Guidelines & Tools for Incorporation of Environmental Protection into Science & Social Studies Curricula

UNESCO Regional Workshop on Thematic Issues in Education for Sustainable Development (ESD) under the Mobile Training Team (MTT) Project
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Workshop Objectives

1. To explore the leading global environmental issues facing our societies today.
2. To stress the importance of teaching for ‘ecological literacy’ in all subjects of the curriculum.
3. To introduce participants to an evolving set of tools and methodologies for ESD and to actively experiment with adapting the tools to curriculum development and thematic integration.
4. Develop a training guideline for teacher educator to incorporate Environmental Protection into teacher education curriculum.
In this workshop, you will ... 

- Explore theory and practice regarding the integration of environmental protection and other thematic issues into formal school curriculum, grounded in collaborative systems thinking.

- Experience **ISIS Method** and **ISIS Accelerator** toolkit, hands-on

- Receive “Train-the-trainer”-level instruction: how to use, how to teach others

- Deepen / polish / improve professional skills

- Think about how to apply the concepts, tools and approaches to your own work.
Workshop Methodology and Process

- Short Power Point presentations
- Participate in simulation games
- Work in teams and small groups
- Brainstorm and discussion of Ideas
- teams make proposals and come to agreements
- Build a Pyramid of Ideas
Guide everyone through a series of exercises, thinking processes and discussions

Keep things moving, flowing, connecting, “making sense”

Help you put everyone’s ideas to work
Your Job

Listen, participate, think, talk, ask questions

Pay attention to the ideas you have, so that you can use them later

Share ideas, opinions and seek collaboration

Consider how to use, adapt, engage with these tools to assist you in carrying out your environment work successfully

Enjoy!
First Definition . . . What is the “environment”?  

Environment (en·vi·ron·ment)  
Pronunciation: \( \text{in-} \text{ˈvīrə(n)-mənt, } -\text{ˈvī(ə)r(n)-} \)  
Function: noun  
Date created: 1827

1: the circumstances, objects, or conditions by which one is surrounded

2 a: the complex of physical, chemical, and biotic factors (as climate, soil, and living things) that act upon an organism or an ecological community and ultimately determine its form and survival

b: the aggregate of social and cultural conditions that influence the life of an individual or community (e.g. the built environment)

Why is Environmental Protection Important?

A short video
For how long can this go on?

A *moderate business-as-usual scenario*, based on United Nations projections of slow, steady growth of economies and populations, suggests that *by 2050, humanity’s demand on nature will be twice the biosphere’s productive capacity.*

What does this mean?

At this level of ecological deficit, *exhaustion of ecological assets and large-scale ecosystem collapse become increasingly likely.*
We Need to Reorganise Society for Ecological Sustainability
We means . . . We need Ecological literacy

- Ecological Literacy means having the “ability to distinguish between health and disease in natural systems and their relation to health and disease in human ones.”

Ecological sustainability is our responsibility . . . Just like safe driving.
Ecological Literacy

The foundation of ecological literacy as having three components:

1. the knowledge necessary to comprehend interrelatedness,
2. an attitude of care or stewardship, and
3. the practical competence required to act on the basis of knowledge and feeling”.

Ecological Literacy

An ecologically literate person should also have at least . . .

- a basic understanding of both natural ecology and human ecology,
- understand the concept of sustainability in general,
- understand the dynamics of their local and regional systems,
- be able to distinguish between development and growth, and
- have the wherewithal and skills to solve problems.
What are the barriers & challenges to teaching environmental protection as an integrated Interdisciplinary thematic Issue in the formal school curricula?
The **AtKisson Sustainability Accelerator**

Tools and Processes for Mainstreaming Sustainable Development
The Hope Graph

A Symbolic Representation

Objective:
Strive to PUSH this point forward and up
... implement Sustainability FASTER ...
... and REDUCE the amount of loss and damage

Unsustainable Technologies & Practices

Sustainable Technologies & Practices

1880 1920 1960 2000 2040

The Time of Our Lives
The Accelerator Tools

1. Define sustainability issues
   Gather stakeholders
   Orient key actors
   Choose indicators
   Measure and report

2. The ISIS Method, a logical thinking process that helps groups develop a more systematic and strategic understanding of ESD

3. Train on sustainable development
   Educate team & stakeholders
   Develop plans and initiatives
   Do teambuilding
   Build broad consensus for action
Compass

“A Tool for Orienting, Assessing, and Measuring Sustainability”

- **N = Nature**
  Environment, resources, ecosystems, climate

- **E = Economy**
  Jobs, investment, housing, innovation, work

- **S = Society**
  Government, culture, institutions, collective concerns

- **W = Well-Being**
  Individual health, families, education, quality of life

The Compass framework is based on well-regarded sources of sustainability theory.
4 Basic Criteria for Sustainability

- **N:** Living within the Earth’s physical and biological limits
- **E:** Maintaining a vital, prosperous economy
- **S:** Supporting social stability, equity, and development
- **W:** Making individual opportunity, fulfillment, and happiness possible
Planning Method: ISIS
Issues → Systems → Innovation → Strategy

- **ISSUES:** Start by identifying key issues and analyze trends & indicators
- **SYSTEMS:** Analyze Systems and find best-value points of leverage and curriculum entry/linkage points
- **INNOVATION:** Create new lesson ideas to incorporate thematic issues using multi-methods, spaces and assessment criteria.
- **STRATEGY:** Create effective integrated and interdisciplinary lesson plans built on a systems understanding.
Pyramid

A Tool for Training, Collaborative Planning, and Curriculum Integrations and lesson planning

Groups work together ...

- Step by step approach builds toward integrated action
- Creates shared understanding and consensus – level by level
- Creates a visual 3-D record of the group’s decision or learning process

Pyramid has been used by hundreds of groups around the world
Pyramid was used to synthesize the knowledge learned from the various modules.

Participants guided through the pyramid exercise through 5 Levels concerning four different dimensions of Nature, Economy, Society, and Well-Being.
Singapore Youth Environmental Envoy Training & Project Development

- Five Years Collaboration with NEA
- Over 275 Youth Leaders from high schools, polytechnics, universities and business trained
- Provide conceptual and practical training on the process of sustainable development, with emphasis being put on cooperative teamwork, communication, networking and systems thinking
- Provide a framework and launching point for the YEEs to develop environmental sustainability related projects
- Provide tools and skills to encourage environmental sustainability projects and actions.

Singapore National Environment Agency
Youth Environmental Envoy Programme
2004-2009
Thailand Eco-School Planning

- Organised by the *Thai Department of Environmental Quality Promotion* from March to May 2008
- Pilot project with 41 schools in all five regions of Thailand
- Application of AtKisson tools (in five 4-day workshops) to assist schools in their pre eco-school planning by aligning eco-school indicators and strategies with community sustainable development issues and trends.
- Currently, schools are implementing their respective plans and assessment is on-going.
Green Office Training and Planning

- Project of Singapore Ministry of Foreign Affairs and Singapore Environment Institute (SEI) as part of Initiative for ASEAN Integration August – November 2008.
- Cambodia, Laos, Myanmar and Vietnam
- Training for government officials on how to plan for, develop and implement a sustainable ‘green office’ culture through resource and energy conservation and efficiency.
Incorporating Sustainability in University Community Outreach

University of New South Wales, Faculty of Built Environment, community engagement unit - FBEOutThere! Strategic Planning, December 2005
Result of project with AtKisson Accelerator:

- Increasing awareness on sustainability
- Integrated division program
- Establishment of a CSR Division. This would be the first CSR Division at Corporate Level for ANTAM under Director of General Affairs & CSR in Indonesia
- **Pongkor (Gold mining)** final proposal on Learning Center for Gold Mining and Ecotourism (It concern on mining closure)
- **Pomalaa (Nickel mining)** final proposal on Green Initiatives (concern on mining operation)

**PT ANTAM Indonesia, Jan – June 2008**
Regional Policy Making

- Eleven Baltic nations in a cooperative initiative for regional sustainable development
- Mandate from the Prime Minister level
- Driven through government ministries, but multi-stakeholder in character and governance
- Seeking a new strategic mandate for 2004-2010
- Adopted ISIS / Pyramid to develop a new strategy
- Process to culminate with Prime Ministers summit in June 2004

Baltic Countries’ Environmental Ministers
The Riga Proposal:
Agenda 21 for the Baltic Sea Region
National Sustainable Development Planning – Government of Latvia

- Compass Index
- Pyramid Strategy
- Expert Forums on Linkages
- Sustainability Awards Program
The U.S. Army Installation Sustainability Program

- Individual bases (e.g. Fort Lewis) pursuing 25-year sustainability initiatives

- Bases and base commanders leading surrounding communities and other federal agencies to adopt innovations (e.g. energy, water, community involvement, smart growth)

- Installation Sustainability Program won Presidential Award in 2003
Sustainability Indicator Projects
Orlando: Healthy Community Initiative

- Compass Index
- Pyramid Strategy
- Expert Forums on Linkages
- Sustainability Awards Program

**Results:**
- Local funders use results to set funding priorities
- Political leaders use to focus attention on system drivers
Sustainability Indicator Projects
Sustainable Pittsburgh ...

- Regional Outreach Strategy
- Compass Report and Community Indicators Handbook

Results:
- Contributed to Launch of Smart Growth Partnership
- Pyramid Workshop to Train Partnership Founders in S.D. and Generate Strategic Options

Source: http://www.sustainablepittsburgh.org
Coffee Break
What can we learn about environmental sustainability from a hula hoop?
PYRAMID Level 1: Issues, Perspectives and Trends

What are the issues that matter? What are the trends and forecasts if nothing changes?

Quickly Educates All Participants on the Issues and Trends Affecting Your community or country
Step 1: Choosing your Central Issue:

- First, each Pyramid Group brainstorm a list of what you feel are the most important environmental issues related to your country.

- Then identify one issue that is shared by all the countries of the people in your Pyramid Group.

**Note:** Use some criteria to weigh various issues in relation to each other, your curriculum requirements and needs and the sustainability of your community. See the side bar.

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**Choosing your Central Environmental Issue**

Criteria for selecting the Issue you will build your lesson from:

- **Relevant to your country or community** and to the lives of the teachers and students

- **Access to information** on this topic either in your library, through the internet or via local human resource people

- **Relevance to your syllabus and curriculum** requirements and needs.

Use the Central Issue to frame your starting point and focus your group’s discussion.
Step 2: Exploring Stakeholder Perspectives & Roles:

- First we divide the groups in Compass Streams representing Nature, Economy, Society and Wellbeing and select Compass Responsibilities.

- Each person identify two stakeholders from their sector related to the central issue.

- Then use Worksheet 3 to help each person think about what this particular environmental issue means to them as a stakeholder group, (Page 19).

- Discuss perspectives.
Why is perspective important for SD?

Understanding the views and values of different stakeholders is essential to the sustainable development process.

Answers to the following questions will help us in working together . . .

- What do they think about this particular issue or problem?
- Why do they think this way? What or who may have influence on their thinking?
- How do they see themselves in relation to cause, effect and solution to the issue / problem?
Compass Mapping our Community Stakeholders

Instructions

1. Write down the names of each stakeholder on a Post-it note according to the color of the Compass Sector you think that they would be most associated with.

2. Stick the Post-it notes on the Compass Triangle.
Step 3: Identifying Compass Issues and Factors

- Each Compass Stakeholder representative brainstorm 9 factors related to the central issue and putting them on the Pyramid (cause and effects)

- One Factor Per Post-it Notes
  - Nature = Green  Economy = Blue
  - Society = Yellow  Wellbeing = Pink

- **Note**: you should try to have an even number of ‘causes’ and ‘effects’ related to the central environmental issue.
Construct the Pyramid – Level 1

1. Attach all of your Post-it notes the appropriate Pyramid Panels sides (nature, society, economy and wellbeing)

2. Work together with the other three groups to attach all four sides together on top of the Community Compass Sector Vision Triangles.

3. Each Compass Stream report to the others on the nine factors that they have identified.
Lunch
End of Day 1
Quick Review of Day 1
Considering Perspectives . . . A critical skill for ESD

- The ability to consider an issue from the view of different stakeholders is essential to Education for Sustainable Development.

- Considering an issue from another person’s viewpoint, besides your own, leads to cross-cultural, intra-national and international understanding.

- This understanding is essential for creating the mood of cooperation that will be essential to carry forward with successful sustainable development.
Pyramid Level 1: Issues & Trends

Compass Groups Present their issues

- Each Compass Group report their key issues to the other three Compass Groups
- The others should listen and write down any linkages that they find with their own Compass sector issues
Pyramid Level 2: Systems... How do things relate? Where can we integrate into the Curriculum

Identifies Critical Links and Leverage Points Where Change will Bring the Most Effective Results

Why is it happening? What causes what? Where can change be made?
A **System** is a collection of related parts that interact in an organised way for a purpose.

**Key words:**
- Related
- Organised
- Purpose

Systems are bound together by the **laws of cause and effect**, and governed **by flows of information, energy and materials**.
A House is a System or a “whole”

- It has purpose
- It is organized
- Its parts are interrelated
A Few Familiar Systems

- Your body
- Your car
- Your office
- Our planet
A grouping of stuff that is not...

...interrelated, organized, nor purposeful...

... is a not a system.
A system can be . . .

. . . made up of many sub-systems
Step 1: Identify Cross Systems Linkages

- Using your colored yarn, physically connect your own Compass Point Indicators with Indicators from the other three Compass Points.
Characteristic of Systems

1. Every system has a purpose within a larger system.

2. All of a system's parts must be present for the system to carry out its purpose optimally.

3. A system's parts must be arranged in a specific way for the system to carry out its purpose.

4. Systems change in response to feedback.

5. Systems maintain their stability by making adjustments based on feedback.
Step 2: Develop a Systems Relationship Map - Take the central issue and create a systems map around it on a large piece of flip chart paper or newsprint.

Use the appropriate coloured sticky notes
- Nature = Green
- Society = Yellow
- Economy = Blue
- Wellbeing = Pink

**Note:** On the maps, ‘pressures/drivers’ to the central issue should be on the left side of the paper and ‘responses/effects’ on the right side.

Some elements may sit in the middle as they are connectors between pressures and responses.
Systems Analysis Step 2

Instructions

Step 2: Stick all of your section’s Indicator Post-it Notes onto the big flip chart like below:

Pressures

Responses
Now 2007 - 20 years + 20 years

FACTORIES COMPLYING WITH ENVIRONMENTAL LAWS

LEVEL OF ENVIRONMENTAL AWARENESS

OUTDOOR RECREATION

BIODIVERSITY

ENFORCEMENT OF ENVIRONMENTAL LAWS

INDIVIDUAL HEALTH

ECOLOGICAL GROWTH

RIVER BASED BUSINESSES

CORRUPTION

COMPANIES DOING CSR

ENVIRONMENTAL REGULATIONS

WATER QUALITY IN THE RIVER

FACTORIES COMPLYING WITH ENVIRONMENTAL LAWS

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ECOLOGICAL GROWTH

RIVER BASED BUSINESSES

CORRUPTION

COMPANIES DOING CSR

ENVIRONMENTAL REGULATIONS

WATER QUALITY IN THE RIVER
Systems Analysis: Identifying the relationships & linkages

Instructions

**Step 3:** Next, find the relationship linkages and pathways between all of the indicators from the four Compass Points.
**System Feedback Loops**

- In most cases, changing one factor will impact on another factor, which will then affect the first.

- Feedback will either reduce the impact of the change, or will amplify it.

Source: Adapted from UNDP Young Leaders in Governance Systems Module / LEAD and Sustainability Institute. 2005.
All dynamics arise from the interaction of just two types of feedback loops:

1. **Positive (self-reinforcing):** Positive loops tend to reinforce or amplify whatever is happening in the system.

2. **Negative (balancing or self-correcting) loops:** Negative loops counteract and oppose change.
Reinforcing Loops generate exponential growth

Public support for water conservation → Effort at conservation → Awareness of positive results → Positive Results → Reinforcing Loop

Source: Adapted from UNDP Young Leaders in Governance Systems Module / LEAD and Sustainability Institute. 2005.
Balancing loops create resistance & stability.

Balancing loops tend to counteract changes to systems. They seek goals, provide stability and push towards equilibrium.

![Diagram of balancing loops](image)

Source: Adapted from UNDP Young Leaders in Governance Systems Module / LEAD and Sustainability Institute. 2005.
Step 4: Finding our Curriculum Linkage Entry Point –

1. The next step of the Systems level of the Pyramid is focused on finding the points of connection to our syllabus, or what we call ‘Curriculum Entry Points’.

2. These are places that we can integrate the environmental issue to our curriculum and syllabus. These places will be marked on the system map with small circle, like this:
Pyramid Level 2: Finding Curriculum linkages

Instructions

- Review your syllabus units and learning requirements and work to cross link these to any place in the system diagram that they created.

- Places that they find linkages to their Science or Social Studies syllabus units they should designate with a green dot and also put a post-it note next to it summarizing what the linkage is and to which unit, lesson or standard.

- Pyramid Level 2: Finding Curriculum linkages
  - Social Studies
  - Science
Remember . . .

Environmental Protection = Action
**Action Competence (UNESCO 2002)**

Avoid the belief that awareness leads to understanding, understanding leads to concern, and concern motivates the development of skills and action.

- Consider issues and problems that concern young people
- Explore how these problems can be resolved in the local community or local context
- Action Competence

Start from the questions, issues and problems that concern young people themselves, and help them develop action competence through community-based learning.
Pyramid Level 2: Finding Where to make change

Instructions

3. Next step is to see where in the system that we just mapped out we feel that our school/students could make positive contribution to tackling central environmental issue through an Action Project linked to the syllabus.

4. Mark these place with the symbol:
Small Actions can yield large results

A case of finding the best “leverage point”

“Maybe we should write that spot down.”

Artist: Gary Larson
A story of...

A Naughty Boy...and A Stone
Finding the best Leverage Point

Wanting to make system change . . . Hmmm..
Finding the best Leverage Point

Trying to go straight at the problem . . . Sometimes produces no results . . . Or the wrong results
Finding the best Leverage Point
Better to look around to find a place that would be more easy to make change
Finding the best Leverage Point

But you also need a good idea or ‘lever’ to help you make the change . . .
Finding the best Leverage Point

... At the perfect ‘leverage point’
Finding the best Leverage Point

And with a little bit of effort . . .
Finding the best Leverage Point

... We sometimes can have a ...
Finding the best Leverage Point
BIG IMPACT!
What does a Systems approach give us?

- **Insight**: “Understand components and their links in the system, you will understand its behavior.”

- **Leverage**: “Change a component or link in the system, and you will change the system behavior.”

- **Solution**: “Solving problems almost always involves changing systems (identify and change the limiting factor.”
ESD Attributes

Step 5: Knowledge, Skills Value and Perspectives –

1. What are the **Knowledge, Skills, Values and Perspectives** that your students should possess to fully understand and work towards solving the environmental problem.

2. Refer to Worksheet 7 page 25 in your guidelines document.

3. Take 20 minutes to answer these as best you can?
Pyramid Level 2 Construction

Step 5: Feedback loop

1. Record your primary ‘feedback loop’ on the appropriate coloured Post-it notes.
2. Stick on your Pyramid Panel sides
3. Construct level 2 of the Pyramid
Pyramid Level 3: Ideas ... for environmental protection related lesson. What can we do?

Generates New Ideas with the Power to Create Transformative System Change

What kinds of change would be most effective ... for the whole system?
Pyramid Level 3: Ideas Brainstorming

Step 1: Reflective Questioning

- Each person to think about the key insights from the previous systems level.
- Try to answer to following two questions:

  1. What can I do involve students in helping to solve this environmental issue at my identified ‘leverage points’?

  2. Exactly how does this environmental issue link with my curriculum / syllabus?

  3. Can I Integrate an Action Component into my curriculum and standards?
Project based Learning – Starting with the End in Mind

Video

Source: http://pbl-online.org/pathway2.html
Step 2: System Scoping

1. Each person pick one Leverage Point and one Curriculum Linkage point, and develop a list of ideas under the following three areas . . .

- Possible teaching methodologies and approaches I/we could use at this place.

- Locations for teaching at this place (i.e. classroom, school grounds, in the community, etc.)

- Curriculum standards you can incorporate or link to here
Step 2: Lesson Idea Brainstorming

1. Each person brainstorm as many lesson ideas as you can for one curriculum entry/linkage point and at one system ‘leverage point’, and write each idea down on a sticky note.
2. Post the notes on a flip chart and try to cluster them.
3. Share your ideas with your team members and discuss the pros and cons.
4. See were you can combine ideas together.
5. Write each final Lesson idea on a Post-it note and construct Level 3 of the Pyramid.

What Learning Approach do I want to take?

Since we are dealing with Environmental Protection, as mentioned before, this usually translates into some type of action or behaviour change outcome.

Thus, we must contemplate the approach we will take with our lesson. Do we take a . . .

• . . . Project-based Learning Approach (PBL) with an Action component;; or
• . . . an Experiential Learning approach with no action component?
Pyramid Level 4: Strategy . . . and lesson Planning. How can we do it?

How do we effectively implement? What will it take to succeed?

Connects Directly to Implementation Planning using Cultural Change Theory
Project Design

Design Principle # 1
Begin with the End in Mind

Design Principle # 2
Craft the Driving Question

Design Principle # 3
Plan the Assessment

Design Principle # 4
Map the Project

Design Principle # 5
Manage the Process

Source: http://pbl-online.org/pathway2.html
Pyramid Level 4: Strategy . . . and lesson Planning. How can we do it?

Six Steps to Help You Begin Planning

1. Develop a Lesson / Project Idea
2. Decide the scope of the lesson (or project)
3. Select Standards
4. Incorporate simultaneous outcomes
5. Work from lesson design criteria
6. Create the optimal learning environment
A Proposed ESD Lesson Framework

1. Thematic Topic Area: (example: Water Pollution)
2. Science / Social Studies Syllabus Linkages
3. Key Concepts that can be elaborated from this thematic topic
4. Essential or Driving Question of the Lesson
5. Focus, Bridge and Process Questions
6. Lesson Assessment Questions
7. Interdisciplinary Links / Strands to Keep In Mind
8. What do we want the students to learn? –
9. Activity Description
10. Activity Outline in Relation to Key Learning Modalities
11. Learning Assessment
12. References & Resources for this lesson
13. Action Component
Crafting a Driving Question

- A good Driving Question makes a lesson or project intriguing, complex, and problematic. Although standard classroom assignments, like story problems and essays, pose questions that students must answer, a Driving Question requires multiple activities and the synthesis of different types of information before it can be answered.

- Coherence It brings coherence to disparate project activities and serves as a "lighthouse" that promotes student interest and directs students toward the project's goals and objectives.

- Authenticity - Driving Questions should address authentic concerns. For example, when creating the Driving Question it is useful to ask yourself: "Where is the content I am trying to teach used in the real world?" Although it is usually easier to focus students' attention on a single question, some topics will require multiple Driving Questions.
BALTIC 21 used PYRAMID to successfully create a new sustainable development strategy for the entire 11-nation region of Northern Europe.
Open Discussion on Methodology and Process

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Thank you for your participation!

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