

TIME: 30 minutes

Worksheet: Stoplight Importance and Resource Availability

Potential Project: ____________________
Combined Score: ____________________

IMPORTANCE						
Low	1	2	3	4	5	High
AVAILABILITY OF RESOURCES						
Low	1	2	3	4	5	High

Potential Project: ____________________
Combined Score: ____________________

IMPORTANCE						
Low	1	2	3	4	5	High
AVAILABILITY OF RESOURCES						
Low	1	2	3	4	5	High

Potential Project: ____________________
Combined Score: ____________________

IMPORTANCE						
Low	1	2	3	4	5	High
AVAILABILITY OF RESOURCES						
Low	1	2	3	4	5	High

Potential Project: ____________________
Combined Score: ____________________

IMPORTANCE						
Low	1	2	3	4	5	High
AVAILABILITY OF RESOURCES						
Low	1	2	3	4	5	High

Potential Project: ____________________
Combined Score: ____________________

IMPORTANCE						
Low	1	2	3	4	5	High
AVAILABILITY OF RESOURCES						
Low	1	2	3	4	5	High

Potential Project: ____________________
Combined Score: ____________________

IMPORTANCE						
Low	1	2	3	4	5	High
AVAILABILITY OF RESOURCES						
Low	1	2	3	4	5	High

Source: http://www.esdtoolkit.org/reorient_edu/stoplight_wksht_imp.htm

Worksheet: Stoplight

Project:	Recommendation	Project:	Recommendation
____________	Stop	____________	Stop
____________	Wait	____________	Wait
____________	Start	____________	Start
Total Score ______		Total Score ______	
Project:	**Recommendation**	**Project:**	**Recommendation**
____________	Stop	____________	Stop
____________	Wait	____________	Wait
____________	Start	____________	Start
Total Score ______		Total Score ______	
Project:	**Recommendation**	**Project:**	**Recommendation**
____________	Stop	____________	Stop
____________	Wait	____________	Wait
____________	Start	____________	Start
Total Score ______		Total Score ______	

Source: http://www.esdtoolkit.org/reorient_edu/stoplight_wksht.htm

ESD Resources from UNESCO

Education for Sustainable Development Toolkit

http://unesdoc.unesco.org/images/0015/001524/152453eo.pdf

The *ESD Toolkit* is an easy-to-use manual to begin the process of combining education and sustainability. The *ESD Toolkit* includes three components:

(1) An introduction to sustainability and ESD.

(2) A description of the major thrusts and components of ESD and a method for bringing ESD to the school level.

(3) Exercises to help schools and communities understand sustainability, create sustainability goals and reorient the curriculum to address sustainability, and initiate change within an educational system.

The document helps schools and communities develop a process for creating locally relevant and culturally appropriate education.

ESD Lens: A Policy and Practice Review Tool

http://unesdoc.unesco.org/images/0019/001908/190898e.pdf

This publication supports policy-makers and practitioners to initiate the process of reorienting education towards sustainable development at a national or school level. The *ESD Lens* contains 13 tools as well as an ESD action plan.

Teachers' Guide for Education for Sustainable Development in the Caribbean

http://unesdoc.unesco.org/images/0016/001617/161761e.pdf

This publication seeks to promote the inclusion of education for ESD in teachers' practices. It is written for both teacher educators and teachers at all levels of education in the Caribbean region. The experiences described in this document are intended to be drawn upon in the classrooms, schools and communities of the region.

Teaching and Learning for a Sustainable Future

http://www.unesco.org/education/tlsf/

This multimedia teacher education programme contains 100 hours (25 modules) of professional development for use in pre-service teacher education courses and for use in in-service education of teachers, curriculum developers, education policy-makers, and authors of educational materials.

UNESCO Associated Schools Second Collection of Good Practices: ESD

http://unesdoc.unesco.org/images/0018/001812/181270e.pdf

This collection contains 23 descriptions of ESD projects from all five UNESCO regions. The ESD projects use holistic and interdisciplinary approaches to ESD. This collection stresses the essential role of teachers in a wide variety of schools and learning settings.

Regional Collection of Good Practices: Millennium Development Goals and Education for Sustainable Development in Asia and the Pacific Region

http://unesdoc.unesco.org/images/0018/001873/187337e.pdf

This publication presents a sample of good practices implemented by the UNESCO Associated Schools network (ASPnet) in the Asia and the Pacific Region. The publication gives practical guidelines to better understand the role of ESD in relation to the MDGs. Nine selected school-based projects from five countries (Indonesia, Republic of Korea, Pakistan, Sri Lanka and Uzbekistan) illustrate how the themes of ESD and the MDGs can be interpreted within particular learning contexts. The projects address sub-themes of ESD, such as indigenous knowledge, climate change, biodiversity, and poverty reduction.