



## School As A Teaching Tool – Credit IDC 3 – Rochester School

### **Intent**

To integrate the sustainable features of a school facility with the school's educational mission.

### **Requirements**

Design a curriculum based on the high-performance features of the building, and commit to implementing the curriculum within 10 months of LEED certification. The curriculum should not just describe the features themselves, but explore the relationship between human ecology, natural ecology and the building. Curriculum must meet local or state curriculum standards, be approved by school administrators and provide 10 or more hours of classroom instruction per year, per full-time student.

### **Rochester Strategy**

Rochester School is committed to teaching environmental education, outdoors education, sustainable education, and conservation education through its Pre-K through 12<sup>th</sup> curriculum and the use of its campus and through liaisons with universities so that they can use the school's campus for their curriculum.

Rochester School as a teaching tool, main activities are described as follows:

### **Construction & Pre-operational Phase:**

During the construction phase, Rochester school hosted field visits from Pontificia Universidad Javeriana's "LEED Course" (USGBC Education Provider since December 2012), Colegio Mayor de Cundinamarca University, ASHRAE Colombia chapter, and SENA (National Learning Service), including architects, engineers (civil, mechanical, electric, environmental), ecologists, business administrators, lawyers, and parents from Rochester School, in order to explain the main goals of the project and its construction sustainable strategies applied and how environmental impacts were reduced or mitigated. 160 professionals (Architects, Engineers, Ecologists, Business Administrators, others), 23 Building Technician Students and 20 senior high students attended those field visits.



LEED Course – Pontificia Universidad Javeriana  
October, 2011



Colegio Mayor de Cundinamarca  
March, 2012



LEED Course – Pontificia Universidad Javeriana  
May, 2012



Green Apple Day of Service  
September, 2012



SENA – Building Technician Students  
November, 2012



SENA – Building Teachers  
March, 2012



LEED Course – Pontificia Universidad Javeriana  
ASHRAE Colombia Chapter  
November, 2012

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## **Operational Phase:**

### **General Guidelines**

Rochester School has a high social and environmental responsibility related to development of attitudes, values and ethics, focusing on the environmental problems affecting and guiding global scope. Acquisition of knowledge and incorporation of values and ethics are configured within its educational project, which includes environmental and conservation guidelines. The faculty and the rest of the staff are interested in using the new infrastructure and facilities as a teaching tool initially based on a Master of Science graduation project for the Department of Marine and Environmental Systems at "Florida Institute of Technology" in 2009, proposed by Eng. Juan Pablo Aljure, Rochester School Principal, called "Proposed Energy Curriculum Guidelines for K-12 Schools in Colombia". These curriculum guidelines are based on a sustainable and ethical use of energy.

To achieve this proposal, the following goals have been established:

1. Develop the curriculum guidelines referring to the sustainable and ethical energy use for K-12 grades in educational institutions. This includes prospective learning tools for all grade levels and specific learning expectations at the end of 2<sup>nd</sup>, 5<sup>th</sup>, 8<sup>th</sup>, and 12<sup>th</sup>, to aid teachers in their unit plans. This document responds to the Colombian needs on the rational and efficient use of energy legislation, but it pursues a higher scope, sequence, continuity, and balance.
2. Design the implementation of the curriculum guidelines through grade level projects that integrate most of the subjects like English, Spanish, Natural Science, Computer Science, Social Science, and arts.

These guidelines also take into account the following national guidelines and policies: Colombian Energy and Mining Ministry national plan that includes the educational sector; Congress National Law 697 (October 3<sup>rd</sup> from 2001) regarding rational and efficient use of the energy; Education Ministry Decree 1743 (August 3<sup>rd</sup> from 1994) regarding Environmental School Projects (PRAE in Spanish),

Rochester School has designed the following projects for different environmental topics and grade levels as follows, which are being developed through the different subject teachers of each grade level and for a minimum of 30 hours in the first year:



Strand	Topic	Subtopic/Objective	Project	Levels
ENERGY	Ethical and sustainable use of Energy	Solar panels and electric power generators To evaluate the difference between: using alternative energy sources and their respective technological advances in energy reduction, their environmental advantages, and their cost reduction benefits	Solar energy as an electricity source for Rochester School.	All levels
			The role played by the school's gardens, in relation to its photosynthesis process.	Lower 1&2, Mid & High School 1&2
			Evaluating the Energy consumption recordings, obtained from electrical devices used at Rochester School.	High School
			What environmental advantages are offered by LEDS, as our luminosity source, used at Rochester School?	High School
			What use do we give our solar panels at Rochester School?	All levels
			What environmental and health advantages, are offered by using solar panels at Rochester School?	All levels
			What alternative energy sources does Rochester School use?	All levels
			Rochester School's rational use of energy and its response to reducing Global Warming.	High School
			Awareness of alternative generators of energy, and how they can be used at Rochester School	Mid & High School 1&2
			How does Rochester School help in the conservation of our environment and its carbon print, by using renewable energy sources?	Mid & High School 1&2
			Rochester School's greenhouse effect gas emission recordings and evaluation	High School
Monitoring Rochester School's energy consumption.	High School			

Strand	Topic	Subtopic	Sample Projects	Levels		
CONSERVATION	Landscaping	School's gardens and the Torca forest  To appreciate indigenous species of flora, set in Rochester School's green areas. This can promote a sense of social and cultural appropriation toward environmental responsibility, among the students, thus forming new concerns in conservation and ecological restoration. These can be incorporated in their daily activities, both in and out of school.	Illustrated guide of Rochester school's indigenous species of flora, including its direct surroundings and the high Andes' forest.	All levels		
			The vegetation's role in retaining and gathering water.	All levels		
			Environmental service offered by Rochester, surroundings and the high Andean forest's.	High School		
			Adoption of Rochester School's TREES.	All levels		
			Rochester School's flora as a natural resource to harvest Carbon Dioxide	High School		
			The flora's potential as natural purifiers of air	Mid & High School 1&2		
			How was Rochester School's construction built?	Mid & High School 1&2		
			How has the 'Lote Olguita' transformed through time?	High School		
			How does Rochester School relate to the local and regional High Andean ecosystem?	High School		
			Constructive behavior toward Rochester School's gardens	All levels		
	Urban Entomology	School's gardens and the Torca forest  To understand the role of invertebrates; observed and studied in Rochester School's grounds, and how they maintain and enhance the natural ecosystem.	A Guide of Anthropoids and their importance for Rochester School, its surroundings and the High Andes forest	All levels		
			A study of the indigenous flora and their capacity to attract pollinating insects toward Rochester School	All levels		
			Awareness of benign insects, in order to develop an integral management of pest removal among Rochester School's orchard.	All levels		
			Behavior comparisons between social insects at Rochester School and the five elements of cooperative learning.	High School		
			Environmental importance of invertebrates at Rochester School.	High School		
			Composting	Compost location and Worm composting  To take advantage of a decomposition process of matter and their nutrient cycle, using compost and worm compost techniques; to give an adequate management of organic residues from Rochester School's activities, and to reduce the environmental impact caused from daily activities.	Organic residues as a source of organic fertilizers	Mid & High School 1&2
					The decomposition process of organic matter, as a source of organic fertilizer.	Mid & High School 1&2
					Compost heaps as a global warming protector	All levels
					Compost's financial benefits for Rochester School.	High School
					How do worms process our organic residues?	All levels
	Analysis of organic residues, produced in the Audeteria, discovering its values for compost and humus.	Mid & High School 1&2				
	Quantifying of organic residues; compost and humus produced at Rochester School	High School				
	How do microorganisms participate in the process of organic matter decomposition?	High School				
	Relationship between the cycle of nutrients and the minimization of environmental impact, generated by the organic residues produced daily at Rochester School.	Mid & High School 1&2				
	Analyze Rochester School's vegetable garden's soil composition	High School				
	When using Rochester School's organic residues, all compost procedures must be monitored	Mid & High School 1&2				





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CONSERVATION	Urban agriculture	School orchard	Build our greenhouse to sow native plant species.	Preschool, Lower 1&2		
		To implement different types of organic agriculture and permaculture for the growth of vegetables in Rochester School's orchard and to serve as a hands-on learning tool.	Study the decomposition process of organic matter in Rochester School's surrounding areas.	Mid & High School 1&2		
			Design and build Rochester School's hydroponics system	Mid & High School 1&2		
			Take advantage of residues, generated by the school, to build our orchard.	Preschool, Lower 1&2		
	SOLID RESIDUE TREATMENT	Solid residue collectors and containers	Quantifying of inorganic residue, generated by our Rochester School.	Mid & High School 1&2		
			What types of inorganic residue does Rochester School generate?	All levels		
		*To prevent contaminating natural surroundings due to inadequate management of solid residue, by minimizing its volume, residue classification, adequate storage, treatment (if necessary) and disposal.  *To reduce the production of solid residue, by putting into practice proposals and projects, which aim to reduce residue produced daily at Rochester School.  *Replace products with contaminant packaging, sold in Rochester School, with environment-friendly substitutes.  * Pour and dispose of liquid residue in a rational way; respecting necessary environmental neutralizing norms.	Social and environmental impacts created by consumer goods used in Rochester School	High School		
			The environmental impact of inorganic residues generated in Rochester School.	All levels		
			Learn how to separate organic residue.	All levels		
			Alternatives for the reduction of consumer goods at Rochester School	All levels		
			Reusing objects, which others have no need for, at Rochester School	All levels		
			How can I recycle products, I use at Rochester School, which I do not need anymore?	All levels		
			What kind of plastic receptacles, used at Rochester School, can we recycle?	All levels		
			Making our own paper at Rochester School.	Preschool, Lower 1&2		
			How well do we use our Rochester School's residue collectors?	All levels		
			Recycling Rochester School's inorganic residue to create useful objects.	All levels		
			Appropriate handling of residue generated by our Auditoria.	All levels		
			BIRDS	School gardens and Torca forest.  To promote among Rochester School students, with the use of interactive activities and observation, a systemic, constructive and reflexive responsibility; related to the threats affecting different bird species which frequent Rochester School, and surroundings.	Illustrated guide of bird species present at Rochester School, surrounding areas and the High Andes forest.	All levels
					How is the native flora used in the school's landscaping, related to the presence of bird species, in creating a biological corridor?	All levels
					What relationship exists between our environment's health and the presence of birds within Rochester School?	All levels
Build bird feeding trays for Rochester School's bird life.	All levels					



Strand	Topic	Subtopic	Sample Projects	Levels
AIR AND TEMPERATURE	Air and Temperature Quality	Classroom, Buildings, Auditoria and Administration building.  To measure the importance of Rochester School's air quality, both indoors and outdoors, understanding its relationship to integrated health.	Exploring Rochester School's Air quality.	All levels
			How does the bioclimatic (air & temperature) quality in Rochester School's classrooms enhance the learning process?	Mid & High School 1&2
			How do we manage Rochester School's air quality and temperature?	Mid & High School 1&2
			What type of substances and building materials were used in Rochester School, so as not to affect our air quality?	Mid & High School 1&2
			Rochester School's air quality.	All levels



## Implementation

During the 2012-2013 school year, Rochester School has successfully implemented the following integrated projects:

### Pre-Kindergarten

#### Title: Nature's Carnival

This project was based on the students' interests. We also took into account the learning expectations and virtues development.

The children researched about native plant species of the school campus with the collaboration of their parents. They also did presentations about their findings to the community, improving their communication skills and knowledge.

The objective of our project is to use the school's facilities as means to get to know and understand our natural environment and how to take care of it.



### First Grade

#### Title: Native Plants at Rochester School

First grade's integrated project is called "NATIVE PLANTS AT ROCHESTER," which seeks students' development of environmental awareness through the understanding of existing biodiversity in our school by researching and working cooperatively. Integrating various subjects, students conducted interactive activities (planting, taking care of plants, and others), observation, responsible and reflective thinking about the biodiversity in their school and surrounding areas.

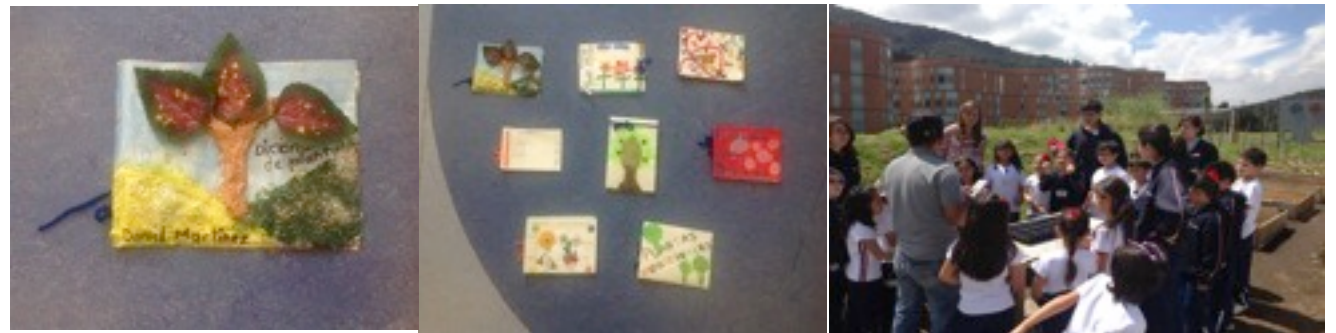




## Second Grade Title: Herbal tea infusion

Second graders explored the uses of native medicinal plants that can be found in our campus and geographical area. They started by recognizing the medicinal plant species that grow at school. They then researched five other species that teachers and students choose from a list. The students presented the results to the community about their uses, ways to cultivate them, how to take care of them, and how to identify them.

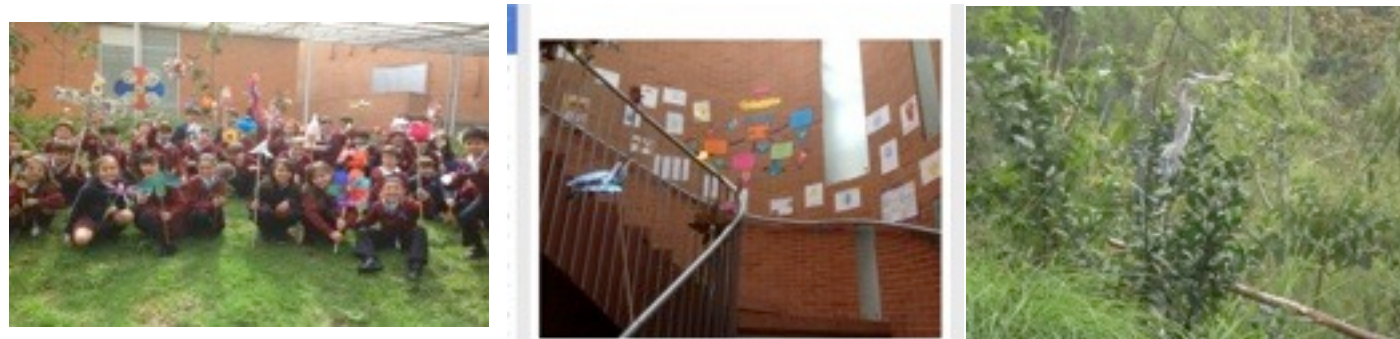
They used the school's orchard once a week to cultivate their own medicinal plants mainly through English, Math, and Science class. They kept records of what they observed and shared with friends. At the end of the project they shared some of them in tea bags through the school's infirmary.



## Third Grade Title: Hungry Birds

Our integrated project "Hungry Birds" is the opportunity in which third graders learn more about birds from Bogota's Savannah. With the support of every subject, containing a variety of activities that allow students to perform in different ways such as drawing, writing, singing, reading, retelling and investigating.

The project is divided into four topics: 1) Growing out of the nest; 2) Nests; 3) Gardens; and 4) Bird feeders.





## **Fifth Grade**

### **Title: Recycling Bottles for the Green House**

During the year 2012-2013, the students at the end of Upper Elementary at Rochester School have been developing an integrated project that has set its main goal to increase students' awareness of the ecological impact of human residues; this led to the development of collaborating and caring attitudes that helped decrease this impact, which in turn helped reduce the landfill disposal of plastic bottles. Throughout the school year the Fifth Graders performed different activities using reusable material to produce a variety of decorating ornaments displaying their creativity such as: Christmas decoration, candle holders, and a beautiful big Christmas tree, among others. Currently the students are collecting used bottles to make a green house for the school. In addition they have implemented different activities using the English language to hold campaigns and awareness brigades in oral and written texts that wish to expand this ecological concern to the different members of our community.



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